

ORIGINAL ARTICLE

From Growth to Greatness: Key Factors in Overcoming Stunting

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ABSTRACT

Introduction: Child malnutrition, including stunting, continues to affect millions, hindering physical and cognitive growth and posing risks to national development. Addressing this issue requires a comprehensive approach integrating key factors to promote optimal child outcomes. This study analyzes the influence of key characteristics in overcoming child malnutrition to promote optimal child growth and development. **Materials and methods:** This study was conducted over six months (from March to November 2023) in Yogyakarta, Indonesia, using field research techniques with a cross-sectional study approach. Data collection involved questionnaires, structured interviews, and observations. A total of 200 respondents, comprising parents and their toddlers, participated in the study. The researchers used Structural Equation Modelling (SEM) to analyze the data. **Results:** The SEM conceptual test results for the model showed good fit indices (GFI = 0.865; AGFI = 0.829; RMSEA = 0.062, CFI = 0.904; TLI = 0.888; NFI = 0.806). The generated model is fit based on the goodness of fit statistics output from Amos version 26 software. Relationships between construct variables show that those with a significant direct effect on child growth are environmental health, family resilience, and holistic parenting. Meanwhile, social capital, the empowerment process, government support, and environmental health indicate significant indirect effects on child growth. **Conclusion:** This study identifies environmental health, family resilience, and holistic parenting as key direct factors influencing child growth, while social capital, empowerment, and government support have significant indirect effects. These findings highlight the need for integrated efforts to address child malnutrition through a multidimensional approach.

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INTRODUCTION

As of 2023, the global prevalence of stunting among children under five years old is significant but has been gradually declining over the past decade. In 2022, an estimated 148.1 million children were stunted, representing about 22.3% of the global population under five years old. Most of these children live in Asia (52%) and Africa (43%). Despite this decline, the progress has been insufficient to meet global nutrition targets. Only about one-third of all countries are on track to halve the number of children affected by stunting by 2030. Additionally, 45 million children were affected by wasting (acute malnutrition), and 37 million were overweight in 2022 [1]. More intense and coordinated efforts are required to achieve these targets and address the broader impacts of malnutrition on children's health and development globally.

Indonesia mirrors this global challenge, with stunting remaining a significant concern. Based on the 2021 Indonesian Toddler Nutrition Status Study, the prevalence of stunting among toddlers in Indonesia was 24.4%. That means that almost a quarter of toddlers in Indonesia were stunted, or one in four toddlers experienced stunting in 2021. Although the stunting rate has reduced, it has not yet met the target prevalence of 14% by 2024. Indonesia still has a task to reduce the prevalence by 10.4% in the next 2.5 years [2]. One of the provinces in Indonesia that is facing stunting issues is Yogyakarta. The prevalence of stunting in Yogyakarta province was 11.08% in 2020, an increase from 10.69% in 2019.

Prolonged stunting issues can affect economic growth, poverty, and inequality. A generation that supports national development can be formed if children are born healthy, grow well, and receive quality education. Delays in children's growth can reduce Intelligence Quotient (IQ) scores by 10 to 15 points, lower school achievements, potentially reduce earnings by 20 percent when working, exacerbate poverty, and threaten the survival of future generations [3,4]. It is a crucial

threat to human quality in Indonesia and the nation's competitiveness. It can disrupt brain development, affecting abilities and performance in school, productivity, and creativity in productive ages [5].

Through the Sustainable Development Goals (SDGs), it is hoped that by 2030, Indonesia can end all forms of malnutrition in toddlers, including stunting and wasting. This movement involves various sectors and stakeholders working together to reduce the prevalence of stunting and other forms of malnutrition in Indonesia [6]. However, the results have not been maximized. Many people have not participated in promoting stunting reduction [7]. Families play an essential role in preventing stunting [8,9]. The causes of stunting include economic conditions, knowledge, education level, and family habits. Therefore, health promotion and family resilience are crucial in addressing stunting. The significant contribution of this research is to provide a basis for the government, especially in Yogyakarta, to make policies related to health promotion to improve family resilience, enhance child growth, and prevent stunting. This study analyzes the influence of key characteristics in overcoming child malnutrition to promote optimal child growth and development.

