

Multilevel Analysis: The Impact of Conceptual Social Capital on Stunting in Children Under Five in Tulungagung Regency, East Java, Indonesia

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ABSTRACT

Background: Stunted children have inadequate nutritional intake, which may affect neural cell maturation and make them vulnerable to developmental delays, such as delayed motor development, lower cognitive ability, and slower social responses. Social capital can serve as a stimulatory resource within a community. The concept of social capital was initially understood as a form of trust that people place in their community and in individuals as members of that community. This study aimed to estimate the association of social capital with stunting among children under five years of age while accounting for contextual effects at the integrated community health post (posyandu) level.

Subjects and Method: This was an analytical cross-sectional study. The target population comprised children aged 6–59 months with stunting. The sample consisted of 100 stunted children aged 6–59 months and their mothers, and 100 non-stunted children aged 6–59 months and their mothers, randomly selected from the working areas of Sumbergempol, Tunggangri, and Rejotangan Primary Health Centers in Tulungagung Regency, East Java, Indonesia. The dependent variable was stunting. The independent variables were education, income, and social capital. The data were analyzed using multiple multilevel logistic regression, with posyandu as the second-level unit.

Results: Multilevel multiple logistic regression analysis showed that the risk of stunting among children under five was lower among those whose mothers had higher education ($\geq$ senior high school) ($b = -1.17$; 95% CI = -2.09 to -0.24 ; $p = 0.013$), whose parents had higher income ($\geq$ IDR 1,500,000/month) ($b = -0.94$; 95% CI = -1.59 to -0.28 ; $p = 0.013$), and who lived in communities with high social capital ($b = -0.69$; 95% CI = -1.34 to -0.03 ; $p = 0.039$). The analysis indicated a substantial contextual effect of factors at the posyandu level within villages on stunting among children under five (ICC = 8.90%).

Conclusion: The risk of stunting among children under five was lower among children whose mothers had higher education ($\geq$ senior high school), whose parents had higher income ($\geq$ IDR 1,500,000/month), and who lived in communities with high social capital.

Keywords: children under five, education, income, social capital, stunting,

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BACKGROUND

Growth and development during this period require serious attention. Children under five are more receptive to learning processes but are also highly sensitive to both supportive and unsupportive environments (Titaley et al., 2019). Stunting is a global public health problem that affects children's potential for linear growth (Reurings et al., 2013). Stunting in developing countries such as Indonesia remains a public health problem that requires serious and sustained intervention (Laksono et al., 2022). According to stunting prevalence data compiled by the World Health Organization (WHO), Indonesia was among the three countries with the highest prevalence of stunting in Southeast Asia, with an average prevalence of 36.4% during 2005–2017. Based on the 2018 Basic Health Research (*Riskesdas*), the prevalence of stunting among children under five reached 30.8%, meaning that approximately one in three children under five experienced stunting. This figure had not met the WHO standard, which sets 20% as the maximum acceptable prevalence of stunting, indicating that the burden of stunting among children under five in Indonesia remained high (Lukman et al., 2022).

Stunting is a chronic nutritional problem caused by multiple factors, including socioeconomic conditions, maternal nutrition during pregnancy, infant morbidity, and inadequate nutritional intake during infancy. In the future, stunted children may experience difficulties in achieving optimal physical and cognitive development (Trihono et al., 2015). Stunted children have inadequate nutritional intake, which may affect neural cell maturation and make them vulnerable to developmental delays, such as delayed motor development, lower cognitive ability, and

slower social responses (Muhoozi et al., 2016).

Social capital can serve as a stimulatory resource within a community. The concept of social capital was initially understood as a form of trust that people place in their community and in individuals as members of that community. Communities establish shared agreements as values within the community. Social capital can serve as a foundation and determinant of an orderly and prosperous community life. It can also represent both potential and energy for bridging, strengthening, and stimulating other forms of capital within a community. Social capital is a potential resource that individuals within a community can optimize to overcome the problems they face (Sari, 2022).

The concept of social capital used in addressing stunting views social capital as consisting of social networks and norms of trust. The quality of social relationships among individuals is influenced by their capacity to solve the problems they face. Therefore, social capital is understood as a resource for collective action aimed at achieving greater outcomes (Nahar et al., 2020).

Factors that may influence stunting include interpersonal relationships, civic participation, social trust, reciprocal norms, shared beliefs, and social support. The purpose of this study was to estimate the association of social capital with stunting among children under five years of age while accounting for contextual effects at the integrated community health post (*posyandu*) level

SUBJECTS AND METHOD

1. Study Design

This was a quantitative study using an analytical cross-sectional observational design conducted from January to February 2024.

