Malnutrition prevalence among toddlers based on family characteristics: A cross-sectional study in the rural and urban areas of Aceh, Indonesia

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Abstract
Introduction: Malnutrition among toddlers can be correlated to family characteristics, access to food and the socio-economic background of the family in rural and urban areas. These situations influence the children's nutrition status.

Objectives: To identify the prevalence of malnutrition and the related factors among toddlers in rural and urban areas based on family characteristics in Aceh Province, Indonesia.

Method: A cross-sectional study was performed among 600 households with toddlers in rural and urban areas. A self-administered questionnaire was used to measure family characteristics. The toddlers' height and weight were measured to identify their nutritional status. Data were analysed using Chi-square.

Results: The prevalence of malnutrition among toddlers was higher in urban areas than in rural areas with underweight (59.7% vs. 40.3%), stunting (51.0% vs. 49.0%), and wasting (52.3% vs. 47.7%). There were no differences between underweight and stunting problems in urban and rural areas (p> 0.05). However, there were differences between wasting in urban and rural areas, related to mothers' education (p= 0.031) and mothers' occupation (p= 0.014)

Conclusions: Mothers' education and the mothers' job status were significantly different regarding their effect on the child's wasted status in rural and urban areas (p<0.05). Mother's job status was significantly different regarding its effect on the child's overweight status in rural and urban areas (p<0.05).

Introduction
Whilst the child mortality in Indonesia has fallen sharply, the millennium development goal (MDG) was not reached in 2015. This may have an impact on human development 2030[1,2]. One policy direction that improves nutrition in the national medium-term development plan (NMDP)[3], is improving surveillance nutrition, including monitoring of growth through monitoring nutritional status. Basic Health Research[4] showed that Aceh in 2018 is still troubled with nutritional status of toddlers as shown by the prevalence of 23.5% underweight, 37.1% stunting, 11.9% wasting, and 8.8%overweight.

According to Amosu *et al*[5], nutritional problems influenced several interacting factors such as poverty, education, food availability in household and low family income. According to Chandran[6], nutritional problems are also caused by socio-economic factors and low level of maternal education. Mothers who work at home (66.2%) tend to have children with better nutrition than those working outside. Children whose parents had formal education had a 2.9% chance of having malnutrition in rural areas, compared with 5.4% in urban areas[7]. Peng *et al*[8] concluded that children living in rural areas had a 6.7 times risk of malnutrition due to limited food supply, while parents who work had a 5.1 times risk of malnutrition. Mpora *et al*[9], showed that there are differences in nutritional status between rural areas and urban areas, According to Labada *et al*[10] the number of family members has an impact on nutritional status, as much as 26.8%.

The prevalence of nutrition problems that occurs in Aceh Besar Regency is higher than Banda Aceh city based on the report from basic health research at 2018, allegedly caused by family characteristics such as education, occupation and living area. Based on Aceh Besar district profile, most of the parents work as farmers with low educational level (28.7%). In addition, the conditions they live in a rural area also contributes to the high prevalence of nutrition

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problems in children. There are very limited studies that compare the situation between regions.

Objectives
To identify the prevalence of malnutrition and the related factors among toddlers in rural and urban areas based on family characteristics in Aceh Province, Indonesia.

Method
This study employs a longitudinal study design. This research is using a secondary file from the Nutrition Survey in Aceh province 2018. The survey is a collaboration work between Aceh Health Department and Nutrition Department of Polytechnic Health Ministry of Health Aceh. Research locations include Banda Aceh city (as urban area) and the district of Aceh Besar (as rural area) for research from September - October 2018. Sample in this research comprised families that have toddlers aged 0-59 months 29 days. Those families were chosen by using cluster sampling method. The selection of clusters was done randomly based on Probability Proportional to Size (PPS) assisted by random tables. There were 30 clusters chosen in Aceh Besar district. Total sample was 600 toddlers, consisting of 300 from urban areas and 300 from rural areas. Respondents' addresses, identities, toddlers' nutritional monitoring and evaluation data, anthropometric data such as date of birth, weight, length and height, were obtained from Survey

Research report on monitoring of nutritional Status in 2018 in Aceh.

Statistical analysis was done by using univariate and bivariate analysis. Chi-square test was used to analyse data on nominal scale.

Results
The sample in this research was 600 families, 300 families from Aceh Besar district (rural areas) and 300 families from Banda Aceh city (urban areas). The distribution of toddlers' characteristics is shown in table 1.

