



## Household Factors Associated with Underweight in Children 24-59 Month in Urban and Rural in Indonesia

### *Faktor Rumah Tangga yang Berhubungan dengan Kejadian Underweight pada Anak 24-59 Bulan di Perkotaan dan Pedesaan di Indonesia*

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#### ABSTRACT

The underweight still remains a public health problem for toddlers in Indonesia. The purpose of the study to identify the factors related to the underweight incident for toddlers at 24-59 months in urban and rural areas of Indonesia. This research used cross-sectional study design. This study used secondary data on the Total Diet Study-Individual Food Consumption Survey of 2014. The sample size in this study was 5165 toddlers from 24-59 months and distinguished by urban and rural areas. Bivariate Analysis used chi square. This study estimates that 20.3% of children aged 24-59 months were underweight with a greater proportion in rural areas 22.5%. Significant factors related to the underweight incidence in the urban and rural areas were the father's education level (urban;  $p = 0.02$  and rural;  $p = 0.005$ ) and mother's education level (urban;  $p = 0.001$  and rural;  $p = 0.005$ ), number of household members (urban;  $p = 0.03$  and rural;  $p = 0.012$ ), and energy adequacy level (urban;  $p = 0.012$  and rural;  $p = 0.005$ ). The factor that was estimated to be significantly related to the underweight incidence just in rural areas as children's age ( $p = 0.012$ ), the total number of children in one house ( $p = 0.047$ ). Multisectoral collaboration is needed to reduce nutritional problems, especially in rural areas. The efforts to improve community nutrition by improving the socio-economic condition of the community should be based on regional capabilities and local wisdom in the region.

**Keywords:** Toddlers, urban-rural, household, underweight

#### ABSTRAK

*Underweight (kekurangan berat badan) masih menjadi masalah kesehatan masyarakat pada balita di Indonesia. Tujuan penelitian ini untuk mengidentifikasi faktor-faktor yang berhubungan dengan insiden underweight pada balita usia 24-59 bulan di daerah perkotaan dan pedesaan di Indonesia. Penelitian ini menggunakan desain studi cross sectional. Penelitian ini menggunakan data sekunder Studi Diet Total-Survei Konsumsi Makanan Indonesia tahun 2014. Ukuran sampel dalam penelitian ini adalah 5165 balita usia 24-59 bulan dan dibedakan berdasarkan daerah perkotaan dan pedesaan. Analisis bivariat menggunakan uji chi-square. Studi ini menunjukkan bahwa 20,3% anak-anak berusia 24-59 bulan memiliki berat badan kurang dengan proporsi yang lebih besar di daerah pedesaan 22,5%. Faktor-faktor yang berhubungan secara signifikan terkait dengan kejadian kekurangan berat badan di daerah perkotaan dan pedesaan adalah tingkat pendidikan ayah (kota;  $p = 0,02$  dan desa;  $p = 0,005$ ) dan tingkat pendidikan ibu (kota;  $p = 0,001$  and desa;  $p = 0,005$ ), jumlah anggota rumah tangga (kota;  $p = 0,03$  dan desa;  $p = 0,012$ ), dan tingkat kecukupan energi (kota;  $p = 0,012$  dan desa;  $p = 0,005$ ). Faktor yang berhubungan secara signifikan dengan kejadian kekurangan berat badan hanya di daerah pedesaan adalah usia anak-anak ( $p = 0,012$ ), jumlah total anak dalam satu rumah ( $p = 0,047$ ). Kolaborasi multisektoral diperlukan untuk mengurangi masalah gizi terutama di daerah pedesaan. Upaya meningkatkan gizi masyarakat dengan meningkatkan kondisi sosial ekonomi masyarakat harus didasarkan pada kemampuan daerah dan kearifan lokal di wilayah tersebut.*