2. Population and Sample

The target population comprised mothers with children aged 6–59 months with stunting and children aged 6–58 months without stunting in 22 villages. The working area of Sumbergempol Primary Health Center included 8 villages (Doroampel, Wonorejo, Bendijati Wetan, Jabalsari, Bukur, Sumberdadi, Bendiljati Kulon, and Sambirobyong); Tunggangri Primary Health Center included 8 villages (Winong, Salakkembang, Tunggangri, Jabon, Pager-sari, Betak, Tanjung, and Domasan); and Rejotangan Primary Health Center included 6 villages (Rejotangan, Blimbing, Pakesrejo, Tanen, Ariyojeding, and Sumberagung) in Tulungagung Regency. The sample consisted of 100 mothers and children aged 6–59 months with stunting and 100 mothers and children aged 6–59 months without stunting in the working area of Sumbergempol Primary Health Center, Tulungagung Regency. Thus, the total sample comprised 200 respondents.

3. Study Variables

The study included dependent and independent variables. The dependent variable was stunting. The independent variables were interpersonal relationships, civic participation, social trust, reciprocal norms, shared beliefs, and social support.

4. Operational Definition of Variables

Interpersonal relationships are a form of social relationship established by individuals as members of a rural community, including vertical relationships with other members who have greater authority or power within the village, such as village officials, community leaders, and others.

Civic participation refers to the involvement of individuals as members of the community in which they live. The benefits of social capital that can be obtained depend on the strength of their social relationships with others. Participation in various local

community activities is one way of investing in social capital.

Social trust is an important component when an individual engages in an enterprise or productive activity. Because individuals have limitations in predicting and managing uncertainty, they need to establish trusting relationships with others.

Reciprocal norms refer to the social rules that people need in community life. These collective rules are usually unwritten but understood by all members of society and determine expected patterns of behavior in the context of social relationships. Norms can be regarded as concrete manifestations of values and guidelines that contain obligations, permissions, and prohibitions.

Shared beliefs refer to human beings as a form of social resource and are understood as shared rules of the game that guide individual behavior.

Social support is a form of social capital that functions as collective energy originating from the community itself and depends on the quality and quantity of social relationships among individuals within the community.

Stunting is a major nutritional problem that has impacts on the social and economic life of the community.

5. Study Instruments

Data collection, including questionnaire administration, weighing, and anthropometric measurements, was conducted at *posyandu* according to the schedule of each *posyandu* in the village.

6. Data Analysis

Univariate analysis was performed to obtain the frequency distribution and percentages of the characteristics of the study subjects. Bivariate analysis was conducted to analyze differences between the independent and dependent variables, while multivariate analysis used multilevel multiple logistic regression.

7. Research Ethic

Research ethics, including informed consent, anonymity, and confidentiality, were carefully maintained throughout the study. Ethical approval was obtained from the Research Ethics Committee of dr. Sayidiman Magetan Regional Hospital, East Java, Indonesia (No. 445/35/403.300-/2024) on January 3, 2024.

RESULTS

1. Univariate Analysis

The univariate analysis presents the mean, standard deviation, minimum, and

maximum values for each study variable, including sex, income, education, social capital, maternal age, child age, social support, shared beliefs, civic participation, social trust, reciprocal norms, and social relationships.

Table 2 shows that the lowest minimum value was 1 for child age, while the highest maximum value was 49 for maternal age. The lowest mean was 2.12 for child age, while the highest mean was 31.39 for maternal age. The lowest standard deviation was 0.97 for child age, while the highest was 5.99 for maternal age.

Table 1. Univariate analysis of categorical data

Variable	Category	N	%
Sex	Male	95	47.50
	Female	105	52.50
Income	< IDR 1,500,000	96	48
	≥ IDR 1,500,000	104	52
Education	< senior high school	159	79.50
	> senior high school	41	20.50
Social capital	Low	92	46
	High	108	54

Table 2. Univariate analysis of continous data

Variable	n	Mean	SD	Min	Max
Maternal age	200	31.39	5.99	18	49
Child age	200	2.12	0.97	1	4
Social support	200	10.46	3.17	4	20
Shared beliefs	200	8.83	2.73	3	14
Civic participation	200	17.07	4.28	6	30
Social trust	200	6.82	2.78	5	25
Reciprocal norms	200	15.15	3.78	4	20
International relationships	200	9.64	2.39	3	15

2. Bivariate Analysis

Table 3 shows an association between maternal education and the risk of stunting among children under five. Mothers with an education level of ≥ senior high school had 0.17 times the odds of having a child with stunting compared with mothers with < senior high school education (OR = 0.17; 95% CI = 0.07–0.40; $p < 0.001$).

Table 3 shows an association between parental income and the risk of stunting

among children under five. Children whose parents had an income of ≥IDR 1,500,000/month had 0.31 times the odds of experiencing stunting compared with those whose parents had an income of <IDR 1,500,000/month (OR = 0.31; 95% CI= 0.17–0.56; $p < 0.001$).

