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ORIGINAL ARTICLE

SOCIOECONOMIC AS STUNTING PREDICTOR ON CHILDREN AGED 24-59 MONTHS AT BEFORE AND DURING COVID-19 PANDEMIC

Sosial Ekonomi sebagai Prediktor Stunting pada Anak Usia 24-59 Bulan Sebelum dan Selama Pandemi COVID-19

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ABSTRACT

Background: Stunting is a high-priority malnutrition problem globally. The COVID-19 pandemic was predicted to increase hunger and worsen the condition of stunted children. **Purpose:** To determine the socioeconomic factors for stunting in children aged 24-59 months before and during the COVID-19 pandemic in the Magelang Regency. **Methods:** This study used a case-control design from August to November 2021. Subjects were children under five aged 24-59 months from the Magelang Regency. The subjects consisted of 162 stunted children and 166 normal children. The nutritional status screening was derived from e-PPGBM data, and was further validated through repeated anthropometric measurements. Phone interviews with mothers or trustees were done to obtain primary data. Data were analyzed using a chi-square test and declared significant if the p-value was below 0.05. **Results:** Socioeconomic status factors significantly related to stunting before the COVID-19 pandemic were family income below the region's minimum wage (cOR = 2.18; 95% CI = 1.31-3.64), incapability to fulfill food and household needs (cOR = 2; 95% CI = 1.25-3.23), and incapability to save income (cOR = 2; 95% CI = 1.32-3.33). During the COVID-19 pandemic, a socioeconomic factor that was found to be significantly related to stunting was incapability to fulfill food and household needs (cOR = 1.57; 95% CI = 1-2.46). **Conclusion:** Low family income and incapability to fulfill food and household needs was strongly associated with stunting. Improvements to community empowerment and stunting prevention programs in response to COVID-19 need to be made to prevent new stunting cases.

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ABSTRAK

Latar belakang: *Stunting merupakan masalah gizi buruk yang menjadi prioritas global. Pandemi COVID-19 diprediksi meningkatkan kelaparan dan memperburuk kondisi anak-anak stunting.* ***Tujuan:*** *Penelitian ini bertujuan untuk mengetahui hubungan faktor sosial ekonomi dengan stunting pada anak usia 24-59 bulan selama masa pandemi Covid-19 di Kabupaten Magelang.* ***Metode:*** *Penelitian kuantitatif ini menggunakan desain case control. Subjek penelitian adalah balita usia 24-59 bulan yang berasal dari Kabupaten Magelang. Jumlah subjek penelitian adalah 162 anak stunting (kasus) dan 166 anak normal (kontrol). Skrining status gizi berasal dari data e-PPGBM, untuk selanjutnya divalidasi melalui pengukuran ulang antropometri. Data primer diperoleh dengan wawancara telepon kepada ibu atau wali. Data dianalisis menggunakan Chi-square dan dinyatakan signifikan jika P value < 0,05.* ***Hasil:*** *Hasil studi menunjukkan bahwa status sosial ekonomi yang berhubungan dengan stunting sebelum pandemi Covid-19 adalah pendapatan keluarga yang rendah di bawah standar gaji minimum daerah (OR = 2,18; CI 95% = 1,31-3,64), ketidakmampuan untuk memenuhi makanan dan kebutuhan rumah tangga (OR=2; 95%CI=1,25-3,23, dan ketidakmampuan menabung pendapatan/gaji (OR=2; 95%CI=1,32-3,33). Sedangkan pada masa pandemi Covid-19, status sosial ekonomi yang berhubungan signifikan dengan stunting adalah ketidakmampuan memenuhi kebutuhan pangan dan rumah tangga (OR=1,57; 95%CI=1-2,46).* ***Kesimpulan:*** *Status sosial ekonomi sangat berhubungan dengan stunting. Peningkatan program bantuan keuangan untuk keluarga miskin yang memiliki anak balita, terutama selama pandemi Covid-19 sangat membantu memenuhi kebutuhan sehari-hari dan menjaga ketahanan pangan keluarga. Selain itu, upaya pencegahan multisektor juga perlu ditingkatkan untuk menurunkan prevalensi stunting.*

INTRODUCTION

Stunting in children is a global public health problem that is associated with an increased risk of morbidity, mortality, non-communicable diseases in adulthood, low learning capacity, and productivity (1). About 22% of children under five around the world are stunted. Stunted children tend to be more susceptible to disease and infection, as well as experiencing cognitive development barriers (2). In middle-income countries, stunting relates with low socioeconomic or poor households. Socioeconomic is an important determinant of stunting in children under five (3). The COVID-19 pandemic has resulted in a massive global economic recession. Around 120 million people in the world are in extreme poverty conditions as a result of the COVID-19 pandemic (4).

