Low Birth Weight and Underweight Association in Children Aged 6-59 Months in Palembang, Indonesia: A Cross-Sectional Study

by Indah Sari

Low Birth Weight and Underweight Association in Children Aged 6-59 Months in Palembang, Indonesia: A Cross-Sectional Study

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Abstract—Underweight and low birth weight are important markers for The Global Nutrition Targets in 2025, expressed especially in newborns, with a 30 percent reduction in between 2012 and 2025. This study was, therefore, aimed to comprehensively analyzing the association between low birth weight and underweight, as well as other influencing factors. In addition, a community based cross-sectional study was conducted to determine the prevalence of underweight among children between the ages of 6 to 59 months in Seberang Ulu I subdistrict of Palembang, with the sample being women with children that satisfied the inclusion criteria. These include wards that were either the first or last child in the family and single birth, while families that have moved and mothers who refused to join this study were excluded. Furthermore, the sample consisted of about 114 eligible mothers, selected using simple random sampling technique. Data were collected during house visits by face-to-face interviews using a structured interviewer-administered questionnaire and anthropometric measurements using weight sclaes. Univariate, bivariate using chi-square test and multivariate using multiple logistic regression were performed in this study. The results showed that a higher risk for children with low birth weight to become underweight, in contrast with normal babies, after controlling by diarrhoea & ARI in the last 1 month, mother's hand washing practice, availability of latrine and household monthly income (p-value<0.05). Furthermore, a balanced nutrition during pregnancy and regular hand washing practices by mothers tend to also prevent the occurrence of infectious disease, subsequently reducing the incidence of underweight in children under the age of five. Therefore, it is suggested that regular hand washing practice is encouraged, in order to promote a healthy lifestyle.

Index Terms—underweight, low birth weight, Palembang

I. INTRODUCTION

A newborn's weight at birth is an important marker of maternal health, fetal health and nutritional status. Globally, one in seven livebirth (20.5 million babies) suffered from low birth weight in 2015. A 30 percent reduction in between 2012 and 2025 is one of The Global Nutrition Targets that would save lives and fuel the achievement of other nutrition targets, including the reduction of stunting, wasting and underweight [1]. In addition, approximately 165 million children under the age of 5 years are stunted, 99 million are underweight, and 51 million are wasted in the world [2].

Indonesia is one of the countries in Southeast Asia, faced with the problem of underweight with a fluctuation in values recorded from 2007 (18.4%), 2010 (17.9%), 2013 (19.6%) and 2018 (17.7%), and also low birth weight, which exhibited a steady decline in 2007 (11.5%), 2013 (10.5%) and 2018 (6.2%), according to the Health Basic Research. Furthermore, the predominance of low birth weight in South Sumatera (6.8%) was observed to be higher than the national level in 2018 (6.2%) [3], [4], while underweight was slightly lower (at 17.2% vs 17.7%) although there was an increase of about 3.1% between 2016 and 2017 in Palembang, the capital of South Sumatera [4], [5]. Furthermore, Seberang Ulu I was identified as one of the subdistricts with the third highest prevalence of underweight, therefore, it was selected for study purposes.

Previous studies reported that low birth weight in newborn can be a risk factor of underweight among children under the age of five [6]–[11]. In addition, others include, gender [2], [10], [12]–[18], age of the child [9], [10], [12], [17]–[23], early complementary food feeding [15], [18], diarrhoea & ARI in the last 1 month [2], [14], [15], [21], [22], [24]–[28], mother's hand washing practice [29], availability of latrine [13], [15], [21], household monthly income [17], [22]. This study was, therefore, aimed to comprehensively analyze the association between low birth weight and underweight, as well as other influencing factors. Also, the research is intended to identify the disease prevalence amongst children in Seberang Ulu I subdistrict of Palembang, South Sumatera, Indonesia.