Table 3 shows an association between social capital and the risk of stunting among children under five. Children living in communities with high social capital had

0.44 times the odds of experiencing stunting compared with those living in

communities with low social capital (OR= 0.44; 95% CI= 0.25–0.77; p= 0.005).

Table 3. Results of simple logistic regression of the association of social capital and other factors with stunting among children under five

Variables	OR	95% CI		P
		Lower limit	Upper limit	
Education ≥ senior high school	0.17	0.07	0.40	<0.001
Income ≥ IDR 1,500,000/month	0.31	0.17	0.56	<0.001
Social capital (high)	0.44	0.25	0.77	0.005

3. Multivariate Analysis

Table 4 presents the results of multilevel multiple logistic regression analysis of the association of social capital and contextual village effects with the risk of stunting among children under five. Family income was negatively associated with stunting. Mothers from households with an income of ≥ IDR 1,500,000/month had log odds of having a child with stunting that were 0.94 units lower than those from households with an income of < IDR 1,500,000/month (b = -0.94; 95% CI = -1.59 to -0.28; p = 0.013).

Education was negatively associated with stunting. Mothers with an education level of ≥ senior high school had log odds of having a child with stunting that were 1.17

units lower than mothers with < senior high school education (b = -1.17; 95% CI = -2.09 to -0.24; p = 0.013).

Social capital was negatively associated with stunting. Children living in communities with high social capital had log odds of experiencing stunting that were 0.69 units lower than those living in communities with low social capital (b= -0.69; 95% CI= -1.34 to -0.03; p= 0.039).

Multilevel multiple logistic regression analysis showed a contextual effect of factors at the posyandu level within villages on stunting among children under five (ICC= 8.90%). This means that 8.90% of the variation in stunting was attributable to factors at the posyandu level.

Table 4. Results of multiple multilevel logistic regression analysis of the association of social capital, education, and income with stunting among children under five

Independent Variable	Regression coefficient (b)	95% CI		p
		Lower limit	Upper limit	
Fixed effect				
Social capital (high)	-0.69	-1.34	-0.34	0.039
Education (≥ senior high school)	-1.17	-2.09	-0.24	0.013
Income (≥ IDR 1,500,000/month)	-0.94	-1.60	-0.28	0.005
Random effect				
Posyandu within village				
Var (constant)	0.32	0.039	2.648	
N observations = 200				
N groups = 22				
Log likelihood = 121.16				
p < 0.001, ICC = 8.75%				

DISCUSSION

Association of Income with Stunting

The results of this multilevel analysis provide evidence that family income is negatively associated with stunting. Mothers from households with higher monthly income had lower log odds of having a child with stunting than mothers from households with lower monthly income.

One important factor in achieving good nutritional status is family income; if a family does not have sufficient financial resources, it may not be able to meet its nutritional needs. Low family income affects the quality and quantity of food consumed by the family (Muslimah et al., 2020).

Food consumed by families is often less varied and available in smaller quantities, particularly staple foods that are important for child growth. Consequently, children may be at risk of inadequate nutrition and stunting. However, the assumption that only families with sufficient or high incomes can consume healthy foods should be reconsidered. Knowledge of the nutrient content of different foods can help mothers and families choose foods that are affordable but nutritionally adequate (Kusumawati et al., 2015).

Association of Education with Stunting

The results of this multilevel analysis provide evidence that education is negatively associated with stunting. Mothers with higher education had lower log odds of having a child with stunting than mothers with lower education.

Maternal education affects protein and energy intake, which may indirectly affect stunting status. Most mothers had higher levels of education, namely senior high school and higher education. However, they did not necessarily have extensive knowledge because their knowledge was derived from both formal and non-formal education

(Ramli et al., 2022). Low maternal education may result in limited access to information and knowledge, leading to lower awareness and an inability to implement clean and healthy living behaviors and meet nutritional needs.

Mothers with higher education are more likely to educate and care for their children according to their needs. Parents with higher educational attainment have greater opportunities to obtain better employment, which may ultimately affect their household income and food choices (Salma et al., 2022).

Association of Social Capital with Stunting

The results of this multilevel analysis provide evidence that social capital is negatively associated with stunting. Children living in communities with high social capital had lower log odds of experiencing stunting than children living in communities with low social capital.

Children's health can be improved through social capital in the form of mothers' active participation in community activities; limitations in human and financial capital can be compensated for through social capital (Fantay et al., 2019). The health of children from families with limited human and financial capital can be improved through the role of social capital, particularly the social capital possessed by mothers. Social capital is a potential resource that can influence community members to adopt healthy behaviors and utilize health services. Higher maternal social capital is associated with a lower risk of health problems in children (Hamdi et al., 2023).

AUTHORS CONTRIBUTION

Ayun Widya Rizki selected the research topic and collected the research data. Didik

Tamtomo and Bhisma Murti analyzed the data and reviewed the research document.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

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