Stunting among children Indonesian urban areas: What is the risk factors?

by Tri Siswati

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ABSTRAK

Latar Belakang: *Stunting adalah malnutrisi kronis yang* dapat terjadi pada semua balita termasuk balita di daerah perkotaan.

Tujuan: *Penelitian ini bertujuan untuk mengetahui faktor risiko stunting pada anak*-anak 0-59 bulan di perkotaan *di Indonesia.*

Metode: *Penelitian ini* merupakan penelitian cross sectional dengan menggunakan data sekunder berdasarkan Riskesdas tahun 2013. Sampel berjumlah 13.248 anak usia 0-59 bulan dari 33 provinsi, yang tinggal di daerah perkotaan, lahir tunggal (37 minggu), usia ≥37 minggu kehamilan, skor TB/U -5,99 hingga TB/U 5,99 SD, dan data yang diobservasi lengkap. Variabel bebas adalah karakteristik anak (usia, jenis kelamin, berat dan panjang lahir); dan karakteristik rumah tangga (usia orang tua, tinggi badan orang tua, pendidikan, pekerjaan, tingkat ekonomi), sedangkan variabel terikat adalah stunting. Analisis dilakukan dengan regresi logistik multivariat menggunakan Stata13.

Hasil: Faktor yang berhubungan dengan terjadinya stunting balita di perkotaan adalah BBLR (AOR 1,2 CI 95% 1,09-1,32); dan bayi lahir pendek (AOR 1,16 CI95%: 1,99-1,23) dan karakteristik rumah tangga seperti ayah pendek (AOR 1,24, CI95% 1,18-1,31); ibu pendek (AOR 1,23, CI95% 1,17-1,29); ibu berpendidikan rendah (AOR 1,14, CI 95% 1,02-1,23); ayah berpendidikan rendah (AOR 1,13, CI95% 1,02-1,23), dan tingkat ekonomi menengah dan rendah (AOR 1,12, CI 95% 1,06-1,19; AOR 1,24, CI95% 1,15-1,33).

Kesimpulan: Faktor yang berhubungan dengan stunting balita di perkotaan adalah BBLR dan tinggi badan orang tua.

KATA KUNCI: balita; determinan; Indonesia; perkotaan; stunting

ABSTRACT

Background: Childhood stunting is a form of chronic malnutrition, including among children in the urban area.

Objectives: This research was to determine the risk factors of 0-59 months stunting children in urban Indonesia.

Methods: This was a cross sectional study using secondary data based Indonesia's Basic Health Research 2013. Samples were a total of 13,248 children aged 0-59 months from 33 provinces, urban residency, singleton, ≥37 weeks gestation, and HAZ score -5.99 to 5.99 SD. Independent variables were children characteristics (age, sex, size of birth); and household characteristics (parental age, high, education, employment, economic level), while the dependent variable was stunting. Multivariate logistic regression analysis was performed using Stata 13.

Results: Children characteristics such as low birth weight (AOR 1.2 CI 95% 1.09-1.32); and short newborn length (AOR 1.16 CI95%:1.99-1.23) and stature father (AOR 1.24, CI95% 1.18-1.31 and mother (AOR 1.23, CI95% 1.17-1.29); maternal low education (AOR 1.14, CI 95% 1.02-1.23); paternal low education(AOR 1.13, CI95% 1.02-1.23), low middle economic level (AOR 1.12, CI 95% 1.06-1.19; AOR 1.24, CI95% 1.15-1.33) were factors associated with urban stunting children.

Conclusion: Low birth weight and short stature were dominant factors associated with stunting children in Indonesian urban areas.

KEYWORDS: children; determinant; Indonesian; urban; stunting

INTRODUCTION

Stunting is the most prevalent chronic malnutrition form in Indonesia and other developing countries (1). One fifth children are stunted (1), and it tend to be stunted in a whole life cycles (2). Stunting is not only a problem of short stature but may also be at risk of it's short and long term consequences (1).