II. METHOD

A community based cross-sectional study was conducted to determine the prevalence of underweight, low birth weight and other associated factors amongst children between the ages of 6 to 59 months. This study took place from 1st to 30th August, 2019 at Seberang Ulu I subdistrict. The populations were all mothers of children under the age of five in Palembang as study population. Samples were mothers of children between the ages of 6 to 59 months who fulfilled the inclusion criteria, such as single birth and those that are either first or last born in the family. Families that have moved and mothers who refused to join this study were excluded. The sample size was subsequently calculated using the hypothesis tests for two population proportions. In a previous study, the prevalence of underweight with low and normal weight among children under the age of

five was 42% and 18%, respectively [10]. Therefore, given the 95% confidence intervals (CI) and the 80% power of the test, the final sample size included 114 of eligible mothers, selected using simple random sampling technique.

Data were collected during house visits by face-to-face interviews using a structured interviewer-administered questionnaire and anthropometric measurements. This was divided into five parts for the ease of response, assuring the systematic nature of the tool was maintained. Furthermore, part A and B outlined the socio-demographic characteristics e.g., household monthly income and the practice of early complementary food feeding, while C and D focused on the children characteristics, encompassing age, gender, birth weight, presence or absence of diarrhoea/ARI in the last one month, and environmental factors, e.g., availability of latrine and the mother's hand washing practice, and finally, part E was centered on children weight measurement (anthropometric) using weight scales.

The dependent variable was nutritional status in children aged between 6 to 59 months, measured using anthropometric indices which were expressed as the number of standard deviation (SD) units (Z-score) from the median of the reference population, through which the 2006 WHO Child Growth Standards were calculated. In addition, children with weight-for-age-z-score (WAZ) <-2SD were categorized as underweight, and coded 0, while those with values of -2SD to +2SD were grouped as normal, and coded 1.

The birth weight was considered as the main independent variable or the main risk factor, because of the study focus, and children with birth weight <2500 grams were classified as low birth weight (coded 0) and ≥2500 grams was termed normal (coded 1). Gender was coded (0) for male and (1) for female, while age categorization include 24 to 59 months (coded 0) and 6 to 23 months (coded 1). The practice of early complementary food feeding were categorized as yes, assuming that the children were fed before 6 months (coded 0), and no, on instances where it was totally avoided till after 6 months old (coded 1). Moreover, children that suffered diarrhoea or/and ARI in the last one month were grouped as yes (coded 0), and no (coded 1), while the section for mother's hand washing practice consisted of several questions, including; frequent hand washing with soap, under flowing water, before meal preparations, after coming in contact with money, animals, or gardening, after using the toilet, touching insecticide, and before breastfeeding babies. The affirmation with all options, was classified as good (coded 1), and not good (coded 0) on instances where one has a negative answer. Availability of latrine were categorized as no (coded 0) and yes (coded 1). Household monthly income were coded 0 as below minimum wage in Palembang City (<205.5 USD) and coded 1 as minimum wage and above (≥205.5 USD).

To explore the association between low birth weight and underweight and also other factors, risk ratio (RR) of underweight comparing children with low birth weight and normal weight was calculated from 2x2 table consisting of underweight variable in the column and birth weight status in the row (unadjusted). However, logistic regression models were used in multivariate analysis (RR adjusted and 95% CI) to control the confounders, with p-value < 0.05, declared as a significant association, while the analysis was conducted using "binreg" command in the statistical software package.

III. RESULTS

Table I present the distribution of children between the ages of 6 to 59 months by backgorund characteristics.

TABLE I

Distribution of children between the ages of 6 to 59 months by backgroud characteristics

Variables	Total (n)	Percent
Underweight		
Underweight	34	29.8
Normal	80	70.2
Birth Weight		
Low Birth Weight (LBW)	17	14.9
Normal	97	85.1
Gender		
Male	53	46.5
Female	61	53.3
Age of the Child		
24-59 months	75	65.8
6-23 months	39	34.2
Early complementary food feeding		
Yes	86	75.4
No	28	24.6
Having diarrhoea or/and ARI in the last 1 month		
Yes	47	41.2
No	67	58.8
Mother's hand washing practice		
Not Good	82	71.9
Good	32	28.1
Availability of latrine		
No	11	9.6
Yes	103	90.4
Household monthly income		
<205.5 USD	63	55.3
205.5 USD and above	51	44.7
Total	114	100.0

