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Original Article

Determinants of Stunting Among Children Under Two Years of Age in Batu Bara District, Indonesia

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ABSTRACT

Batubara District is one of 33 districts/cities in North Sumatra Province with relatively high stunting prevalence. This study aimed to determine the determinants of stunting among children under two years of age in the Laut Tador Health Center work area of Batu Bara District in 2023. The design of this study was case-control. The number of samples was 154 (case), and control was 154 (non-stunting). Respondents were mothers of children under two years of age. Independent variables were chosen based on the preliminary study results in the study area, including the mother's education, mother's knowledge, family income, history of mother on ANC visits, history of mother taking iron tablets, history of child getting exclusive breastfeeding, and history of child getting complementary feeding. Trained health workers and members of the researcher team collected all data. Analysis data included univariate, bivariate analysis using chi-square and multivariate (logistic regression) analysis. The study showed that there were significant differences between family income (p < 0.001), history of mother on ANC visits (p < 0,001), history of a mother taking iron tablets (p=0.043), history of children under two years getting exclusive breastfeeding (p < 0.001), and history of children under two years of getting complementary feeding (p < 0.001) and stunting, respectively. The role of health posts (Posyandu) and village cadres should be improved to provide information about antenatal care, taking iron tablets during pregnancy, exclusive breastfeeding, and complementary feeding to pregnant women, including monitoring children's growth.

Keywords: Stunting, Children Under Two Years of Age, Laut Tador Health Center Work Area, Batu Bara District, North Sumatra, Indonesia

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INTRODUCTION

According to World Health Organization, stunting is defined as a height that is more than two standard deviations below the WHO child growth standards median. In early life, stunting can occur in the first 1000 days from conception until the child is under two years of age[1-3].

The short-term impacts of stunting include poor cognitive and educational performance, and the long-term impacts are low adult wages, lost productivity, and increasing susceptibility to degenerative diseases[4,30-31].

Globally, more than 162 million children under five have stunted growth[9-10]. In Africa, the prevalence of stunting was 37.2%, 34.6% and 33.6% in 2010, 2015 and 2017, respectively. This prevalence is similar to the prevalence in Southeast Asia, which was 39.5% (2010), 34.8% (2015), and 33.0% in 2017. However, in America, the prevalence is lower than in Africa and Southeast Asia, with a prevalence of 7.9% in 2010, and 6.3% in 2017[2].

In Indonesia, the prevalence of stunting among children under five years of age was 36.8%, 35.6%, 37.2%, and 30.8% in 2007, 2010, 2013, and 2018, respectively, 27.7% in 2019,

and 24.4% in 2021[4-8].

In North Sumatra, the prevalence of stunting among children under five years of age was 28.7% in 2020 (E-PPGBM, 2020), and 25.8% (2021), and 21.2% in 2022 (SSGI, 2022).

Batubara District (Fig. 1) is one of 33 districts/cities in North Sumatra Province with relatively high stunting prevalence in children under five years of age. In 2018, 2019, and 2020, 2021, and 2022, the prevalence was 32.3%, 30.1%, 28.7%, 25.8%, and 21.2%, respectively[6].

Based on the 2023 E-PPGBM data, the number of children under two years of age in the Laut Tador Health Center work area of Batu Bara District was 428, and 36.0% (154/428) among them were stunted.

Current stunting prevention programs in Indonesia include taking iron tablets during pregnancy (one tablet, minimum 90 tablets), ANC visits (at least six times), consume animal protein daily for babies over six months of age, monitoring growth and development, immunisation of children five years of age at the health post (Posyandu) every month, and exclusive breastfeeding for six months continued until two years of age including complementary feeding for complement breastfeeding (MP-ASI)[8-9].

This study aimed to determine the determinants of stunting in the Laut Tador Health Center work area of Batu Bara District, North Sumatra in 2023.

METHOD

The Laut Tador Health Center work area of Batu Bara District had a 3060 population, with 1504 males and 1556 females. The number of heads of families was 978, and the population density was 215.71 people/km2. The study was conducted in all (ten) villages (Tanjung Prapat Village, Laut Tador, Pelanggiran, Perk Tanjung Kasau, Dwi Sri, Tanjung Kasau, Tanjung Seri, Mekar Sari, Sei Simujur, and Kandangan) in the Laut Tador Health Center work area of Batu Bara District from May 11 to 20, 2023.