**Kata kunci:** Balita, perkotaan-pedesaan, rumah tangga, kekurangan berat badan

## INTRODUCTION

Today's children are tomorrow's world, a generation that is expected to become quality human resources when they grow up. However, unwittingly children have lost that hope. Hunger and malnutrition threaten them. Indonesia, as a developing country, has one of the problems of malnutrition, namely underweight. Underweight is body weight that is too low for a normal healthy child. Index Weight based on age used to assess children who are underweight or severely underweight. Weight index based on age describes the relative body weight compared to the age of the child. In general, a child is underweight if he or she have z-score weight for age in  $-3SD$  until  $<-2SD$  and severely underweight if child have z-score weight for age in  $<-3SD$ .<sup>1</sup>

The impact of malnutrition for toddlers is related to a decrease in brain, physical, mental development and will affect the decrease in cognitive function, decrease in body immunity, which causes a decrease in the quality of human resources in the future, as well as an increased risk of metabolic diseases as adults and increased morbidity and mortality.<sup>2</sup> The prevalence of underweight in Southeast Asia was 26.4% in 2007-2014,<sup>3</sup> while the incidence in the world up to 2017 was 13.5%.<sup>4</sup> Underweight prevalence in 2018 was 17.7%, consisting of 3.9% with severely underweight and 13.8% with underweight. Underweight in rural areas (15.4%) was higher than in urban areas (12.4%), and severely underweight in rural areas (4.6%) was higher than in urban areas (3.3%).<sup>5</sup> This is due to differences in the culture of urban area and rural area in terms of food needs and socio-economic status.<sup>6</sup> Toddlers at the age of 2-5 years are a group prone to the underweight condition rather than children under the age of 2 years.<sup>7</sup>

Based on the UNICEF framework (2013), many interacting factors that cause underweight include direct factors such as lack of food intake that occur together with infectious diseases, indirect factors such as household food availability, child feeding practices, confusion factors, and health services, and underlying factors are sociodemographic factors such as education, income, and parental work.<sup>8</sup> To address these challenges and mitigate problems associated with the underweight, exploration of underlying socioeconomic and household factors is crucially important. Structural and demographic differences between rural and urban areas will affect individuals in making decisions, especially in parenting, so that it also affects the nutritional status of children. Priority should be given to identifying household risk factors which are influenced by sociodemographic factors including educational level, parental work, wealth status and place of residence in order to devise national policy. However, it is important to further

understand household factors when stratifying by rural–urban place of residence among toddlers at age 24-59 month.<sup>9</sup> This study aimed identifying factors associated with the incidence of underweight for toddlers at age of 24-59 months in urban and rural areas in Indonesia based on 2014 Total Diet Study data.

## **MATERIAL AND METHOD**

The design of this study was a cross-sectional study. This study used secondary data on the 2014 Studi Diet Total (SDT): Survei Konsumsi Makanan Individu (SKMI), which conducted in all provinces (33 provinces), districts/cities (497 districts/cities) of Indonesia in 2014. The population in the SDT of 2014 was all households representing the entire province of Indonesia. The SDT of 2014 samples were all households that had been visited and registered in the data of 2013 Riskesdas. The SDT samples of 2080 census blocks were randomly selected from 3,000 census block of Riskesdas of 2013 samples of provincial representation. Recall interview technique consumes 1x24 hours by nutrition staff (Diploma in Nutrition for Health Polytechnic) and referred to the 5-Steps Multiple-Pass Method technique.

The population of this study was all households that had a toddler at the age of 24 to 59 months in Indonesia based on the SDT of 2014 data. The samples were children at age (24-59 months) recorded in the SDT-SKMI of the 2014 report, which would be taken by taking total sampling. The sample size used in this study was 5165 toddlers, then it was differentiated by residences area, namely in urban and rural areas. The total number of toddlers in urban areas was 2478 toddlers, and in rural areas was 2687 toddlers. Age was categorized into three age groups, 24-35 months, 36-47 months, and 48-59 months.

