Risk Factors for Stunting and Severe Stunting among Children (12-59 Months Old) in the Coastal Area of Surabaya, East Java, Indonesia

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Abstract--- *The prevalence of children with stunting in Indonesia has remained high over the past decade, especially in coastal areas. This study aimed to analyze factors which correlate with stunting and severe stunting among children (12-59 months old) who lived in the coastal area of Surabaya, East Java, Indonesia. This was a descriptive-analytic study with a cross-sectional approach. The study enrolled 85 mother-child pairs with children aged 12-59 months old with stunting using a multistage random sampling technique. The independent variables were child's age, sex, birth order, mother's age, mother's level of education, complementary feeding practice, number of children under five years old at home, family size, and family's income; the dependent variable was the level of stunting. All of the socio-demographic data were gathered using a questionnaire. Complementary feeding practices were assessed with the Child Feeding Questionnaire. Children's height was measured with an infantometer. Nominal logistic regression test showed that factors which correlate with stunting and severe stunting among children aged 12-59 months old include birth order (first and second child), and sub-optimal complementary feeding practice. First and second children were less likely to experience severe stunting (OR 0.035; 95% CI 0.003-0.36 and OR 0.003; 95% CI 0.00-0.02). Children with sub-optimal complementary feeding practice had higher odds for severe stunting (OR 2.477; 95% CI 2.42-58.48). Reducing birth rates which limit birth order and providing appropriate complementary feeding practice is important in reducing stunting in the coastal areas of Surabaya. Hence, health promotion programs to address these findings should be designed comprehensively.*

Keywords--- Stunting; Children; Indonesia

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I. INTRODUCTION

The most prevalent form of malnutrition among children is stunting. Almost 161 million children in the world, in 2013, were stunted. More than half of them lived in Asia [1]. Children were defined as stunted if their height-for-age-Z score ≤−2 for the same age and sex using the WHO Child Growth Standards median [2]. Stunting is the impaired growth and development that children experience as a result of inadequate nutrition, repeated infection, and poor psychosocial stimulation over a long period [3].

Stunting must be prevented as early as possible because it has an irreversible effect [4]. Children aged 12-59 months had a significantly increased likelihood of being stunted than those aged <12 months [5]. Stunting in early life can lead to emotional, social, and cognitive development problems in adulthood [6]. Stunting increases the risk of morbidity and mortality. The short-term consequences include deficits in cognitive function, poor motor development, and loss of potential for physical growth [1], [7]. Meanwhile the long-term consequences are disproportions in body structure, unfulfilled academic potential, poor reproductive health, and increased risk of infection [8].

The trend of stunting among children in the world continues to decrease [9] Between 2000 and 2018, the prevalence of stunting in the world declined from 32.5% to 21.9% [10]. However, it is still far from meeting the Sustainable Development Goals which targeted that by 2020, there should be no single type of malnutrition in the world [11]. In Indonesia, the prevalence of stunting for children under five years old is slowly decreasing. Basic Health Research 2013 reported that 37.2% children under five years old were stunted [12]. By 2016 and 2018 the prevalence had declined to 33.06% [13] and 30.8% [14]. This is still higher than the World Health Organization's target (20%) [15]. One of the 18 provinces which has a high prevalence of childhood stunting above the national prevalence is East Java [14]. In the period 2015-2017, the prevalence of stunting among children (0-59 months old) was 27.1%, 26.1%, and 26.7%, respectively [16]–[18]. Surabaya city is now included in 260 regencies/cities that have been designated as priority locations for stunting prevention in East Java [19]. By 2017, the prevalence of stunting among children under five years old slightly decreased to 22.8%, from 23.2% in 2016 [17], [18]. Mostly, these children lived in the coastal area of Surabaya City.

The coastal area of Surabaya City is very unique not only because of its abundant natural resources, but also the characteristics of the people who live there. As a fish-producing region, the coastal area has potential to fulfil protein needs for their children. Otherwise, the diversity of the population's character also has an impact on the mother's behavior in terms of fulfilling children's nutritional needs [20]. In Surabaya City, the coastal area is pretty close to the urban area, so the social-economy conditions, such as level of education, income, and family size, also vary from better to poor [21]. Previous research revealed factors which increase the risk of children being stunted in Indonesia, including child's characteristics, such as gender, birth weight, birth order, exclusive breastfeeding, and the number of siblings; mother's characteristics, such as age, marital status, level of education, and work status; family's characteristics, such as type of family and wealth index. Meanwhile, inadequate complementary feeding practice was found to directly correlate with childhood stunting [22]–[26].