The COVID-19 pandemic has been predicted to increase hunger cases and worsen the condition of malnourished children. UNICEF predicted that the COVID-19 pandemic would increase child malnutrition by around 15% (7 million children) in the first 12 months (5). The economic shock due to COVID-19 has been divided into three stages: 1) the virus attacks and subsequently have an impact on household income and expenditure; 2) various restrictions to control COVID-19 are carried out such as temporary travel bans, restrictions on public transportation, and business closures; and 3) restrictions on economic activities cause an economic downturn (6). COVID-19 has contributed to job loss, reduced income, decreased family welfare, and household financial insecurity in vulnerable populations (7,8). Most of the population living below the poverty line (10.86%) and vulnerable populations (30.77%) in Indonesia have been affected by the COVID-19 pandemic (6). A previous study found that the biggest stressors respondents experienced during the COVID-19 pandemic were related to financial problems such as borrowing money or not being able to pay bills (45.60%), losing their jobs (31.40%), and food insecurity in meeting basic household needs (20.40%) (9).

The Magelang Regency is a prominent stunting area and has contributed to the high number of positive COVID-19 cases in Central Java. Based on that condition, it would be insightful to investigate the impact of socioeconomic factors on stunting before and during the COVID-19 pandemic in the Magelang Regency.

METHODS

This was a quantitative study with a case-control design. Subjects were children aged 24-59 months who were divided into two groups. The case group consisted of 162 children who were stunted and the control group consisted of 166 children who had normal/non-stunted growth (based on a minimal sample size of 137 children per group). The children's stunting was measured using a median z-score height for age based on the WHO anthropometric standard. Children whose median height for their age was below minus 2 of the median standard deviation (-2SD) were grouped as stunted children. Both groups were obtained from the e-PPGBM and selected by simple randomization with location as a consideration. For the validity of nutritional status, the children's heights were re-measured by nutrition officers. Repeated measurement of subjects' anthropometric was obtained from a digital weighing instrument with an accuracy of 0.01 kg (AND) and a multifunctional height measuring instrument/stadiometer with an accuracy of 0.10 cm (SAGA).

Children aged 24-59 months were selected for this study with the consideration that they experienced the COVID-19 pandemic from the beginning and received the same exposure from the start, meaning the subject population was more homogeneous. Data for this study were collected during the pandemic from August to November 2021; thus, this was carried out with strict health protocols in place and with minimal contact with respondents to prevent COVID-19 transmission. Primary data were obtained by phone interviews. The research was done across ten primary public facilities with high COVID-19 cases and stunting prevalence. The ten primary public facilities were Salam, Sawangan II, Mungkid, Muntilan I, Muntilan II, Mertoyudan II, Borobudur, Salaman I, Salaman II, and Tegalrejo.

Socioeconomic status was measured using several variables: (1) steady job for the head of the household; (2) family income per month; (3) capability to fulfill food and household needs; (4) capability to save income; and (5) receiving government aid. Socioeconomic variables were asked about to children's parents or guardians directly. Parents were classified as having a steady job if they had constant work and a reliable income over a long period of time. Meanwhile, family income per month was categorized based on regional minimum wage in the Magelang Regency, which was as much as 2,075,000 rupiahs in 2021 and 1,882,000 rupiahs in 2019. Data for the capability to fulfill food and household needs and saving income variables were obtained from parents or guardians. The types of government aid programs referred to in this study include Bantuan Langsung Tunai (BLT), Program Keluarga Harapan (PKH), Bantuan Pangan Non Tunai (BPNT), BLT Usaha Mikro Kecil dan Menengah (UMKM), and BLT Dana Desa. Other sociodemographic characteristics were obtained through the children's parents or guardians. The pre-pandemic interview segment referred to the period of time prior to 2019. Meanwhile, the questions for the portion during the pandemic referred to the first year of the COVID-19 pandemic. Respondents were questioned about conditions during both time periods during the same interview as retrospective exposure by emphasizing the different conditions over time.