METHODS

Study design

This research used field research techniques with a cross-sectional approach to analyze the influence of key factors in overcoming child malnutrition to promote optimal child growth and development by depiction of the characteristics of social capital, the process of empowerment, government support, family resilience, holistic parenting, environmental health, and child growth.

Participants

The research was conducted for six months (from March to November 2023) in ten Integrated Health Service Posts (Posyandu) in the Kemantren Ngampilan sub-district, Yogyakarta, Indonesia. This sub-district is one of the top ten with the highest stunting rates in Yogyakarta City. Posyandu, short for Pos Pelayanan Terpadu (Integrated Health Service Post), is a community-based health service in Indonesia focused on maternal and child health, including immunization, growth monitoring, antenatal care, and nutrition counseling. Operated by trained community volunteers in collaboration with local health centers.

The total population of 355 refers to the number of mothers with toddlers who met the inclusion criteria (mothers and their toddlers aged 0-72 months) in the

selected area. Each mother was paired with her toddler, forming a mother-toddler dyad, which served as the unit of analysis. The sample size was determined using the Slovin formula with a 5% margin of error, and an additional 10% was included to account for potential dropouts, resulting in a required sample of 200 dyads. The research team established quotas based on the number of Posyandu, and data collectors continued recruiting participants at each site until they reached the assigned quota. Quota sampling was employed to ensure proportional representation across the study area, which consisted of ten Posyandu. The sample was evenly distributed, with 20 dyads recruited from each Posyandu. On average, each Posyandu serves approximately 30 toddlers per month.

Instruments development and validation

The researchers developed instruments based on relevant literature and contextualized them to the Indonesian setting. Constructs included social capital, empowerment process, government support, family resilience, holistic parenting, and environmental health. All items were developed in Bahasa Indonesia. Confirmatory factor analysis was conducted to assess construct validity, while internal consistency reliability evaluation used Cronbach's alpha. Preliminary item validity was examined using Pearson product-moment correlation.

The validation process followed the sequential steps:

- (1) Content validation, in which a panel of experts reviewed each item for clarity, relevance, and alignment with the theoretical constructs;
- (2) Item analysis, where preliminary item-total correlations were examined using Pearson's product-moment correlation to assess the consistency of individual items with the overall construct;
- (3) Reliability testing, in which internal consistency for each construct was evaluated using Cronbach's alpha, ensuring all constructs met the minimum acceptable threshold ($\alpha > 0.70$);
- (4) Confirmatory Factor Analysis (CFA), which was employed to confirm the hypothesized measurement model and evaluate factor loadings of each item on its corresponding latent construct. The CFA results indicated that the item was valid if its factor loading exceeded 0.50; and
- (5) Model fit evaluation, using multiple indices including CFI, TLI, RMSEA, and χ^2/df to ensure the overall adequacy of the measurement model. The instruments used in primary data collection to examine several variables illustrated in Table 1.

Table I: The instruments used in primary data collection

Constructs	Definition	Theory	#item	Range score	Question Example	Mean± SD	Cronbach's Alpha	Construct Validity	Interpretation
Social capital (SC)	A self-developed questionnaire to assess social/work networks, level of trust between individuals, adherence to norms, concern for others, and involvement in social organization activities.	Adapting Fukuyama's theoretical framework [10] to align with the local context and study objectives	3	a Likert scale (1-3)	"Members or administrators are actively involved in community empowerment activities related to family resilience, food security, and child development." (3: Always/Often, 2: Sometimes, 1: Never)	3± 0.596	0.81	SC1=0.799 SC2=0.552 SC3=0.825 CFA results indicate valid items because three items for factor loading values are more than 0.50	Higher score
Family resilience (FR)	A self-developed questionnaire to assess family quality reflected through the tranquility (includes religious activities, family legality, health insurance, family harmony, and experiences of living through divorce), independence (encompasses the fulfillment of basic needs, financial security, continuity of education, family health, and access to online media), and happiness (comprises family interaction and social interaction).	Combined with iBangga [11]	3	a Likert scale (1-3)	"In my family there is conflict within the household in the form of no greetings between family members/separate beds between husband and wife/leaving home/divorce/domestic violence" (3: Always/Often, 2: Sometimes, 1: Never)	2± 0.595	0.85	FR1=0.520 FR2=0.564 FR3=0.825 CFA results indicate valid items because three items	Higher score
Holistic parenting (HP)	A self-developed questionnaire comprising five dimensions of ability: meeting nutritional needs, caring for children, maintaining health, educating the child, and nurturing the child.	The extended model of care [12] health and development are closely tied to maternal nutrition, health and well-being. The underlying drivers of poor maternal and child nutritional outcomes in sub-Saharan Africa are structural in nature. These risks include social, economic, and environmental factors that together compound vulnerability to poor outcomes. Poverty, as a driver of poor maternal and child health outcomes, is an important determinant that is both a cause and a consequence of malnutrition. The United Nations' Children's Fund (UNICEF)	5	a Likert scale (1-3)	"I always get my children used to washing their hands with soap before and after activities such as (before and after eating, after defecating, after urinating, after playing)" (3: Always/Often, 2: Sometimes, 1: Never)	3± 0.628	0.83	HP1=0.771 HP2=0.868 HP3=0.548 HP4=0.537 HP5=0.676 CFA results indicate valid items because five items	Higher score