The design of this study was case-control. The case was all (154) stunting in children under two years of age found in the study area in 2023 (the minimum sample size was not calculated). Stunting is defined as described previously by WHO[1]. The number of controls was 154 non-stunting among 274 (56.2%) children under two years in this area in 2013 that were selected by purposive sampling (case vs. control was 1:1).

Respondents were mothers of children under two years of age. After obtaining informed consent, each respondent was asked to complete a questionnaire focusing on possible risk factors (determinants) for stunting (Fig. 2b, c). The multiple choice questionnaire was adapted from the SSGI (*Survei Status Gizi Indonesia*), 2021. Trained health workers and members of the reseacher team collected all data.

Independent variables were chosen based on the preliminary study results of 40 mothers of children with stunting conducted in the study area in March 2023, included the mother's education, mother's knowledge of stunting, family income, history of mother on (frequently) ANC visits, history of mother taking iron tablets during pregnancy, history of child getting exclusive breastfeeding, and history of child getting complementary feeding.

Analysis data included univariate, bivariate, and multivariate (logistic regression) analysis. Bivariate analysis was conducted using Pearson's chi-square. Fisher's exact test was used if one or more of the values in a 2 × 2 contingency table was less than 5. Logistic regression analysis was performed to determine variables associated with stunting. Based on bivariate analyses results, all variables with *p*-values < 0,25 were selected for multivariate analysis. A p-value < 0.05 was considered statistically significant. Quantitative data analysis was conducted using SPSS program v.22 (IBM).

This study was approved by the Health Research Ethics Committee, Sari Mutiara Indonesia University, Medan (Number 2287F/KEP/USM/VII/2023 (dated July 31, 2023), and declared to be ethically appropriate in accordance with seven WHO 2011 standards, including social value, scientific assessment and benefits, risks, persuasion/exploitation, confidentiality and informed concern referring to the 2016 CIOMS Guidelines.

RESULTS

After obtaining informed consent, each child's mother was asked to complete a questionnaire focusing on possible risk factors for stunting in children under two years of age (Fig. 2b, c). A total of 248 respondents agreed to complete the questionnaire.

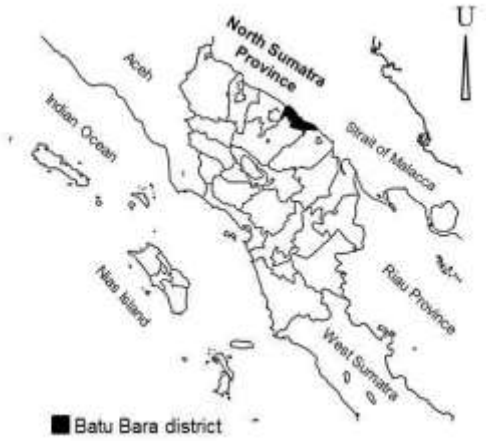

Fig. 1. Maps of North Sumatra Province showing the location of the study. North Sumatra Province consists of 25 districts and eight cities. The black square indicates the Batu Bara District.

Overall (case and control), the majority (89.9%; 223/248) of respondents had intermediate (junior and senior high schools) to low (no school or elementary school) education, 61.3% (152/248) had low knowledge of stunting (includes the definition, causes, characteristics and consequences), 66,9% (166/248) sufficient family income, 53.2% (132/248) visited ANC less than six times during pregnancy, 52.5% (130/248) took iron tablets less than 90 tablets during pregnancy, 85.2% (211/248) of the children did not get exclusive breastfeeding (up to 6 months), and 84.7% (210/248) of children did not get complementary feeding.

Table 1. Response to questionnaire administered to respondents regarding possible risk factors for stunting in the Laut Tador Health Center work area of Batu Bara District, 2023 (n=248)

Independent variable	n (%)
Mother's education	
Intermediate-low	223/248 (89.9)
High	25/248 (10.1)
Mother's knowledge of stunting	
Insufficient	152/248 (61.3)
Sufficient	96/248 (38.7)
Family income	
Insufficient	82/248 (33.1)
Sufficient	166/248 (66.9)
History of mother on ANC visits	
Inadequate	132/248 (53.2)
Adequate	116/248 (46.8)
History of mother taking iron tablets	
Insufficient	130/248 (52.5)
Sufficient	118/248 (47.5)
History of child getting exclusive breastfeeding	
Insufficient	211/248 (85.2)
Sufficient	37/248 (14.8)
History of child getting complementary feeding	
Insufficient	210/248 (84.7)
Sufficient	38/248 (15.3)

Based on bivariate analysis results, independent variables were selected that had a value of $p < 0.25$ into the multivariate model.