Short term consequences of stunting included the risk of illness, irreversible body damage, cognitive impairement, decreased cognitive function, developmental disorders, mortality, and metabolism disorder (1, 3-4). While its long term consequences such as low language and motor skills, low learning outcomes and school performance (4), also low adult productivity (5). Stunting in early life cause a lower rate of metabolism, oxidative fat (5)and tend to suffer from metabolic syndrome due to more body fat composition (6). It is relatively to be more overweight and obesity in adolescence and later life (5-6). Hence, obesity increases the risk of metabolic syndrome and chronic degenerative diseases, such as high blood pressure, diabetes mellitus, coronary heart disease, hypercholesterolemia, stroke, and cancer (5-8).

Indonesia's government have been concerned to overcome stunting children in which the prevalence was among the largest countries with stunted problem after Pakistan (45%), Congo (43%), India (39%), Ethiopia (38%) (9), and then Indonesia (37.2%) (10). World Health Organization (WHO) states to focus combat children malnutrition by reducing 40% of stunted children in 2025 (9). In fact the prevalence of stunting increase as many as 0.4% per year in Indonesia, from 35.6% in 2010 (15) to 37.2% (11) in 2013.

Determinants of stunting are including proximate and distal factors, also direct and indirect factors (12). Hence, in the last two decades, social factors are the most important factor to affect the people's health status (13). The inequality of social and structural factors are an important factor in disparities health status. That factors including economic both macro and micro level, social level, gender, race, education level, occupation, environment, water and sanitation, housing, and policy (13-15). The differences in social level affect the difference in health exposure and disease severity (14).

Studies in developing countries suggested that the nutritional status of children in urban areas is better than children living in rural areas (16-17). The underlying factor was because the residence had a close association with the access to communication, transportation, food, school and health services. Subramanian *et al.,* 2003 and Kien's *et al.,* 2016 stated that children living in an urban area were a protective factor for stunting than rural areas (OR 0.75 and 0.145 respectively) (18). Unfortunately, as many as one-fourth of Indonesian stunted children living in urban areas (11). The objective of the study was to analyze the determinant factors for stunting children in urban areas in Indonesia.

MATERIALS AND METHODS

This study was a cross-sectional study, using secondary data based on the Indonesian Base Health Research (Riskesdas) 2013. The sample was selected in 2 stages, the first stage includes the list of primary sampling units (PSUs) in the master table. The number of PSUs in the master table was 30,000 selected by probability proportional to size (PPS) with the number of households census population in 2010. The second sample frame were all census buildings in which there were ordinary households (excluding institutional household: dormitory, prison and others). The population were as many as 37,025 children 0-59 aged months. Samples were selection by criterias i.e. living in urban areas, singleton, ≥37 weeks gestation, HAZ score between -5.99 to 5.99 SD, complete data in observed variables. As many as 13,248 under-five children were included in this study.

The independent variables were children characteristics including age (mo's), sex (female and male), birth weight (grams), newborn length (short if <48 cm and normal if ≥48 cm), and family characteristics, i.e parental education (low if <junior high school, middle if senior high school, and high if higher than senior high school), parent's employment status (employed and unemployed), parent's high, (short father if ≤160 cm, short mother if ≤150 cm, the number of family members (≤4 and >4), the number of under-five children (≤2 and >2), while the dependent variable

was stunting children. Stunting children was less than -2 deviation standart height for age z score WHO, while normal stature was 2 deviation standard and up. Economic status were divided into three categories, low (quintil 4 and 5), middle (quintil 3) and high level (quintil 1 nd 2), measured by on ownership of household goods.

Children characteristics and demographics were collected using individual and household questionnaires, while nutritional status data were collected with a Fesco digital weight scale with 0.1 kg precision and height measuring by microtoise. Data collection was conducted by a team of trained enumerators with a minimum educational background of health diploma degree, each team consisting of 6 persons including the chairman. This data was guaranteed the validity process and the result of its observation.

Data were analysed by STATA 13. Determinants of stunting children were analysis by logistic regression. The model of determinants of stunting was analysed by multivariate logistic regression by odds ratio 95% confidence interval (CI). Variables with probability values less than 0.25 in this bivariable test are subsequently included in the modelling analysis with multivariate analysis. The multivariate test was done by the enter method, while the best fit model as chosen based on aike's information criterion (AIC). The data presenting by text, map, table and graph. The research was approved by MHREC Faculty medicine of UGM No KE/FK/009/EC/2017 dated January 27, 2017.