This study had child subjects as a risk group. To minimize COVID-19 transmission, direct contact with subjects was minimized and no biological specimens were taken. The research ethics permit was granted by the National Commission for Health Research Ethics at the Health Research and Development Agency, and has been approved under number LB.02.01/2/KE.352/2021, June 8, 2021.

Data were analyzed using SPSS 21 software. Subjects' characteristics were analyzed descriptively. The relationship between nutritional status and socioeconomic status was analyzed bivariately using a chi-square test with a significance level of $p<0.05$ and a 95% Confidence Interval (CI). The crude odds ratio and 95% CI were obtained from the risk estimate table, which simultaneously analyzed them alongside the chi-square test.

RESULTS

This study involved 328 respondents consisting of 162 stunted children and 166 normal children. Respondents' characteristics are shown

in Table 1. Most of the children were more than three years old, and almost equal between males and females. In the stunting group, about 30% of them had severe stunting. The majority of the fathers and mothers' education ended with high school. The mothers were mostly housewives. Meanwhile, most of the fathers were housekeepers, domestic, and related helpers.

The families' socioeconomic status was found to play a role in influencing the children's nutritional status. The relationship between family socioeconomic status and the stunting incidence before COVID-19 in the Magelang Regency is depicted in Table 2. Some aspects of the families' socioeconomic status before the pandemic were significantly related to stunting incidence in children aged 24-59 months. The socioeconomic factors that significantly related with stunting before the pandemic include family income below the region's minimum wage (OR = 2.18; 95% CI = 1.31-3.64), incapability to fulfill food and household needs (OR = 2; 95% CI = 1.25-3.23), and incapability of saving income (OR = 2; 95% CI = 1.32-3.33).

Table 3 shows aspects of the families' socioeconomic status that were related to stunting during the COVID-19 pandemic. One aspect that significantly related to stunting was incapability to fulfill food and household needs (OR = 1.57; 95% CI = 1-2.46).

This study revealed that socioeconomic status is significantly related to stunting before and during the COVID-19 pandemic in children aged 24-59 months in the Magelang Regency. Three socioeconomic factors were significantly related to stunting before the COVID-19 pandemic. Compared to the non-stunted group, stunted children under five were 2.18 times more likely to come from families with monthly incomes below the minimum wage, twice as likely to have parents incapable of fulfilling food and household needs, and twice as likely to have parents incapable of saving their income. Meanwhile, during the COVID-19 pandemic, there was only one socioeconomic factor associated with stunting: the inability of families to fulfill their food and household needs. Stunted children under five were found to be 1.6 times more likely to experience this. The risk was slightly lower than before the pandemic. This study showed that low family income before the COVID-19 pandemic increased the risk of stunting. This is in line with a previous study in Bangladesh which showed that rich families had a lower risk of having stunted children under five.

Table 1
Respondents' Sociodemographic Characteristics

Respondents' characteristics	n	%
Age		
24-36 months	116	35.37
37-59 months	212	64.63
Sex		
Male	161	49.09
Female	167	50.91
Height for age		
Normal (SD ≥ -2)	166	50.61
Stunted (-2,99 < SD < -2)	120	36.59
Severely stunted (SD < -3)	42	12.80
Mother's education		
No education	3	0.91
Graduated primary school	41	12.50
Graduated junior high school	98	29.88
Graduated senior high school	158	48.17
Graduated higher education	28	8.54
Father's education		
No education	1	0.30
Graduated primary school	64	19.51
Graduated junior high school	87	26.52
Graduated senior high school	148	45.12
Graduated higher education	28	8.54
Mother's occupation		
Unemployed	223	67.99
Government employee	5	1.52
Farmer, fisher	2	0.61
Housekeeper, domestic, and related helper	22	6.71
Private employee	29	8.84
Trader	45	13.72
Others	2	0.61
Father's occupation		
Unemployed	1	0.30
Government employee	5	1.52
Farmer, fisher	11	3.35
Housekeeper, domestic, and related helper	127	38.72
Private employee	66	20.12
Trader	116	35.37
Others	2	0.61

Table 2
Relationship between Family Socioeconomic Status and Stunting Before the COVID-19 Pandemic