The Indonesian government has already conducted various programs to reduce the prevalence of stunting in children under five years of age, in the first 1000 days of children's lives [27]. However, appropriate, effective, and efficient interventions are still needed, emphasizing locus, such as the coastal area [15], [28], to ensure a 40% reduction by 2025 [2]. To design an appropriate intervention and policy, the risk factors should be identified. This study, therefore, aimed to analyze the risk factors for stunting and severe stunting among children (12-59 months old),

especially those who lived in the coastal area of Surabaya, East Java, Indonesia. We hypothesized that child's factors (age, sex, birth order), mother's factors (age, level of education, complementary feeding practice), and family's factors (another child aged less than 59 months old, family size, and family's income) are risk factors for stunting and severe stunting among children aged 12-59 months.

II. METHODS

This was a descriptive-analytic study with cross-sectional approach. The populations were mother- child pairs where the child was aged 12-59 months and was stunted, as recorded by the public health center in Surabaya City. Samples were gathered by using multistage random sampling. First, the researcher randomly selected the public health center (puskesmas) using a lottery method. The one which was selected was Puskesmas Tambak Wedi. Furthermore, all children aged 12-59 months who were stunted, on the puskesmas, were taken as samples. As many as 85 mother-child pairs who were recorded at Puskesmas Tambak Wedi, Surabaya City, were involved.

The independent variables in this study were divided into child, mother, and family factors.

Child factors included age, sex, and birth order. The age was classified into two groups: 12-36 and 37-59 months old. Birth order was classified from number 1 to number 5.

Mother's factors included age, level of education, and complementary feeding practice. The age was classified into ≤ 30 and >30 years old. The level of education was divided into four groups: elementary school, junior high school, senior high school, and diploma/university graduates. Complementary feeding practice was assessed by using the modified child feeding questionnaire, a self-report measure to assess parental beliefs, attitudes, and practices regarding child feeding [29], [30]. It consists of 15 questions about food quality, food quantity, and meal frequency measured using a 5-point Likert-type scale (always=4; sometimes=3; rare=2; never=1) [31]. Complementary feeding practice was categorized as good (optimal 33-60) and poor (sub-optimal 1-32). The modification of the child feeding questionnaire was already tested for its validity and reliability.

Family factors included another child aged less than 59 months old, family size, and family's income. Households with more than one child less than 59 months old were classified as yes, while the opposite was classified as no. Family size referred to the number people in the family. This was categorized into ≤5 persons and >5 persons. Family's income was assessed from monthly income earned by all family members who already had a job. Data were then compared to the regional minimum wage for Surabaya City. A family income of less than 3,583,000 IDR was categorized as poor, while ≥ 3,583,000 IDR was rich.

The dependent variable was stunting. Stunting was defined as height-for-age Z-score ≤-2 for the same age and sex by using the WHO Child Growth Standards median [2]. For the present study, the classification was divided into severe stunting (height-for-age Z-score ≤-3) and stunting (height-for-age Z-score ≤-2). Each child's height was measured by the researcher, using an infantometer.

This study obtained ethic approval from Universitas Airlangga (reference number 997-KEPK). All respondents were given information about the study during door-to-door data collection. Written informed consent was obtained from the mothers for themselves and also as the guardian of their children, which permitted children's participation.

Descriptive statistics were used to summarize the characteristics of samples. Bivariate analysis by using chi-square was performed to analyze the correlation between risk factors and stunting, as well as the Odds Ratio (OR). Multivariate analyses were performed with Nominal Regression test (level of significance 95%).

III. RESULTS

Most of the children had severe stunting (74.1%). More than half were 12-36 months old (54.1%), male (57.6%), and many of them were the first children (40.0%). Slightly more than half of the mothers were aged ≥ 30 years old. Many of them had graduated from elementary school (44.7%). The majority of them were already performing good complementary feeding practice for their children (70.5%). Mostly, mothers said that their household didn't have another child aged less than 59 months old, except the child who was stunted (87.1%). As many as 64.7% of respondents reported the member in their household to be less than five, both children and adults. Almost all of the respondents (89.4%) were from a poor family with a monthly income less than the regional minimum wage for Surabaya City. The details of mother-child sociodemographic characteristics can be seen in Table 1.

Table 1. The sociodemographic characteristics of the mothers and their 12-59 month-old children (n = 85)

Characteristics		Severe Stunting		Stunting	
		n	%	n	%
Child's factors					
Age	12-23 months old	6	7.1	9	10.6
	24-59 months old	16	18.8	54	63.5
Sex	Male	14	16.5	35	41.2
	Female	8	9.4	28	32.9
Birth order	1st	13	15.3	21	24.7
	2nd	4	4.7	19	22.4
	3rd	4	4.7	10	11.8
	4th	0	0.0	10	11.8
	5th	1	1.2	3	3.5
Mother's factors					
Age	≥30 years old	14	16.5	26	30.6
	<30 years old	8	9.4	37	43.5
Level of education	Elementary school	11	12.9	27	31.8
	Junior high school	4	4.7	15	17.6
	Senior high school	6	7.1	20	23.5
	Diploma/university	1	1.2	1	1.2
Complementary feeding practice	Sub-optimal	12	14.1	13	15.3
	Optimal	10	11.8	50	58.8
Family's factors					
Other children aged ≤59 months old	No	21	24.7	53	62.4
	Yes	1	1.2	10	11.8
Size	≤ 5 people	18	21.2	37	43.5
	> 5 people	4	4.7	26	30.6
Income	Poor	19	22.4	57	67.1
	Rich	3	3.5	6	7.1