RESULTS

A total of 13,248 children aged 0-59 months included in the study. The prevalence of stunting 0-59 children in Indonesian urban area is 32.16%, minimum 20.34% (Maluku) and maximum 42.75% (NTT) (Fig 1). Mostly, 53.74% of children were 24-59 aged months, 51.15% were boys and 95,15% were normal birth weight. About 41.93% of mother and 45.52% of fathers had middle education, 53.40% had >4 number family members, 98.35% had ≤2 number of children under-fives, 69.26% had high economic level, while 69.11% of mothers and 75.85% of fathers had normal high. See detail in **Table 1**.

In details, the prevalences of stunting among urban Indonesian children are also presented (**Fig 2**).

The statistical test showed that age and small size of birth (low birth weight, short newborn length) had associated with stunting children (p<0.05), as detail in **Table 2**.

Results showed that parent's education, mother occupation, number of children <5 years, parent's high and economic status had an association with stunting. As detail in **Table 3**.

The best fit model of the multivariate test showed that risk factors for stunting children in
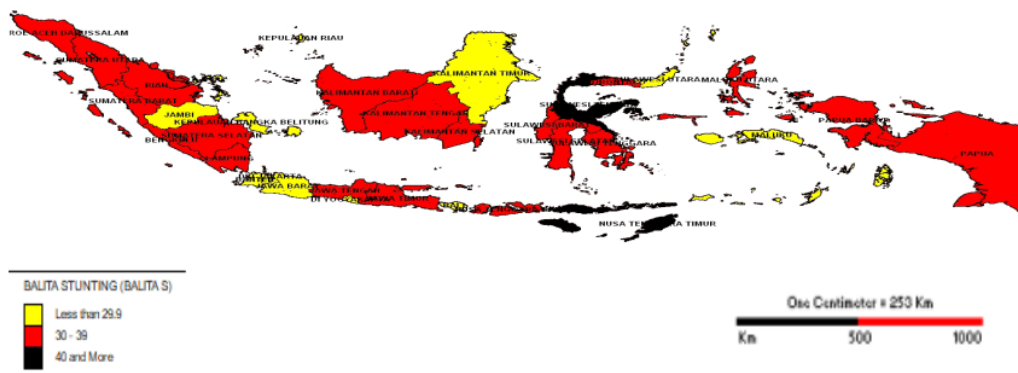

Fig 1. Prevalence stunting Indonesian children in the urban area
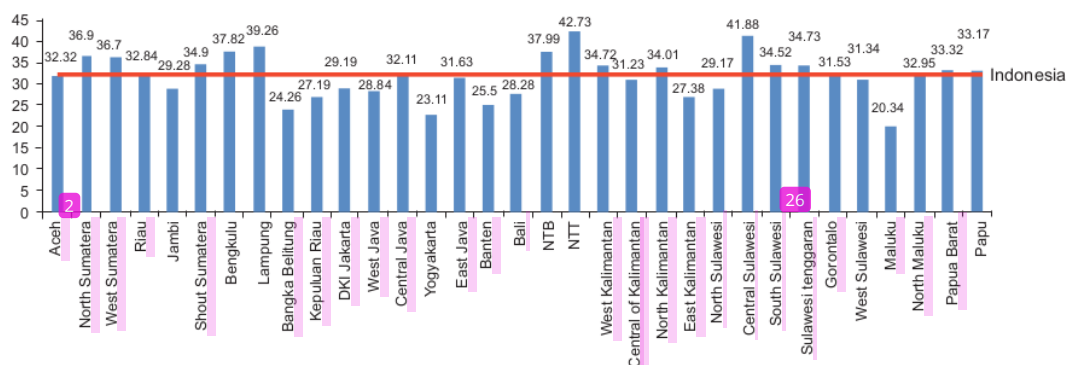Data source : Riskesdas, 2013