Variables	Stunting				cOR 95%CI (min-max)	P
	Yes		No			
	N	%	N	%		
Head of household had a steady job						
No	60	37.04	61	36.75	0.97	0.52
Yes	102	62.96	105	63.25	(0.63 – 1.55)	
Family income per month						
Less than regional minimum wage	132	81.48	111	66.87	2.18	0.00*
Same or more than regional minimum wage	30	18.52	55	33.13	(1.31 – 3.64)	
Capability to fulfill food and household needs						
Incapable	63	38.89	40	24.10	2	0.00*
Capable	99	61.11	126	75.90	(1.25 – 3.23)	
Capability to save income						
Incapable	71	43.83	45	27.11	2	0.01*
Capable	91	56.17	131	78.92	(1.32 – 3.33)	
Received government aid						
No	129	79.63	137	82.53	0.83	0.30
Yes	33	20.37	29	17.47	(0.48 – 1.44)	

*P < 0.05 will be considered significant by the chi-square test; cOR: crude Odds Ratio

Table 3
Relationship between Family Socioeconomic Status and Stunting During the COVID-19 Pandemic

Variables	Stunting				cOR 95%CI (min-max)	P
	Yes		No			
	N	%	N	%		
Head of household has a steady job						
No	66	40.74	70	42.17	1.06	0.44
Yes	96	59.26	96	57.83	(0.68 – 1.65)	
Family income per month						
Less than regional minimum wage	136	83.95	134	80.72	1.25	0.27
Same or more than regional minimum wage	26	16.05	32	19.28	(0.70 – 2.20)	
Capability to fulfill food and household needs						
Incapable	72	44.44	56	33.73	1.57	0.03*
Capable	90	55.56	110	66.27	(1 – 2.46)	
Capability to save income						
Incapable	88	54.32	80	48.19	1.28	0.16
Capable	74	45.68	86	51.81	(0.83 – 1.97)	
Receiving government aid						
No	48	29.63	40	24.10	1.33	0.16
Yes	114	70.37	126	75.90	(0.81 – 2.17)	
Economic condition during the COVID-19 pandemic						
Feels more difficult	118	72.84	119	71.69	1.06	0.46
Feels the same as before the pandemic	44	27.16	47	28.31	(0.65 – 1.72)	

*P < 0.05 will be considered significant by the chi-square test; cOR: crude Odds Ratio

Simultaneously, several combinations of factors, such as children in poor families, aged more than 14 months with low paternal education further increased the risk of stunting (10). Research in Jember also showed that the risk of stunting was higher in families with low incomes (11). Meanwhile, during the pandemic, family income did not relate with stunting. This could be caused by the increasing amount of families that experienced decreasing salaries during the

COVID-19 pandemic, especially in the normal group. During the pandemic, some household heads lost their steady jobs, thus, influencing the family's income and decreasing their capability to fulfill food and household needs. Both groups had similar economic conditions during the pandemic.

Families in the normal group also experienced socioeconomic problems during the pandemic. Compared to conditions before the pandemic, there was an increase in the proportion of families in the normal group who had a monthly income below regional standards and could not save part of their income (66.87% vs 80.72% and 27.11% vs 48.19%, respectively). This caused children in the normal group to have increased risk equivalent to the children in the stunted group. As a result, these risk factors were not significantly associated with stunting conditions.

This study showed that the socioeconomic factor that still related to stunting during the pandemic was the inability to meet food and household needs. However, the risk was lower when compared to before the COVID-19 pandemic (OR: 2 vs 1.57). This might be because, even though families of non-stunted toddlers also experience this, it is not as severe as that of families with stunted toddlers. The ability to save income before the COVID-19 pandemic helped the non-stunting families to meet their food and household needs. Another protective factor was the aid program provided by the government during the COVID-19 pandemic. There was a significant increase in the number of families receiving government aid during the pandemic in both groups of respondents, reaching around 70%.

DISCUSSION

In Indonesia, the COVID-19 pandemic also impacted the national economic condition. Since social distancing policies were implemented by the central government in March 2020, economic activity has drastically decreased. This has had an impact on both the formal and informal sectors. In the formal sector, the social distancing policy has caused a high dismissal of labor. In the informal sector, the Work from Home policy caused difficulty for people who depend on their daily income to fulfill their daily needs. The informal sector's income has decreased drastically during the COVID-19 pandemic (12).