Nutritional status was then grouped into “not underweight” (Weight for Age Z-score  $\geq -2SD$ ) and “underweight” (Weight for Age Z-score  $< -2SD$ ).<sup>1</sup> Energy needs of toddlers at the age of 2-5 years based on the Energy Adequacy Rates, which were 1125 kcal for the age of 24-36 months, and 1600 kcal for the age of 37-59 months. The Recommended Dietary Allowances (RDA) for each age group of toddlers and gender based on the Minister of Health Regulation No 75 of 2013 was very low energy intake if percent  $< 70\%$  of RDA, low if RDA was  $70\%$  to  $< 100\%$ , normal if RDA was  $100\%$  to  $< 130\%$  and over if RDA was  $> 130\%$ .<sup>10</sup> The characteristic of toddlers’ family namely education were categorized into 3 groups: low (if the education of toddlers' parents did not go to school/did not graduate at Elementary School/graduated at Elementary School/graduated at Junior High School), medium (if the subject graduated at Senior High School), and high (if the subject graduated at D1/D2/D3/

PT). The types of father and mother's jobs were classified as working and not working. The total number of household members was categorized into  $\geq 5$  people and 2-4 people, while the total number of toddlers was categorized into many ( $>1$  toddler) and a little (1 child). Statistical analysis was carried out. Data analysis was used descriptive statistics, including univariate analysis (frequency distribution) and bivariate analysis (chi-square test). All values were considered significant at  $p < 0,05$ . Data presentation in this study uses tables. This research has gone through the ethical review process and obtained proper information by the Commission for Ethics for Research and Community Health Services of the University of Indonesia with No.2/9/UN2.F10/PPM.00.02/2016.

## RESULT

The sample distribution in this study was 5165 households that had a toddler at the age of 24-59 months, there were 2478 toddlers (48%) living in urban areas and 2687 toddlers (52%) living in rural areas. The total number of subjects at the age of 36-47 months is dominant in both rural and urban areas (Table 1). Most of the father's education levels of toddlers at the age of 24-59 months in Indonesia are classified as low and are dominant in rural areas (74,8%) than in urban (50,4%), as well as mother's education levels, most of mother of toddlers at the age of 24-59 months in Indonesia have low education level and are dominant in rural areas (77,2%) than in urban (54,7%) (Table 1). Based on this study, Underweight children are more common in rural (22,5%) than urban areas (17,9%) (Tabel 2).

**Table 1a. Toddler Characteristics and Family Social Characteristics**

Characteristics	Urban		Rural	
	n=2478	%	n=2687	%
<b>Age</b>				
24-35 months	813	32.8	876	32.6
36-47 months	890	35.9	1005	37.4
48-59 months	775	31.3	806	30.0
<b>Gender</b>				
Female	1197	48.3	1313	48.9
Male	1282	51.7	1374	51.1
<b>Total Number of Household Members</b>				
$\geq 5$ people	1383	55.8	1576	58.7
2-4 people	1095	44.2	1111	41.3
<b>Father's Education Level</b>				
Low	1248	50.4	2011	74.8
Medium	924	37.3	547	20.4
High	306	12.3	129	4.8
<b>Mother's Education Level</b>				
Low	1356	54.7	2075	77.2

**Table 1b. Toddler Characteristics and Family Social Characteristics**

Characteristics	Urban		Rural	
	n=2478	%	n=2687	%
Medium	830	33.5	474	17.6
High	292	11.8	138	5.1
<b>Father's Working Status</b>				
Does not work	131	5.3	128	4.8
Work	2347	94.7	2559	95.2
<b>Mother's Working Status</b>				
Does not work	1661	67.0	1589	59.1
Work	817	33.0	1098	40.9

Source: Data Studi Diet Total: Survei Konsumsi Makanan Individu, 2014

The measurement result shows that the average Z-score of weight-for-age for toddlers at the age of 24-59 months in Indonesia is  $-1,02 \pm 1,25$  (the lowest Z-score was 5.77, and the highest was 4.29). The prevalence of underweight toddlers at the age of 24-59 months is about 20.3%; most of the underweight toddlers are found in rural areas (22,5%). The average energy intake of toddlers at the age of 24-59 months was greater in urban areas (1344 kcal $\pm$ 380 kcal) compared to rural areas (1266 kcal $\pm$ 366 kcal). The majority of toddlers in urban and rural areas are classified as poor, mainly in rural areas (Table 2).