Fig 2. The prevalences of children stunting in urban Indonesia

Table 1. Household characteristics

Variable	n	%
Mother's education		
Low	2,390	18.04
Middle	5,555	41.93
High	5,303	40.03
Father's education		
Low	2,272	17.15
Middle	6,030	45.52
High	4,946	37.33
No of family member		
>4	7,075	53.40
≤4	6,173	46.60
No of children <5y		
≤2	13,030	98.35
>2	218	1.65
Mother's occupation		
Unemployed	8,542	64.48
Employed	4,706	35.52
Father's occupation		
Unemployed	438	3.31
Employed	12,810	96.69
Economic status		
Low	1,551	11.71
Middle	2,521	19.03
High	9,176	69.26
Mother's high		
Short	4,092	0.893
Normal	9,156	69.11
Father's high		
Short	3,199	24.15
Normal	10,049	75.85

Indonesian urban areas were size of birth (newborn length and birth weight), parental education, parental high, and economic status. As detail in **Table 4**.

This was a big data research in 33 province in Indonesia, representatives for all province in Indonesia children. But the limitation were the research was cross sectional design which have not explanation about natural histories of stunting children, and some direct variables such as food consumption was not observed.

DISCUSSION

This research showed that household economic and parental education level were significant determinants of stunting. According to WHO 2005, Social Determinants of Health (SDH) including economic, education and other structural factor interact affecting people health status (13). Education investment is a fundamental factor to achieve good health status (13) and eradicate stunting (19-21). Parent's education will affect knowledge of nutrition, good parenting and feeding practice, stimulate optimal growth children (20-22), get opportunities for a better occupation, high economic and well-being, adequate social and network supports, and encouraging their children to get high educational level, healthy and good human resources (20, 22-24). In North-Eastern Iran, 2009 children were born from a low-educated parent were

Table 2. Association of children and household characteristic with stunting

Variable	Stunting		Normal		P	OR (CI 95%)
	n	%	n	%		
Age of children						
>24 mo's	2,405	33.78	4,714	66.22	0.0019	1.08 (1.029-1.136)
≤24 mo's	1,915	31.25	4,214	68.75		1
Sex						
Boy	2,246	33.14	4,531	66.86	0.1806	1.034 (0.985-1.086)
Girl	2,074	32.05	4,397	67.95		1
Birth weight						
Low	280	43.61	362	56.39	0.000	1.36 (1.242-1.490)
Normal	4,040	32.05	8,566	67.95		1
Newborn length						
Short	918	99.84	1,448	15.76	0.000	1.24 (1.171-1.315)
Normal	3,402	31.26	7,480	68.74		1

Table 3. Association between sociodemographic with stunting children

Variable	Stunting		Normal		P	OR (CI95%)
	n	%	n	%		
Mother's education						
Low	1,992	37.56	3,311	62.44	0.000	1.42 (1.315-1.529)
Middle	1,695	30.51	3,860	69.49	0.000	1.15 (1.066-1.245)
High	633	26.49	1,757	73.51		1
Father's education						
Low	1,868	37.77	3,078	62.23	0.000	1.418 (1.313-1.531)
Middle	1,847	30.63	4,183	69.37	0.000	1.150 (1.064-1.243)
High	605	26.63	1,667	73.37		1
Mother's occupation						
Unemployed	2,847	33.33	5,695	66.37	0.0171	1.065 (1.001-1.122)
Employed	1,473	31.30	3,233	68.70		1
Father's occupation						
Unemployed	129	29.45	309	70.55	0.1518	0.900 (0.777-1.043)
Employed	4,191	32.72	8,619	67.28		1
No of household member						
>4	2,047	33.16	4,126	66.84	0.206	1.032 (0.983-1.084)
≤4	2,273	32.13	4,802	67.87		1
No of children <5y						
>2	86	37.45	132	60.55	0.0298	1.214 (1.028-1.434)
≤2	4,234	32.49	8,796	67.51		1
Mother's high						
Short	1,606	39.25	2,486	60.75	0.000	1.32 (1.260-1.391)
Normal	2,714	29.65	6,442	70.35		1
Father's high						
Short	1,291	29.88	3,029	70.12	0.000	1.398 (1.316-1.486)
Normal	1,908	21.37	7,020	78.63		1
Economic status						
Low	667	43.00	884	57.00	0.000	1.452 (1.359-1.549)
Middle	935	37.09	1,586	62.91	0.000	1.252 (1.179-1.329)
High	2,718	29.62	6,458	70.38		1