CONTINUE

Table 1: The instruments used in primary data collection (CONT.)

Constructs	Definition	Theory	#item	Range score	Question Example	Mean± SD	Cronbach's Alpha	Construct Validity	Interpretation
Environmental health (EH)	A self-developed questionnaire based on the scope of environmental health, including the physical quality of drinking water, ownership of toilets, and waste management.	The extended model of care [12] health and development are closely tied to maternal nutrition, health and well-being. The underlying drivers of poor maternal and child nutritional outcomes in sub-Saharan Africa are structural in nature. These risks include social, economic, and environmental factors that together compound vulnerability to poor outcomes. Poverty, as a driver of poor maternal and child health outcomes, is an important determinant that is both a cause and a consequence of malnutrition. The United Nations' Children's Fund (UNICEF)	3	3 a Likert scale (1-3)	"The water I use for drinking and cooking is tasteless, odorless and colorless (according to clean water requirements)." (3: Always/Frequently, 2: Sometimes, 1: Never)	3± 0.710	0.85	EH1=0.808 EH2=0.889 EH3=0.629 CFA results indicate valid items because three items	Higher score
Empowerment process (EP)	A self-developed questionnaire with three dimensions: awareness, capacity building, and utilization. Awareness includes three sub-indicators: cognitive (knowledge), belief, and healing. Capacity building comprises four sub-indicators: human resources, institutional regulations, and value systems.	The extended model of care [12] health and development are closely tied to maternal nutrition, health and well-being. The underlying drivers of poor maternal and child nutritional outcomes in sub-Saharan Africa are structural in nature. These risks include social, economic, and environmental factors that together compound vulnerability to poor outcomes. Poverty, as a driver of poor maternal and child health outcomes, is an important determinant that is both a cause and a consequence of malnutrition. The United Nations' Children's Fund (UNICEF)	3	3	"I am aware of the root of every problem in community empowerment activities related to family/food security and child development." (3: Very aware, 2: Quite aware, 1: Less aware)	3± 0.605	0.86	EP1=0.564 EP2=0.805 EP3=0.512 CFA results indicate valid items because three items	Higher score

CONTINUE

Table 1: The instruments used in primary data collection (CONT.)

Constructs	Definition	Theory	#item Range score	Question Example	Mean± SD	Cronbach's Alpha	Construct Validity	Interpretation
Government support (GS)	a self-developed questionnaire based on three indicators from the government role, including regulator, motivator (dynamisator), and facilitator. The regulator indicator includes two sub-indicators: empowerment regulations and government policies. The dynamisator indicator comprises four sub-indicators: socialization, mentoring, training, and field visits. The facilitator indicator is assessed based on the availability and quality of infrastructure and facilities.	The extended model of care [12] health and development are closely tied to maternal nutrition, health and well-being. The underlying drivers of poor maternal and child nutritional outcomes in sub-Saharan Africa are structural in nature. These risks include social, economic, and environmental factors that together compound vulnerability to poor outcomes. Poverty, as a driver of poor maternal and child health outcomes, is an important determinant that is both a cause and a consequence of malnutrition. The United Nations' Children's Fund (UNICEF)	3	"I am aware of and understand the root of the problems that arise in community empowerment activities related to family resilience, food security, and child development." (3: Always/Often, 2: Sometimes, 1: Never)	2± 0.708	0.84	GS1=0.536 GS2=0.819 GS3=0.739 CFA results indicate valid items because three items	Higher score
Child growth (CG)	Measured in units of length or height according to age.	Kementerian Kesehatan RI/Indonesian Health Ministry [13]	3	Classified into very short, short, normal, and tall	2±0.488	NA	CG1=0.816 CG2=0.674 CG3=0.729 CFA results indicate valid items because three items	Higher score