The final step of multivariate analysis (Table 3) showed that there were significant differences between family income ($p < 0.001$) (OR=5.98, 95%CI: 3.369 – 6.602), history of mother on ANC visits during pregnancy ($p < 0,001$) (OR=3.01, 95%CI: 4.369 – 6.602), history of a mother taking iron tablets during pregnancy ($p=0.043$) (OR=3.23, 95%CI: 2.379 – 6.512), history of children under two years getting exclusive breastfeeding ($p < 0.001$) (OR=2.45, 95%CI: 3.329 – 5.602), and history of children under two years of getting complementary feeding to complement breastfeeding between 6 months and 24 months of age ($p < 0.001$) (OR=9.77, 95%CI: 9.329 – 9.902) and stunting, respectively.

Table 2. The relationship between independent variables and stunting among children under two years of age in the Tador Laut Health Center work area of Batu Bara District, 2023

Independent variable	Dependent variable		*p*-value*
	Stunting	Non-stunting	
	n (%)	n (%)	
Mother's education			
Intermediate-low High	112/124 (91.8)	111/124 (88.1)	0.910
	12/124 (8.2)	13/124 (11.9)	
Mother's knowledge of stunting			
Insufficient	68/124 (54.8)	84/124 (67.7)	0.911
Sufficient	56/124 (45.2)	40/124 (32.3)	
Family income			
Insufficient	82/124 (66.1)	0/124 (0.0)	0.002
Sufficient	42/124 (33.9)	124/124 (100)	
History of mother on ANC visits			
Inadequate	77/124 (62.1)	55/124 (44.3)	0.004
Adequate	47/124 (37.9)	69/124 (55.7)	
History of mother taking iron tablets			
Insufficient	76/124 (61.2)	54/124 (43.5)	< 0.001
Sufficient	48/124 (38.8)	70/124 (56.5)	
History of child getting exclusive breastfeeding			
Insufficient	111/124 (89.5)	100/124 (80.6)	< 0.001
Sufficient	13/124 (10.5)	24/124 (19.4)	
History of child getting complementary feeding			
Insufficient	111/124 (89.5)	99/124 (79.8)	0.003
Sufficient	13/124 (10.5)	25/124 (20.2)	

The dominant variable associated with stunting among children under two years of age in the Laut Tador Health Center work area of Batu Bara District was the history of the child getting complementary feeding.

Table 3. The final stage of multivariate analysis on the relationship between independent variables and stunting among children under two years of age in the Tador Laut Health Center work area of Batu Bara District, 2023

Variable	coefficient	S.E.	DF	*p*-value	OR	95%CI
Family income	2.267	3.701	1	< 0.001	5.98	3.369 – 6.602
History of mother on ANC visits	-2.071	4.830	1	< 0.001	3.01	4.369 – 6.602
History of mother taking iron tablets	-0.121	0.586	1	0.043	3.23	2.379 – 6.512
History child getting exclusive breastfeeding	-1.717	1.295	1	< 0.001	2.45	3.329 – 5.602
History of child getting complementary feeding	1.840	1.295	1	< 0.001	9.77	9.329 – 9.902

Fig. 2. Images showing height measurement taken on a child (2a) and data collected using questionnaires (2b, c).

DISCUSSION

This study revealed a stunting prevalence of 36.0% (154/428) in the Laut Tador Health Center work area of Batu Bara District. The target for district-level stunting control programs in Indonesia is to decrease the prevalence of stunting to 18.4% (2022), 16.0% (2023), and 14.0% in 2024[4-8].

The factors associated with stunting in this study area were family income, history of mother on ANC visits during pregnancy, history of mother taking iron tablets during pregnancy, history of children under two years getting exclusive breastfeeding, and history of children under two years of getting complementary feeding.