Table 1: *Toddlers' characteristics*

Characteristic	Rural areas No. (%)	Urban areas No.(%)
Age		
0 – 12 months	64 (21.4)	100 (33.3)
13 – 24 months	73 (24.3)	79 (26.3)
25 – 36 months	73 (24.3)	65 (21.7)
37 – 59 months	90 (30.0)	56 (18.7)
Gender		
Male	154 (51.3)	155 (51.7)
Female	146 (48.7)	145 (48.3)

The Children's nutritional status was measured by three indices, weight for age (WFA), height for age (HFA) and weight for height (WFH). This is shown in Table 2.

Table 2: *Toddlers' nutritional status*

Nutritional index	Rural areas Number (%)	Urban areas Number (%)
Weight for Age (WFA)		
Severely underweight	25 (8.3)	14 (4.7)
Underweight	55 (18.3)	40 (13.3)
Normal	218 (72.7)	237 (79.0)
Overweight	2 (0.7)	9 (3.0)
Height for Age (HFA)		
Severely stunted	25 (8.3)	29 (9.7)
Stunted	50 (16.7)	43 (14.3)
Normal	225 (75.0)	228 (76.0)
Weight for Height (WFH)		
Severely wasted	36 (12.0)	29 (9.7)
Wasted	31 (10.3)	32 (10.7)
Normal	222 (74.0)	218 (72.8)
Overweight	11 (3.7)	21 (7.0)

Underweight was more prevalent in rural than urban areas. In contrast, overweight was more prevalent in urban areas. Stunting and wasting were similar in rural and urban areas.

Prevalence of underweight children based on the mothers' characteristics is shown in table 3.

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Table 3: *Mothers' characteristics and children's underweight status*

Characteristic of mother	Underweight		OR (95% CI)	p-value
	Rural areas Number (%)	Urban areas Number (%)		
Mother's education				
Low education	34 (64.2)	19 (35.8)		
Middle education	31 (56.4)	24 (43.6)	1.4 (0.67 – 3.00)	0.693
High education	15 (57.7)	11 (42.3)		
Mother's job status				
Permanent Job	4 (44.4)	5 (55.6)		
Job not permanent	3 (42.9)	4 (57.1)	1.1 (0.15 – 7.82)	0.382
No job	73 (61.9)	45 (38.1)		
Number of family members				
Less than 4	26 (66.7)	13 (33.3)	1.5 (0.69 – 3.31)	0.390
4 or more	54 (56.8)	41 (43.2)		

The mother's education, the mother's job status and the number of family members were not significantly different regarding their effect on the child's underweight status in rural and urban areas (p>0.05). Prevalence of stunted children based on the mothers' characteristics can be seen in table 4.

Table 4: *Mothers' characteristics and children's stunting status*

Characteristic of mother	Stunting		OR (95% CI)	p-value
	Rural areas Number (%)	Urban areas Number (%)		
Mother's education				
Low education	32 (57.1)	24 (42.9)	2.1 (1.02 – 4.50)	0.118
Middle education	23 (38.3)	37 (61.7)		
High education	12 (52.2)	11 (47.8)		
Mother's job status				
Permanent Job	8 (72.7)	3 (27.3)		
Job not permanent	3 (60.0)	2 (40.0)	1.8 (0.19 – 16.49)	0.228
No job	64 (48.9)	67 (51.1)		
Number of family members				
Less than 4	43 (47.3)	48 (52.7)	0.7 (0.34 – 1.31)	0.320
4 or more	32 (57.1)	24 (42.9)		

The mother's education, the mother's job status and the number of family members were not significantly different regarding their effect on the child's stunted status in rural and urban areas (p>0.05). Prevalence of wasted children based on the mothers' characteristics can be seen in table 5.

Table 5: *Mothers' characteristics and children's wasting status*

Characteristic of mother	Wasting		OR (95% CI)	p-value
	Rural areas Number (%)	Urban areas Number (%)		
Mother's education				
Low education	28 (68.3)	13 (31.7)	2.2 (1.96 – 5.32)	0.031
Middle education	24 (49.0)	25 (51.0)		
High education	15 (39.5)	23 (60.5)		
Mother's job status				
Permanent Job	4 (28.6)	10 (71.4)		
Job not permanent	1 (18.3)	6 (85.7)	1.8 (1.31 – 2.51)	0.014
No job	62 (57.9)	45 (42.1)		
Number of family members				
Less than 4	45 (49.5)	46 (50.5)	0.7 (0.31 – 1.45)	0.405
4 or more	22 (59.5)	15 (40.5)		

The number of family members was not significantly different regarding its effect on the child's wasted status in rural and urban areas (p>0.05). However, the mother's education and the mother's job status were significantly different regarding their effect on the child's wasted status in

rural and urban areas (p<0.05). Prevalence of overweight children based on the mothers' characteristics can be seen in table 6.