NA= Not Applicable

Data collection

Primary data on variables relevant to the study objectives, including social capital, empowerment process, government support, family resilience, holistic parenting, environmental health, and child development, were collected in ten Posyandu using validated questionnaires (proforma) and structured interviews by trained enumerators. The number of respondents per Posyandu was determined based on pre-established quotas to ensure proportional representation across sites (20 mothers and their children per Posyandu).

Furthermore, the researcher validated the Structural Equation Modeling (SEM) framework developed in this study using a Focus Group Discussion (FGD) involving five stakeholders. The FGD was not used to generate primary qualitative data for thematic analysis, but rather as a validation tool to complement the quantitative model developed through Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM). Specifically, after developing the SEM framework based on empirical data, we conducted an FGD involving five key stakeholders to assess the practical relevance, clarity, and applicability of the model in the field. This process is commonly referred to as model validation through expert judgment or qualitative triangulation, aiming to ensure that the statistically derived model is not only robust in terms of data fit but also meaningful in real-world contexts.

The stakeholders' consensus confirmed that the constructs and relationships reflected in the SEM accurately captured the key contributing factors to address child malnutrition, as experienced in the field. Therefore, the FGD served to strengthen the face validity and contextual validity of the SEM findings, bridging quantitative rigor with practical insight. All participants agreed that the model was appropriate for addressing the contributing factors to overcome child malnutrition. The discussion affirmed that the model was relevant, clearly understood, and aligned with practical needs and field realities.

Data analysis

The characteristics of the participants were analyzed using frequency and descriptive statistics.

The researchers conducted confirmatory factor analysis to assess construct validity, evaluated internal consistency reliability using Cronbach's alpha, and examined preliminary item validity using Pearson's product-moment correlation. The structural equation modeling (SEM) analysis verified the influence between variables. Furthermore, the verification of measurement equivalence and the multi-group SEM analysis confirmed the moderation effect of child growth. If the multi-group SEM analysis is statistically significant, verifying the moderation effect using SEM involves paired parameter comparison analysis. The statistical significance level was $p = 0.05$. This statistical analysis used the Amos

version 26 program.

Ethics approval and consent to participate

This research was conducted according to the Declaration of Helsinki and approved by the research ethics committee at the Universitas Jenderal Achmad Yani Yogyakarta, Indonesia (SKep/80/KEPK/V/2022). Before obtaining the data, all participants signed informed consent.

RESULTS

Characteristics of respondents

The respondents in this study are mothers and their toddlers, with a total of 200 people for each group.

Table II: Characteristics of respondents.

<i>Characteristics</i>	<i>n (200)</i>	<i>%</i>
Age		
Young age (< 20 years old)	5	2.5
Reproductive age (20-35 years old)	140	70
Old age (> 35 years old)	55	27.5
Education		
Primary education	9	4.5
Secondary education	145	72.5
Higher education	46	23
Occupation		
Employed with income at or above the regional minimum wage	22	11
Employed with income below the regional minimum wage	44	22
Unemployed	134	67
Spouse's occupation		
Employed with income at or above the regional minimum wage	69	34.5
Employed with income below the regional minimum wage	99	49.5
Unemployed	30	15
Social capital		
Poor (mean ≤ 50)	10	5
Sufficient (mean = 50.1-75)	8	4
Good (mean >75)	182	91
Empowerment process		
Poor (mean ≤ 50)	12	6
Sufficient (mean = 50.1-75)	75	37.5
Good (mean >75)	113	56.5
Government support		
Poor (mean ≤ 50)	28	14
Sufficient (mean = 50.1-75)	41	20.5
Good (mean >75)	131	65.5
Family resilience		
Poorly resilient (mean ≤ 50)	5	2.5
Moderately resilient (mean = 50.1-75)	82	41
Highly resilient (mean >75)	113	56.5
Holistic parenting		
Poor (mean ≤ 50)	5	2.5
Sufficient (mean = 50.1-75)	23	11.5
Good (mean >75)	172	86

CONTINUE

Table II: Characteristics of respondents (CONT.)