Source: Primary Data, 2019

Based on Table I, the prevalence of underweight and low birth weight children was about 29.8% and 14.9%, respectively, with the females being 7% more than males, where 68.5% were between the age of 24 and 59 months. Furthermore, about 75.4% had received complementary food earlier than 6 months, while 41.2% had experienced of diarrhoea or/and ARI in the last one month. However, the hand washing practices of mothers was not good at 71.9%, and 9.6% of households without latrine, while 55.3% of families had an average monthly income that was below the minimum wage in Palembang City (<205.5 USD).

Table II showed that children with LBW have a higher percentage of underweight compared to those with normal weight. Amongst children with LBW, 70.6% are underweight, while among children with normal weight, 22.7% are underweight. Beside that, female children have a higher percentage of underweight (31.1%) compared to male (28.3%). Children aged 24-59 months have a higher percentage of underweight (33.3%) than children aged 6-23 months (23.1%) too. Mothers who gave early complementary food feeding (31.4%), children with having diarrhoea or/and ARI in the last 1 month (42.6%) and mother's with not good hand washing practice (32.9%) have percentage of children with underweight higher than else.

However, household with latrine, have a proportion of children with underweight (26.2%) lower than household without latrine (63.6%) and percentage children with underweight amongst household with monthly income <205.5 USD (38.1%) higher than household with monthly income 205.5 USD and above (19.6%).

TABLE II
Low birth weight and associated risk factors of underweight among children between the ages of 6 to 59 months

Variables	Categorized	Number of risk	% Underweight	RR (95 % CI)*
Birth Weight	LBW	12	70.6	3.11 (2-5.02)#
	Normal	22	22.7	Ref
Gender	Male	15	28.3	0.91 (0.52-1.60)
	Female	19	31.1	Ref
Age of the Child	24-59 months	25	33.3	1.44 (0.75-2.78)
	6-23 months	9	23.1	Ref
Early complementary food feeding	Yes	27	31.4	1.26 (0.62-2.56)
	No	7	25.0	Ref
Diarrhoea or/and ARI in the last 1 month	Yes	20	42.6	2.04 (1.15-3.61)#
	No	14	20.9	Ref
Mother's hand washing practice	Not good	27	32.9	1.56 (0.73-3.11)
	Good	7	21.9	Ref
Availability of latrine	No	7	63.6	2.43 (1.39-4.22)#
	Yes	27	26.2	Ref
Household monthly income	<205.5 USD	24	38.1	1.94 (1.03-3.68)#
	205.5 USD and above	10	19.6	Ref

*Risk Ratio (RR) (95 % confidence interval (CI)) unadjusted
#Sig < 0.05
Ref: reference

Table II present the association between low birth weight and other associationg factors with underweight in children between the ages of 6 to 59 months. This study has found a positive association between LBW, diarrhoea or/and ARI in the last 1 month, availability of latrine and household monthly income with underweight among children between the ages of 6 to 59 months in Seberang Ulu I subdistrict of Palembang. Meanwhile, gender, age of the child, the practice of early complementary food feeding and the mother's hand washing practice had no correlation. Table III further indicates that gender, age of the child and the practice of early complementary food feeding as non-confounders in this multivariable logistic model. Therefore, low birth weight and underweight association among children was statistically significant, after adjusting diarrhoea or/and ARI in the last one month, mother's hand washing practice, availability of latrine and household monthly income, simultaneously (RR: 3.55; 95% CI: 2.46-5.12).