Table 2. The results of chi-square analysis

	Value	df	Asymptotic Significance (2-sided)
Child's age	1.892[a]	1	.169
Child's sex	.436[a]	1	.509
Child's birth order	7.115[a]	1	.130
Mother's age	3.274[a]	1	.070
Mother's level of education	1.130[a]	1	.770
Mother's complementary feeding practice	9.032[a]	1	.003

A household with another child < 59 mo	1.857[a]	1	.173
Family's size	3.806[a]	1	.051
Family's income	.291[a]	1	.589

Table 3. The odds ratios of stunting among 12-59 month-old children (n = 85)

Parameter Estimates	Estimate	Std. Error	Wald	df	Sig.	95% CI	
						Lower	Upper
Child's birth order: first	-3.339	1.182	7.979	1	.005	.003	.360
Child's birth order: second	-5.886	1.066	30.479	1	.000	.000	.022
Complementary feeding practice: optimal	2.477	.812	9.294	1	.002	2.422	58.488

Table 2 shows the result of bivariate analysis by using chi-square test, which found that the mother's complementary feeding practice was significantly correlated with childhood stunting (p=0.003). Table 3 showed the result of a nominal regression test, which revealed that the first children were 3.339 times more likely to experience stunting rather than severe stunting (p<0.05), and the odds ratio increased for the second children (OR=5.886; p<0.05). Also, mothers who performed sub-optimal feeding practices were 2.477 times more likely to have children with severe stunting (p<0.05).

IV. DISCUSSION

This study aimed to analyze factors which correlate with stunting and severe stunting among children aged 12-59 months old in the coastal area of Surabaya City, East Java, Indonesia. The results revealed that the child's birth order and complementary feeding practice significantly correlated with stunting and severe stunting.

The study found that being a first or second child led to less likelihood of severe stunting. The previous study mentioned that children who were third, fourth, fifth, or more in the birth order were more likely to be stunted than children who were first in order [32]. Similar to the findings, a study in Bangladesh confirmed that children who were second in birth order with less than a 24-month birth interval were more likely to be stunted than children who were first in the birth order. This might be caused by competition for food within a household and mothers may fail to fulfil both children's nutritional needs [33]. Although most respondents only had one child aged 12-59 months old, one-third of them were living together with more than five family members. As a characteristic of coastal families, they live communally with 2-3 families. This can result in the number of residents in one house being between 8 and 11 people [34]. It increases the likelihood of having more than one child of less than 59 months old in each house. Higher birth order children were also less likely to consume diverse food groups, raising their probability of being stunted [35].

This study revealed a significant correlation between a mother's complementary feeding practice and the risk of stunting. Children whose mothers performed sub-optimal feeding practices were more likely to be severely stunted. This is similar to previous research findings [5], [23], [36], [37].The critical period for stunting is associated with feeding transition from breastfeeding to complementary feeding [38]. Age-inappropriate feeding which includes infrequent feeding, feeding insufficient quantities and low dietary diversity were associated with increased odds of stunting in children [39]. The coastal area is abundant in fish and seafood. If managed properly, it contains high-quality protein, which benefits children's nutrition [20]. However, poverty is still a barrier for mothers in the coastal area in terms of providing nutritious food for their children [40]. Mostly, the kind of job taken by respondents' family

members was fishing (fisherman) with a monthly income of less than the regional minimum wage. Low purchasing power means the mother has a limited choice of nutritious food and ability to meet the recommended meal frequency for their children.

The strength of this study was the door-to-door assessment for data collection, which allowed the researcher to meet respondents face-to-face, besides observing their environmental condition. As a preliminary survey, this study had several limitations. The sample number used was too small to generalize the results. The cross-sectional study design also limited the ability to explore causation.

V. Conclusion

In conclusion, our analysis shows that birth order and complementary feeding practice are risk factors for stunting and severe stunting in a population of children aged 12-59 months in the coastal area of Surabaya City, East Java, Indonesia. The findings could benefit for health care providers and policymakers to design a health promotion program to manage and prevent childhood stunting, especially in the coastal area. Our study suggests that further research can be done to explore the risk factors for stunting among children by using a larger sample size.

Conflict Of Interest

The authors reported no potential for conflict of interest.

Acknowledgement

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