<i>Characteristics</i>	<i>n (200)</i>	<i>%</i>
Environmental health		
Poor (mean $\leq$ 50)	6	3
Sufficient (mean= 50.1-75)	7	3.5
Good (mean $>$ 75)	187	93.5
Child growth (Height for age)		
Very short	7	3.5
Short	26	13.0
Normal	164	82.0
Tall	3	1.5
Child growth (Weight for age)		
Severely underweight	4	2.0
Underweight	33	16.5
Normal weight	153	76.5
Risk of overweight	10	5.0

The mothers' age average was in the reproductive age range (20-35). Most respondents have a secondary education, were unemployed, and their spouses' occupations have incomes below the regional minimum wage. In addition, most social capital, empowerment process, government support, holistic parenting, and environmental health were in the good category ($>50\%$). For family resilience, the majority were in the highly resilient category (56.5%), and child growth was in the normal category (82%).

The analysis results

The results of the SEM conceptual model test for health promotion to improve child growth, based on the goodness of fit statistics output from Amos version 26 software, were considered in a good category. Confirmatory Factor Analysis (CFA) is a multivariate technique used to confirm a concept's dimensions and to indicate which indicators are most appropriate for each dimension. CFA results show that items are valid because their factor loading values are more than 0.50. The model in Structural Equation Modeling (SEM) needs to be supported by overall model fit testing using several diagnostic tools.

The goodness of fit tests using various techniques show that the GFI (Goodness of Fit Index) and AGFI (Adjusted Goodness of Fit Index) are the tests that reduce the sensitivity of the sample size in decision-making. GFI and AGFI values range from 0 to 1, with the guideline that the closer the GFI and AGFI values are to 1, the better the model explains the data. Values between 0.80 and 0.90 refer to marginal fit. The tested model can fit with GFI = 0.865 and AGFI = 0.829. RMSEA (Root Mean Square Error of Approximation) is the most popular and widely used fit measure in many studies because it does not overestimate or underestimate and is not dependent on sample size. RMSEA $\leq$ 0.05 indicates a good model fit. The RMSEA value of the tested model is 0.062, which is considered acceptable.

The fit indices NFI (Normed Fit Index), RFI (Relative Fit Index), IFI (Incremental Fit Index), TLI (Tucker-Lewis Index), and CFI (Comparative Fit Index) are good if they have values greater than 0.9, while values between 0.80 and 0.90 refer to marginal fit. Testing with these methods compares the existing model with a null model to address model complexity. CFI, TLI, CFI, and NFI have approached 0.9. It defines that the model is fit. For other goodness of fit criteria, such as chi-square, researchers strive to obtain a low chi-square value due to the significance level greater than or equal to 0.05 ($p \geq 0.05$). A chi-square value of 384.006 and $p > 0.05$ indicates a less satisfactory fit. Only the chi-square value is still less than ideal because the p-value is below 0.05, but the chi-square value has decreased from the previous model, and chi-square is not the only parameter to assess model fit. Overall, the goodness of fit statistics for the SEM model re-specification suggests that this SEM model is considered good.

After testing the SEM model as a whole, the next step is to see if there is a significant and robust relationship between the independent and dependent variables. The relationships between the constructs are as follows (Table 3 and Figure 1):

Table III: Path analysis between construct variables

<i>Dependent Variable</i>	<i>Independent Variable</i>	<i>B</i>	<i>p</i>
Direct effect			
Child growth	Environmental health	0.38	0.000*
	Family resilience	0.55	0.000*
	Holistic parenting	0.22	0.036*
Indirect effect			
Environmental health	Government support	0.10	0.210
Family resilience	Social capital	0.50	0.000*
Holistic parenting	Empowerment process	0.46	0.011*
	Family resilience	0.11	0.219
Empowerment process	Environmental health	0.58	0.000*
	Social capital	0.03	0.743
	Government support	0.89	0.000*

*Significant using the structural equation modeling (SEM)