**Table 2. Distribution of Toddler Nutritional Status and Energy Adequacy Level of Toddlers**

Variable	Urban		Rural	
	n=2478	%	n=2687	%
<b>Nutritional Status</b>				
Underweight	443	17.9	605	22.5
Not Underweight	2035	82.1	2082	77.5
<b>Energy Adequacy Level</b>				
Over	311	12.6	255	9.5
Very Low	390	15.7	612	22.8
Low	1152	46.5	1272	47.3
Normal	625	25.2	548	20.4

Source: Data Studi Diet Total: Survei Konsumsi Makanan Individu, 2014

Factors related to the underweight (weight-for-age) for toddlers at the age of 24-59 months in urban and rural areas. Factors that related to the underweight (weight for age) for toddlers at the age of 24-59 months in urban areas are mother's education level ( $p = 0.001$ ), father's education level ( $p = 0.02$ ), total number of household members  $\geq 5$  people ( $p = 0.03$ ), and Energy Adequacy Rates ( $p = 0.012$ ) (Table 3). While factors related to underweight (weight for age) for toddlers at the age of 24-59 months in rural areas are father's education level ( $p = 0.005$ ), mother's education level ( $p = 0.005$ ), total number of households  $\geq 5$  people ( $p = 0.012$ ), Energy Adequacy Rates ( $p$ -value = 0.005) with the proportion of the underweight incident for toddlers at the age of 24-59 months in rural

areas. Age of toddlers ( $p = 0.012$ ) and total number of toddlers >1 child ( $p = 0.047$ ) have a significant correlation with the proportion of the underweight incident for toddlers at the age of 24-59 months just in rural areas (Table 4).

**Table 3. Factors Related to Nutritional Status for Toddlers in Urban Areas**

Variable	Nutritional Status				Total		<i>p</i> (OR)
	Underweight		Not Underweight		n	%	
	n	%	n	%			
<b>Gender</b>							
Female	208	17.4	988	82.6	1196	100	0.54
Male	235	18.3	1047	81.7	1282	100	0.93 (0.76-1.15)
<b>Age</b>							
24-35 months	140	17.2	673	82.8	813	100	0.42
36-47 months	171	19.2	719	80.8	890	100	
48-59 months	132	17.0	643	83.0	775	100	
<b>Father's Education Level</b>							
Low	249	20.0	999	80.0	1248	100	0.02*
Medium	159	17.2	765	82.8	924	100	
High	35	11.4	271	88.6	306	100	
<b>Mother's Education Level</b>							
Low	280	20.6	1076	79.4	1356	100	0.001*
Medium	135	16.3	695	83.7	830	100	
High	28	9.6	264	90.4	292	100	
<b>Father's Working Status</b>							
Does not work	22	16.8	109	83.2	131	100	0.82
Work	421	17.9	1926	82.1	2347	100	0.92 (0.57-1.47)
<b>Mother's Working Status</b>							
Does not work	150	18.4	667	81.6	817	100	0.70
Work	293	17.6	1368	82.4	1661	100	1.05 (0.84-1.30)
<b>Total Number of Household Members</b>							
≥ 5 people	268	19.4	1115	80.6	1383	100	0.03*
2-4 people	175	16.0	920	84.0	1095	100	1.26 (1.02-1.55)
<b>Total Number of Toddlers in 1 House</b>							
Many (>1 Child)	88	19.4	365	80.6	453	100	0.37
Little (1 Child)	355	17.5	1670	82.5	2025	100	1.13 (0.87-1.47)
<b>Energy Adequacy Level</b>							
Over	52	16.7	259	83.3	311	100	0.012*
Very Low	89	22.8	301	77.2	390	100	
Low	210	18.2	942	81.8	1152	100	
Normal	92	14.7	533	85.3	625	100	