In line with a study in Bangladesh, families with mild and moderate food insecurity were found to be more likely to have stunted children than families with food availability (13). A previous study in Nepal found that most low-income families experienced food insecurity during the COVID-19 pandemic. They preferred to borrow money and food from landlords, reduce food variety, skipmeals, and reduce food portions (14). The COVID-19 pandemic has affected households' economy and caused them to act on coping mechanisms to fulfill daily needs. Furthermore, Li et al (15) found that nutritional problems and household socioeconomic conditions due to the economic shocks of the COVID-19 pandemic was hard experienced by stunting, wasting, and underweight children.

Socioeconomic factors (education and income) and food security factors (family food insecurity) have been associated with stunting in children under five (16). During the pandemic, the stability of food availability and affordability in the community were factors involved in food insecurity. Food insecurity caused by the COVID-19 pandemic in Uganda resulted in delayed food distribution and related with reduction of monthly per capita income below the poverty line (17). Meanwhile, a study in Jordan with more than 3,000 respondents revealed that 36% experienced moderate food insecure and 23% were severely insecure (18).

In Indonesia, the fiscal stimulus rolled out by the government was expected to reduce the economic impact of COVID-19 on welfare and household consumption, with a focus on providing government aid to the poor and most vulnerable groups. Direct cash aid was distributed from village funds for poor families to maximize the coverage of the government aid program (6). In addition to direct cash assistance, forms of social safety nets in Indonesia during the COVID-19 pandemic based on the National Disaster Management Agency included social assistance for basic foodstuffs, direct cash assistance from village funds, pre-employment cards, electricity subsidies, and family hope programs.

The Indonesian Ministry of Education also subsidized internet quotas to support students studying from home. There has been an increase in the budget and number of social assistance targets compared to before the COVID-19 pandemic. A previous study found that the implementation of government aid programs in the Kyrgyz Republic for poor families with children was an important social protection scheme to reduce stunting prevalence (19). In addition, during the COVID-19 pandemic, community initiatives emerged to help

each other, especially in food for families affected by COVID-19. Based on this, it can be concluded that the pandemic's impact on the ability of families to meet food and household needs can be minimized by the various forms of government social assistance and community cooperation.

This study showed that before and during the COVID-19 pandemic, families' incapability to fulfill food and household needs significantly increased risk of stunting. In line with a prior study, the inability to buy food was one of the risk factors for stunting. A study in Yemen showed that the inability to buy food was significantly associated with the incidence of stunting (OR = 11.98; 95% CI = 7.01-20.67) (20). In Indonesia, households with a severe inability to purchase food had the greatest risk of having a child with stunting problems (OR = 2.79 95% CI = 1.54–5.08) (21). However, a study in northern Thailand showed that there was no difference in the inability to buy food between the groups of stunted and non-stunted children (22). An analysis of the socioeconomic impact of COVID-19 in Indonesia conducted by UNICEF showed that declining family income has encouraged families to reduce or change financial allocations for food consumption needs. The results showed that 26.40% of respondents chose to reduce the financial allocation for non-food. However, 18% of respondents chose to reduce the allocation for food. The analysis also showed that inability to fulfill food needs was higher in families with children (12.60%) than in the general population (11.70%) (23).

Research Limitations

Due to the COVID-19 pandemic, this study had limitations in number of locations. This study was only conducted in eight districts out of the 21 districts in the Magelang Regency. As a result, these findings could not truly represent Magelang Regency's entire population. Nevertheless, these findings prove that socioeconomic factors are significantly related with stunting, mainly during the pandemic. These results support the call for the government to strengthen policies and programs related to socioeconomic improvement, especilally in the Magelang Regency as a prominent stunting area.

CONCLUSION

In conclusion, it was found that stunting in children aged 24-59 months in the Magelang Regency was strongly associated with low socioeconomic status before and during the COVID-19 pandemic. Moreover, the pandemic has worsened the economic conditions for middle and low-socioeconomic households, and made it harder to fulfill family needs. This finding supports the relevance of improving financial aid programs for poor families with children, mainly during the COVID-19 pandemic. The COVID-19 pandemic has the potential to increase the risk of chronic nutritional problems due to the community's lower economic capacity; therefore, policies are needed to strengthen families' economy through job creation, providing capital subsidies and assistance for micro, small, and medium enterprises, improving community skills for entrepreneurship according to local potential, providing fertilizer subsidies and improving skills for farmers, and promoting local tourism again.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

AUTHOR CONTRIBUTIONS

SNW conceived of the study, coordinated data collection, and performed the statistical analysis. SNW and SR drafted the manuscript. SNW, SR, TH and AH read and approved the final manuscript.

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