Family income

A study by Zhang et al, showed that household social and economic factors, including household income per capita and maternal education, were significant predictors of stunting in children under five. Household income appeared to decrease the odds of undernutrition among children in a graded fashion (95% CI: 0.59 - 0.90)[12]. The economic situation is one of the contextual causes of stunting[13], and there was an association between stunting prevalence and income per capita in a country[22]. Children from poor households are at higher risk of stunting. There was an association between family wealth and stunting. Low-income families related to limited resources consuming high-quality nutritional foods and access to healthcare facilities[14-15,18,20,22,28].

History of mother on ANC visits during pregnancy

The frequency of pregnant women visiting ANC had a significant relationship with stunting in children under five years of age (p=0.04) because pregnant women can get health information on improving their health status and children during ANC. The information also related to breastfeeding and child-feeding practices [23-24].

History of mother taking iron tablets during pregnancy

The risk of stunting in children 6-24 months of age increased in mothers who did not receive iron supplementation than of mothers who received iron supplementation during pregnancy (OR=3.889; 95%CI: 1.071-14.126) (Sari K. & Sartika RAD., 2023).

History of children under two years getting exclusive breastfeeding

Optimal breastfeeding prevents more than 823 thousand child deaths and 20 thousand maternal deaths yearly. Children who do not receive exclusive breastfeeding have a 2.6 times higher risk of stunting at 0-6 months and twice at the age of 6 to 23 months. However, in the last three years (from 2018 to 2020), the percentage of exclusively breastfeeding decreased from 68.7% in 2018 to 53.9% in 2020[4-8].

History of children under two years of getting complementary feeding

In Indonesia, stunting increased during the complementary feeding period from 22% at 6 months of age to 38% at 24 months of age. Complementary feeding refers to the introduction of solid or semi-solid foods to

complement breastfeeding and take place between 6 months and 24 months of age [9-10].

On the other hand, we assumed those significant factors in this study were also likely due to the contributions of COVID-19 pandemic since all mothers and children were pregnant and born during the pandemic. Since COVID-19 was declared a global pandemic in March 2020, social lives have been upended, and economic activities disrupted around the world, including in Indonesia[25]. The Ministry of Health-UNICEF Rapid Survey 2020 results revealed a decline in essential health services at the start of the COVID-19 pandemic. More than 75% of Posyandu need to provide services, and more than 41% of home visits have stopped. Most health centres reported that less than 10% of their services had been disrupted. However, to confirm our assumption, further study is needed.

Maternal and child health challenges (the mortality and morbidity of mothers, newborns, infants, and toddlers) are closely related to nutritional problems. Therefore, the Indonesian government's strategy includes improving maternal, child and reproductive health, accelerating improvements of community nutrition to prevent and control nutritional problems, and accelerating stunting reduction by increasing the effectiveness of local area-specific and integrated interventions[9-10].

In Batu Bara District, the local government has implemented complementary feeding (MP-ASI) activities and the local food menu for children under five years has been formulated by a nutritionist (Tenaga Gizi Pendamping) and Indonesian Nutrition Association[27].

In 2022, the head of the Batu Bara District provided regulation on convergence priority villages for integrated stunting reduction. Forty-one villages are included based on the distribution of stunting in children under five. This regulation is one of the local government's efforts to reduce the stunting in Batu Bara District[27].

CONCLUSION

The determinants of stunting in the Laut Tador Health Center work area in 2023 were family income, history of mother on ANC visits during pregnancy, history of mother taking iron tablets during pregnancy, history of children under two years getting exclusive breastfeeding, and history of children under two years of getting complementary feeding. The dominant variable associated with stunting was the history of the child getting complementary feeding. Those significant factors were also likely due to the contributions of the COVID-19 pandemic. However, to confirm our assumption, further study is needed.

The Recommendation is that the commitment of multiple sectors is necessary to implement the Regulation on Convergence Priority Villages for Integrated Stunting Reduction that the head of Batu Bara District declared in 2022, particularly in complementary feeding programs for children under two years of age. In addition, the role of health posts (Posyandu) and village cadres should be improved to provide information about antenatal care, taking iron tablets during pregnancy, exclusive breastfeeding, and complementary feeding to pregnant women, including monitoring children's growth.

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CONFLICTS OF INTEREST

The authors report no conflict of interest.

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