Source: Data Studi Diet Total: Survei Konsumsi Makanan Individu, 2014

\*Statistical significance at  $p < 0,05$

**Table 4. Factors Related to Nutritional Status for Toddlers in Rural Areas**

Variable	Nutritional Status				Total		p (OR)
	Underweight		Not Underweight		n	%	
	n	%	n	%			
<b>Gender</b>							
Female	291	22.2	1022	77.8	1313	100	0.703
Male	314	22.9	1060	77.1	1374	100	0.961 (0.80-1.15)
<b>Age</b>							
24-35 months	174	19.9	702	80.1	876	100	0.012*
36-47 months	256	25.5	749	74.5	1005	100	
48-59 months	175	21.7	631	78.3	806	100	
<b>Father's Education Level</b>							
Low	485	24.1	1526	75.9	2011	100	0.005*
Medium	107	19.6	440	80.4	547	100	
High	13	10.1	116	89.9	129	100	
<b>Mother's Education Level</b>							
Low	497	24.0	1578	76.0	2075	100	0.005*
Medium	93	19.6	381	80.4	474	100	
High	15	10.9	123	89.1	138	100	
<b>Father's Working Status</b>							
Does not work	31	24.2	97	75.8	128	100	0.716
Work	574	22.4	1985	77.6	2559	100	1.10 (0.73-1.67)
<b>Mother's Working Status</b>							
Does not work	242	22.0	856	78.0	1098	100	0.657
Work	363	22.8	1226	77.2	1589	100	0.955 (0.79-1.14)
<b>Total Number of Household Members</b>							
≥ 5 people	382	24.2	1194	75.8	1576	100	0.012*
2-4 people	223	20.1	888	79.9	1111	100	1.27 (1.05-1.53)
<b>Total Number of Toddlers in 1 House</b>							
Many (>1 Child)	149	25.6	432	74.4	581	100	0.047*
Little (1 Child)	456	21.7	1650	78.3	2106	100	1.24 (1.00-1.54)
<b>Energy Adequacy Level</b>							
Over	39	15.3	216	84.7	255	100	0.005*
Very Low	162	26.5	450	73.5	612	100	
Low	297	23.3	975	76.7	1272	100	
Normal	107	19.5	441	80.5	548	100	

Source: Data Studi Diet Total: Survei Konsumsi Makanan Individu, 2014

\*Statistical significance at  $p < 0,05$ 

## DISCUSSION

This study estimates that 20.3% of children at the age of 24-59 months are underweight with were more dominant in rural areas (22.5%). According to FAO (2010), it showed that toddlers who suffer from underweight tend to be higher in rural areas compared to urban areas.<sup>11,12</sup> The nutritional status of underweight toddlers in rural areas was more than urban areas due to more favorable socioeconomic conditions in urban

areas.<sup>13</sup> Age of toddlers and the total number of toddlers in households are significantly related to the underweight for toddlers at the age of 24-59 months in rural areas. The prevalence of underweight for toddlers at the age of 24-59 months mostly occurs at the age of 36-47 months compared to other age groups. The result in line of this study in Ethiopia, which stated that the highest body weight deficiency is in the age group of 36-47 months.<sup>14,15</sup> Study in rural Ethiopia shows that at the age group of 36-47 months were 3.5 times higher have risk of malnutrition than the other groups.<sup>16</sup> At the age, since they are still in a period of rapid growth with high activity. At this age, children love to play out of the house, so they are more susceptible to infectious diseases. Also, they have consumed family food, and contamination is more likely to occur in food, especially in rural areas since sanitation is bad.<sup>15,17</sup>

The result of this study shows a significant relationship between the total number of toddlers in households with underweight in rural areas, but it is not significantly related to the urban areas. This result shows families with more than 1 child in a rural area have a risk of toddlers being underweight by 1.24 times compared to families who only have 1 toddler. Families in rural area tend to have more economic problem, such as low average income, so that the food distribution is worse than families in urban area. In urban areas, maybe parents can be helped because access to child care facilities such as daycare is easier or parents in urban areas have income more higher than parents in rural areas so they can hire caregivers. The total number of toddlers also affects the consumption of toddler food because food must be shared equally among all children.<sup>18,19</sup> In addition, total number of toddlers in one households cause more competing siblings in the family increases since it will affect child care and affection.<sup>18,19</sup>