TABLE III
Multivariable logistic model low birth weight and underweight association among children between the ages of 6 to 59 months

Variables	Categorized	RR (95 % CI)*	RR (95 % CI)**
Birth Weight	LBW	3.11 (2-5.02)#	3.55 (2-5.12)#
	Normal	Ref	Ref
Gender	Male	0.91 (0.52-1.60)	-
	Female	Ref	-
Age of the Child	24-59 months	1.44 (0.75-2.78)	-
	6-23 months	Ref	-
Early complementary food feeding	Yes	1.26 (0.62-2.56)	-
	No	Ref	-
Diarrhoea or/and ARI in the last 1 month	Yes	2.04 (1.15-3.61)#	1.76 (1.19-2.59)#
	No	Ref	Ref
Mother's hand washing practice	Not good	1.56 (0.73-3.11)	2.12 (1.41-3.19)#
	Good	Ref	Ref
Availability of latrine	No	2.43 (1.39-4.22)#	1.99 (1.32-3.00)#
	Yes	Ref	Ref
Household monthly income	<205.5 USD	1.94 (1.03-3.68)#	1.89 (1.13-3.17)#
	205.5 USD and above	Ref	Ref

* RiskRatio (RR) (95 % confidence interval (CI)) unadjusted
**Risk Ratio (RR) (95 % confidence interval (CI)) adjusted
#Sig < 0.05

IV. DISCUSSION

The prevalence of underweight and LBW were 29.8% and 14.9%, respectively, where 70.6% of children with LBW had a higher proportion of suffering from underweight, in contrast with the normal weight (22.7%). This study has determined the association between LBW and underweight among children between the ages of 6 to 59 months in Seberang Ulu I Palembang while adjusting for other risk factors. This study has analyzed that the risk of being underweight among children between the ages of 6 to 59 months was found to be minimum 48% higher in children with LBW than normal birth weights after controlling for other factors in a multivariable model. The risk of underweight among children with LBW was 3.6 times higher as compared to those children with normal weight after controlling for other factors such as diarrhoea or/and ARI in the last 1 months, mother's hand washing practice, availibility of latrine and household monthly income. Furthermore, it was established that the result was consistent with previous studies [6]–[8], [12].

Association between LBW and underweight can influenced by diarrhoea or/and ARI (Acute Respiratory Infection) also. This study has found that 71.4% children suffering underweight from whose with LBW and 37.5% from whose with normal weight among children who have diarrhoea or/and ARI in the last 1 months (RR: 1.90, 95% CI: 1.03-3.53). In addition, the prevalence of underweight amongst children with LBW was about 72.2% and about 26.8% from whose normal weight among children with mother's hand washing practice was not good (RR: 2.72; 95% CI: 1.60-4.60). This study found that children whose the mother's hand washing practice were not good (43.9%) have higher proportion of diarrhoea than those with mother's that had good hand washing practice (34.4%). This result was supported by the findings of Girma et al. [29] which revealed that underweight were associated with improper personal hygiene of mothers. This is because of washing hands at critical times prevent various communicable disease. Only 69.3% of mothers practiced good hand washing with soap, while 89.5% washed hands before meal preparation. It means that not all of mothers who washing their hand with soap and before preparing food. Hand washing with soap and before preparing food can interupt the transmissing of feco-oral microbes in the domestic environment. This finding showed that mothers and family members should be given health education to improving hand washing practice and personal hygiene in order to prevent diarrheal diseases and other infection of communicable diseases.

This study also found that the prevalence of underweight in children with low and normal birth weight was about 51.6%, and 25.0%, respectively, amongst those living in household with monthly income that is <205.5 USD (RR: 2.06 ; 95% CI: 1.60-4.60). Rahman et al. [12] stated that children with LBW have higher proportion of underweight than normal weight in families with varying monthly income, encompassing; poorest (at 65.6% vs 47.2%), poorer (at 55.7% vs 39.3%), middle (at 52.1% vs 33.5%), richer (at 45.4% vs 24.4%), and richest (at 34.4% vs 18.5%). Finally, household monthly income was identified as one of indirect factors that influenced nutrition intake among children under the age of five.

V. Conclusion

Based on the results and the discussion, it is concluded that LBW increasing the probability of children to suffering underweight during first five years of life. Baby who was born with LBW had higher risk of underweight than those with normal birth weights. Furthermore, its prevention is possibly attained by improving a mother's personal hygiene.

VI. Acknowledgment

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