Table 6. *Mothers' characteristics and children's overweight status*

Characteristic of mother	Overweight		OR (95% CI)	p-value
	Rural areas Number (%)	Urban areas Number (%)		
Mother's education Low education Middle education High education	6 (60.0) 3 (25.0) 9 (40.9)	4 (40.0) 9 (75.0) 13 (59.1)	0.5 (0.10 – 2.29)	0.251
Mother's job status Permanent Job Job not permanent No job	4 (22.2) 2 (28.6) 12 (63.2)	14 (72.8) 5 (71.4) 7 (36.8)	1.6 (1.04 – 2.73)	0.031
Number of family members Less than 4 4 or more	10 (47.6) 8 (38.4)	11 (52.4) 15 (65.2)	1.7 (0.51 – 5.73)	0.577

The mother's education and the number of family members were not significantly different regarding their effect on the child's overweight status in rural and urban areas (p>0.05). However, the mother's job status was significantly different regarding its effect on the child's overweight status in rural and urban areas (p<0.05).

Discussion
Prevalence of underweight and stunting between rural and urban areas showed no statistically significant differences based on mothers' occupation, mothers' education or the number of family members. However, the prevalence of wasting between rural and urban areas showed statistically significant differences based on mothers' education and mothers' occupation, Interestingly, the proportion reflected a tendency that prevalence of toddlers underweight occurring in rural areas was higher than that in urban areas. Prevalence of toddlers underweight is an indication of an acute nutritional problem which can be associated with poverty, unhealthy lifestyle, and inadequate food intake over a long time[11]. A study by Malina *et al*[12] compared the changes of school-aged children's growth status between urban and rural areas and showed that boys and girls in urban areas have normal linear and weight dimensions in comparison to rural areas.

According to Labada *et al.*[10], working mothers tended to have children with normal nutrition status. Astuti *et al*. concluded that there was no significant correlation between mothers' education status and children's nutritional status[13]. Gurung et al. showed that the number of children in a family was unconnected with wasting[14]. Khotimah et al. reported that the number of family members does not have a significant correlation with malnutrition[15]. Mothers' characteristics play an

important role in the onset of wasting in toddlers[16]. Ewusie *et al*[17] reported that economic gap in a family impacts on the difficulty of the family to access the health services and the food supply and if this condition persists for a long period of time, the children's growth can be affected negatively. According to Amosu et al[5], difficulties on employment opportunities would have an impact on low-income family making it difficult for the family to meet their nutritional needs. In our study the mother's education, the mother's job status and the number of family members were not significantly different regarding their effect on the child's underweight status, stunting status or wasting status in rural and urban areas (p>0.05). Similarly, the mother's education and the number of family members were not significantly different regarding their effect on the child's overweight status. However, the mother's job status was significantly different regarding its effect on the child's overweight status in rural and urban areas (p<0.05).

In addition, mothers' educational level relates to their income, as well as the parenting style. Moreover, they have a chance to use of health services for their child[7]. According to Abuya *et al*[18], family income and mothers' educational levels cannot be separated from children's nutritional status. The difficulty of finding a job will cause poverty, all arising from the low level of education. Furthermore, it can be seen that the proportion of wasting higher in the district of Aceh Besar (rural areas) than Banda Aceh (urban areas). Kinyoki et al[19] showed that there was a significant correlation between living areas and wasting. The wasting proportion in rural areas was 16.3% and 15% in urban areas; it was associated with decreased risk of wasting (OR=0.96), but was not associated with stunting and underweight. According to Smith *et al*[20], the Z-score average (nutritional status

according to weight to high index) was better in urban than rural areas. Underweight, stunting, and wasting in the urban areas were lower than in rural areas. These positive results may be due to the cumulative effect of a series of more favourable social and economic conditions, in the urban areas, such as excellent access to health service, healthier children having more opportunities for higher education.

Conclusions
Mothers' education and the mothers' job status were significantly different regarding their effect on the child's wasted status in rural and urban areas (p<0.05). Mother's job status was significantly different regarding its effect on the child's overweight status in rural and urban areas (p<0.05).

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