Household-level factors, including parental and maternal education, are one of the risk factors for malnutrition.<sup>17,20,21</sup> In this study, the father and mother's education levels were significant for the underweight incident for toddlers in urban and rural areas. Father's education is also equally important with a mother's education in reducing childhood underweight.<sup>17,21</sup> Father's education is related to household income. Fathers play a role as a the main breadwinner, and decision-makers in determining things related to nutrition and health.<sup>17</sup> Mother's education influences childcare and feeding practices. This is in line with this study that mother's education has a significant influence on the nutritional status of children.<sup>22,23,12</sup> Mothers with low education will be more difficult to receive new information, have more belief for taboo information, and more difficult to change eating habits.<sup>7,17,23</sup> The other explanation could be that mothers who had better education had

better income and better childcare practice.<sup>15</sup> Meanwhile, the longer the mother attends education it will significantly reduce the possibility of 2.9% of children under five suffering from malnutrition.<sup>22</sup>

Children living in households that have a large family size are more vulnerable to *underweight*. Family with  $\geq 5$  members in the rural area has a risk of *underweight* of 1.27 times (95% CI 1.05-1.53) and in urban areas has a risk of 1.26 times (95% CI 1.02-1.55) greater than the family with 2-4 member. The size of family members influences the lack of food availability and distribution of food consumption, families that have larger family members must share food so that the occurrence of famine for toddlers tends to be greater than in small families.<sup>13</sup>

Total energy intake will greatly determine nutritional status, health status, and performance in carrying out physical activities. The average energy intake of toddlers was greater in urban areas compared to rural areas. This study showed that there was a significant relationship between the level of energy consumption and the underweight incident in children at the age of 24-59 months in urban and rural areas. Calorie intake affected the reserves of calories and weight. When energy expenditure (through exercise, physical activity or metabolism) was greater than energy intake (through food, supplements, and drinks), this can result in weight loss, underweight and other problems.<sup>24</sup>

This study has several limitations that must be considered. This study design was a cross-sectional survey, so it cannot draw causal conclusions about risk factors that cause underweight. We haven't been able to include all other socioeconomic variables that may be related to the underweight such as cultural characteristics or household food availability. Factors of underweight for toddlers at the age of 24-59 months are almost the same between households in urban and rural areas in this study, so the same set of policies can be used to prevent and reduce socio-economic barriers. The effort to improve community nutrition is a multisector responsibility by improving the socio-economic condition of the community based on the region's local capabilities and local wisdom. Family empowerment must also be improved because the basic factors of underweight for toddlers at the age of 24-59 months are affected by parent's education and knowledge about nutrition, especially in rural areas. Proper family planning and gap between subsequent child births should be maintained to achieve better health for both the mother and the child.

One of the breakthroughs in improving nutrition knowledge in low-educated people through brides and grooms. The Bride and Groom Candidate are one of the targets of the sensitive intervention at the first 1000 days of life movement. The bride and groom course

must also contain nutrition material about balanced nutrition, parenting and childcare specifically for the Bride and Groom Candidate course, and require all brides to attend the course by issuing a certificate. There's no alternative but to create scope and opportunities for education. Nutrition education should also be an integral part of the education process. The involvement of the community, government, and media of mass with health care information may prove to be useful in improving nutritional status.

## CONCLUSION AND RECOMMENDATION

Underweight children are more common in rural than in urban areas. Factors related to the underweight incidence in the urban and rural areas were the father's education level (urban;  $p = 0.02$  and rural;  $p = 0.005$ ) and mother's education level (urban;  $p = 0.001$  and rural;  $p = 0.005$ ), number of household members (urban;  $p = 0.03$  and rural;  $p = 0.012$ ), and energy adequacy level (urban;  $p = 0.012$  and rural;  $p = 0.005$ ). The factor that was estimated to be significantly related to the underweight incidence in rural areas as children's age ( $p = 0.012$ ), the total number of children in one house ( $p = 0.047$ ). The prevalence of underweight also reflects high socio-economic costs for the low quality of life, high vulnerability to various diseases, contributes to loss of productivity, and greater risk of death. Proper family planning and gap between subsequent child births should be maintained, bride and groom candidate in every region are required to get counseling related to nutrition education. Multisector collaboration by public health and healthcare professionals, nutritionists, and policymakers is important to treat and prevent underweight in Indonesia.

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