Table 4. Adjusted odds ratio determinant factors for stunting children

Variable	P	AOR (95%)
Newborn length		
Short	0.000	1.16(1.09-1.23)***
Normal		1
Birth weight		
Low	0.000	1.2(1.09-1.32)***
Normal		1
Mother's education		
Low	0.014	1.14(1.03-1.26)*
Middle	0.203	1.06 (0.97-1.16)
High		1
Father's education		
Low	0.020	1.13 (1.02-1.23)*
Middle	0.226	1.06 (0.97-1.16)
High		1
Mother's height		
Short	0.000	1.23(1.17-1.29)***
Normal		1
Father's height		
Short	0.000	1.24(1.18-1.31)***
Normal		1
Household economic status		
Low	0.000	1.24 (1.15-1.33)***
Middle	0.000	1.12 (1.06-1.20)***
High		1

Note : *p<0.05, *** p<0.001

15% more likely to be stunting than well-educated ones (22).

Another social factor affecting stunting children was of economic status. Economic is the root of the malnutrition problem. Poor people had limited ability to buy and select good quality food, health and recreation facilities and infrastructure, good water access and housing so that the children were at a greater risk of malnutrition (23-24). Research showed that low economic status more likely to have stunted children than the higher level of economic (OR 1.24, 95%CI: 1.15-1.33) (see **Table 4**).

This research showed that short parent more likely to have stunting children than normal. However, the genetic was not prior, it just contributed to a 15% risk factors (25). The major risk factors were environment, such as nutrition, pollution, clean water, hygiene-sanitation, housing, infection affect the fetus health status (23,26). Short mother also reflected chronic malnutrition since the prenatal period, so that mother have small pelvic, and fetus tend to suffer from nutrition and oxygen supply deficiency (25. Maternal need support to got a healthy pregnancy outcome, both sensitive and specific intervention (27).

This research showed that low birth weight and short newborn's length were strong determinants of stunted children. Based on many studies, low birth weight was the most dominant factor for early stunting children (24,28-29). Small birth (low birth weight and short length newborn) is due to chronic malnutrition even before pregnancy period (30-31). As because stunting is a chronic condition that illustrates stunted growth due to long-term malnutrition and manifestations of low birth weight (LBW) and malnutrition in infancy and the absence of perfect catch-up growth in subsequent periods he long deficit of low birth weight and short newborn.

Stunted children who achieved catch-up growth during the golden period-in the first 1000 days of life would grow with normal height in adolescents and adults. They need support by adequate nutrition in quantity and quality including breastfeeding and supplementary feeding (32), smoke-free pollution (33), clean water access, healthy housing, good hygiene and sanitation for optimum growth (15), intervention and prevention recurrent infection (15), supplementation of micronutrients (26), improvement in household economics (34-35). Cohort study with IFLS shows that stunted children who recatch-up in an early age as many as 84% grew as a normal height toddler, while they who failed recatch-up in critical period (early 1000 day of life) 77% would remain stunting during the pre-puberty period (35). However, stunting in early life tend to grow stunting in toddlers, children, teenagers and adults with many consequences in later life (4), The improvement of maternal and children nutritional status as long as the window of opportunity period will prevent chronic children malnutrition including LBW and stunting (23), and increasing macro and micro economic (36). In Indonesia, investment in maternal health and children give benefit 48 time (36).

CONCLUSION

As many as 32.16% of Indonesian children in urban areas was stunting. Factors significantly related to stunting are size of birth (small birth weight and short length), short-stature parents, and social factors such as low parental educational level, house hold economic. Based on this research, intervention on prenatal care and maternal health care should be focused on decreasing the rate of small birth-size, and implementing the 1000 first day of life programs such as parental nutrition education in order to increase knowledge, attitude, and practices related to child health and nutrition.

ACKNOWLEDGEMENT

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