B= the coefficients that represent standardized regression weights

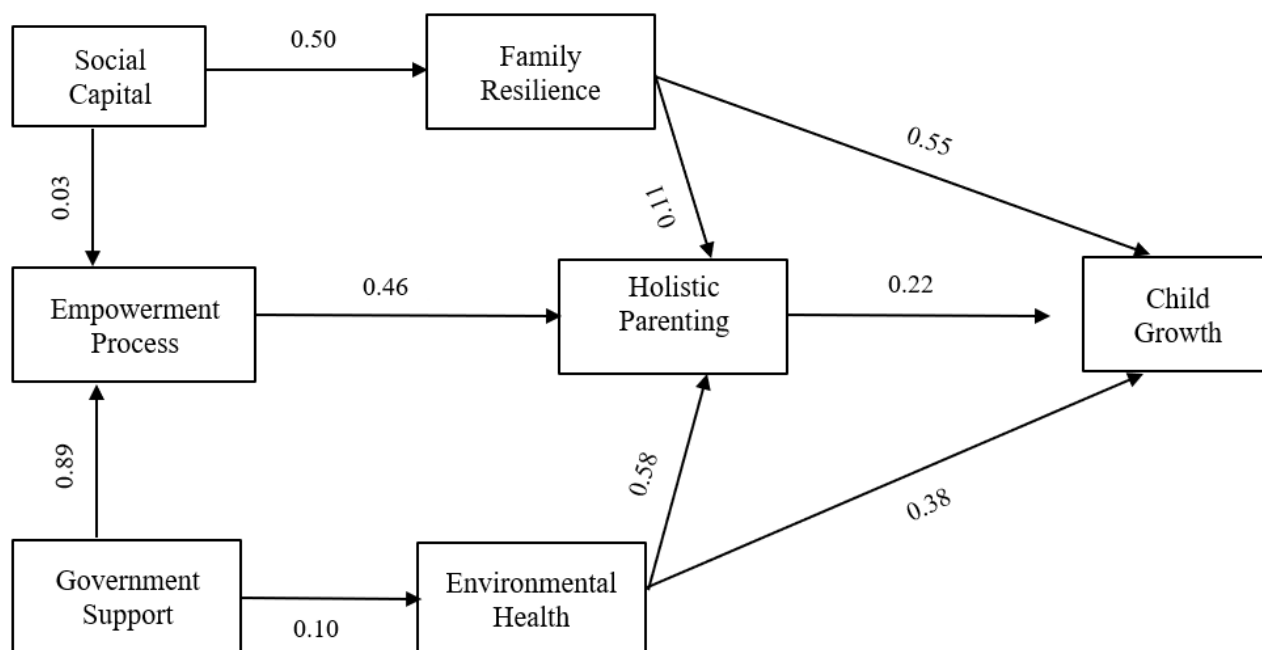


Figure 1: Relationships between construct variables.

The values of standardized regression coefficients between variables are 0 to 0.10, indicating a small effect. Standardized regression coefficient values between variables are 0.10 to 0.50, indicating a medium effect. Standardized regression coefficient values between variables greater than 0.50 suggest a large effect.

Table 3 shows that the variables that have a significant direct effect on child growth are environmental health ($B = 0.38$, $p = 0.000$), family resilience ($B = 0.55$, $p = 0.000$), and holistic parenting ($B = 0.22$, $p = 0.036$). Meanwhile, the variables that have a significant indirect effect on child growth are social capital ($B = 0.50$, $p = 0.000$), empowerment process ($B = 0.46$, $p = 0.011$), government support ($B = 0.89$, $p = 0.000$), and environmental health ($B = 0.58$, $p = 0.000$).

DISCUSSION

The research results indicate that most social capital, empowerment process, government support, holistic parenting, and environmental health variables were in a good category ($>50\%$). For family resilience, the majority were in the highly resilient category, and child growth was in the normal category. Relationships between construct variables show that those with a significant direct effect on child growth are environmental health, family resilience, and holistic parenting. Meanwhile, social capital, the empowerment process, government support, and environmental health indicate significant indirect effects on child growth.

Social capital

Social capital refers to the relationships formed and the norms that shape the quality and quantity of social interactions within a community across a broad spectrum. The indicators used include social/work networks, mutual trust, adherence to norms, concern for others, and involvement in social organizational activities. Social capital plays a crucial role in enhancing family resilience through various mechanisms. Social capital can give individuals a greater sense of care for others [14].

Robust social capital among community members can enhance a family's ability to cope with economic and emotional stress. Extensive social networks provide essential moral and material support during times of crisis. Social capital also contributes to the family members' mental and physical health by providing a supportive environment. Additionally, the norms and values that develop in communities with high social capital can encourage positive and collaborative behavior among family members, which affects family resilience [15]. Involvement in the community and participation in social activities can increase the sense of ownership and responsibility, which are essential elements in maintaining long-term family resilience [16]. Mutual trust and assistance among members/administrators can strengthen cooperative relationships in community empowerment activities related to family resilience and child development.

Family resilience

Family resilience refers to a family's ability to manage resources and problems to achieve well-being. Physical, social, and psychological are three components in building family resilience [17]. Family resilience plays a crucial role in supporting child growth and development, creating a stable environment that supports children's physical and mental health, adapting to and facing challenges, improving academic achievement and social skills in children, and developing a sense of security and self-confidence in children [18,19].

Children who grow up in resilient families have higher self-confidence levels, can build healthy relationships with others, have better mental health, and achieve higher academics [20–22]. Research shows that children raised in a stable and supportive family environment are more likely to become resilient and successful individuals in adulthood [23]. It can be concluded that family resilience impacts factors that can influence children's development.

Parenting

Parenting in this study is measured using six dimensions: the ability to provide nutrition, child care skills, health maintenance skills, child education skills, child nurturing skills, and child protection skills. Parenting is a responsibility inherent to parents from the time a child is born until adulthood. Good parenting can influence a child's physical, emotional, social, and cognitive development [24,25]. If a child often receives criticism, the child will learn to blame others; if a child often receives insults, the child will grow up to be shy; if a child earns tolerance, the child will learn to be patient; similarly, if a child lives with praise, the child will develop self-respect as well as respect for others [26]. Holistic parenting enhances a child's ability to cope with stress and challenges more effectively, fosters strong relationships between the child and their parents, siblings, and friends, and stimulates the child's creativity and critical thinking skills, which in turn can improve family resilience and optimize the child's growth and development [27,28].

Environmental Health

Research results show that almost all residents who were respondents have latrines/toilets (waste disposal places), but some still defecate in the river. Most of them dispose of waste in sewers. However, many still dispose of waste into the river. It can lead to unhealthy air, cause bacteria, and result in infections (diarrhea) in children. The literature states that environmental health is a condition or state of the environment that is optimal and thus impacts achieving optimal health status. The scope of the environment in this study includes the physical quality of drinking water, ownership of latrines, and waste management. Access to clean water, waste disposal, and fuel supply affect children's health [29]. Untreated drinking water and improper use of latrines

are significant risk factors for stunting [30].

Environmental health is a crucial factor related to family resilience and the enhancement of child growth and development. A clean and healthy environment improves children's physical and mental health [31–33]. Exposure to air pollution, for instance, is associated with various health issues, such as respiratory and neurological disorders in children [34]. Contaminated water impacts children's health, such as increased risks of gastrointestinal infections and impaired physical development [35]. Additionally, factors such as population density and access to green open spaces also play a role in influencing children's physical and mental health [36–38]. Parental caregiving skills are an effective intervention for developmental outcomes [39]. Poor care and malnutrition also affect development [40].

Child Growth

This study found that some children have growth issues categorized as very short (3.5%) and short (13%). Several factors influence child growth, including nutritional status. Nutritional status affects malnutrition in children [41]. Ensuring good early childhood development is an investment that benefits human resource development [19]. Developmental disorders typically occur in childhood, affecting various functional domains, and often persist into adulthood.

Good nutrition during childhood is crucial for brain development and cognitive abilities, which impacts academic performance and social skills [42]. Adequate stimulation from family environments and high-quality early education contribute to children's language development and critical thinking skills [43]. Comprehensive early intervention programs can significantly enhance child development, especially in families facing socio-economic challenges [44,45]. A limitation of this study is that not all factors influencing child growth and development were analyzed, leaving room for future research to explore additional variables that may contribute to a more comprehensive understanding of the issue.

CONCLUSION

This study highlighted that ecological health, family resilience, and holistic parenting directly influenced child growth. Furthermore, social capital, empowerment, government support, and environmental health were indirect contributors. Future programs should prioritize strengthening families and holistic parenting practices while enhancing community empowerment and ensuring sustained government support. A coordinated, multisectoral approach is essential to address the root determinants and achieve lasting improvements in child growth and development.

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