

DEVELOPING INTERVENTION MODEL OF STUNTING CASE IN LOCAL GOVERNMENT: CASE RESEARCH OF EAST JAVA PROVINCE

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Abstract

Stunting remains a major public health challenge in Indonesia, particularly in East Java Province where prevalence although declining, remains above the national target. This study aimed to develop a local government intervention model to prevent stunting in children aged 2–3 years. Using a two-stage design, stage I applied a cross-sectional study to identify nutritional and environmental risk factors, while stage II tested a pre-experimental model through community-based interventions. The findings reveal that stunting significantly affects children's growth and intelligence, with family income, maternal knowledge, parenting practices, and access to health services identified as key determinants. The proposed model integrates specific programs such as nutrition supplementation with sensitive interventions including Posyandu revitalization and maternal education. This study contributes to both academic discourse and practical policy design, highlighting that sustainable, multi-sectoral, and locally adapted strategies are essential to accelerate stunting reduction and improve human capital quality.

Keywords: *Stunting, Intervention Model, Local Government.*

INTRODUCTION

Stunting is one of the global health problems, especially in developing countries. This condition is characterised by linear growth disorders due to chronic malnutrition from the foetal stage to the first two years of life (Victora et al., 2021). The effect of stunting is not limited to shorter stature, but also increases the risk of illness, child mortality, and impairs cognitive and motor development, which ultimately harms the quality of human resources in the future (Prendergast & Humphrey, 2014). Anthropometrically, stunting is measured by the height-for-age index (HAZ), which reflects growth failure due to inadequate nutritional intake and frequent exposure to infectious diseases (De Onis & Branca, 2016). World Health Organisation (WHO) refers to stunting as one of the most difficult forms of chronic malnutrition to reverse if not addressed during the critical 1,000 Days of Life (HPK) (Fontaine et al., 2023). Several studies, such as Aurora et al., (2021) and Stein et al., (2023) also show that stunting can reduce a child's intelligence by 10–15 IQ points, thereby affecting educational achievement and productivity in adulthood. Other studies reveal that the cognitive effects of stunting are long-lasting, including low mathematics and literacy scores in primary and secondary school (Lestari et al., 2024). In addition, children who experience stunting are also at greater risk of limited social mobility and reduced income in adulthood, thereby reinforcing the cycle of intergenerational poverty (Danaei et al., 2016 ; Gusnedi et al., 2023).

Based on Indonesian Nutrition Status Survey (SSGI), the prevalence of stunting in Indonesia fell from 21.5% in 2023 to 19.8% in 2024 (Rusdianti et al., 2025 ; Liliana et al., 2025). However, this figure also confirms that the national target of reducing stunting to 14% by 2024, as set out in the National Medium-Term Development Plan (RPJMN), has not yet been achieved (Kementerian Kesehatan RI, 2025). In the context of East Java, prevalence of stunting also decreased to 14.7% in 2024 from 17.7% in 2023 (Kementerian Kesehatan RI, 2025). This decline was significant in many districts/cities in East Java. For example, out of 22 districts/cities, only about 70.96% showed a decline, while 29.04% experienced an increase compared to the previous year (Kementerian Kesehatan RI, 2025). Fact shows that stunting is still a serious problem at the provincial level, even though the trend of underweight has shown a decline.

Government programmes to reduce stunting rates have failed because existing interventions have not comprehensively addressed the main risk factors (Syafrawati et al., 2023). Research shows that the causes of stunting are multidimensional, ranging from poor nutrition, poor environmental health, inadequate parenting practices, to limited access to health services (Yani et al., 2023). Without early intervention, children who are already stunted will become increasingly difficult to recover as they age. Nutrition during pregnancy has also been proven to play an important role in determining foetal growth and development (Jain et al., 2022). Energy and nutrient deficiencies in pregnant women can lead to miscarriage, low birth weight, and even death (Gernand et al., 2016). Conversely, consuming a balanced diet during pregnancy will affect foetal brain growth, which occurs from the fourth week of conception until the age of two (Cusick & Georgieff, 2016).

Based on previous studies, the primary method for preventing stunting is to improve the nutritional quality of pregnant women and infants from pregnancy to early childhood (Heidkamp et al., 2021). These efforts include not only providing nutritious food, but also educating mothers about balanced diets, monitoring maternal health, and improving access to sustainable basic health services (Saleh et al., 2021). Research by Desmond et al., (2021) confirms that investing in maternal and child nutrition early in life will have a long-term impact in the form of improved human resource quality. Recent research by Dewey et al., (2021) also shows that malnutrition in early life not only hinders physical growth but also slows down children's brain development and cognitive function.

Martorell, (1999) states that malnutrition during pregnancy and early life can hinder physical growth, motor development, and cognitive abilities in children. This condition can even alter social behaviour and reduce learning abilities, thereby impacting the quality of education and economic productivity. Nutritional interventions are only effective if carried out from pregnancy until the first 2–3 years of a child's life (Koletzko et al., 2019). This emphasises the importance of the first 1,000 days of life as a golden window that should not be missed, as any delays will be difficult to remedy at a later stage (Victora et al., 2021).

Building on this background, this study focuses on developing a stunting intervention model at the local government level, using a case study of short stature in children aged 2–3 years in East Java Province. Furthermore, the proposed intervention model is designed to be more comprehensive by covering aspects of nutrition, health, parenting, and health services, which are the spearheads of policy implementation. Hopefully, the results of this study will not only enrich the academic literature on stunting reduction strategies but also provide a practical basis for local governments in designing more effective policies to accelerate the improvement of human resources quality in Indonesia.

LITERATURE OVERVIEW

Stunting and Early Childhood Development

Stunting remains one of the world's most significant chronic nutritional problems because its impact is not limited to physical development but also affects children's brain development and learning abilities (Marc et al., 2021). This condition makes children more vulnerable to academic difficulties and low productivity in adulthood. Several studies show that stunting can lower a child's IQ score by 10–15 points, which ultimately affects school performance and future workforce competitiveness (Aurora et al., 2021 ; Stein et al., 2023). In other words, stunting is not only a health issue but also a human development issue, which is why many countries have made stunting a long-term development priority.

Among the most critical periods for preventing stunting is the first 1,000 days of life (HPK). During this phase, children's brains and bodies develop rapidly, making good nutrition essential for determining their future health. Research by Heidkamp et al., (2021) and Desmond et al., (2021) found that micronutrient supplementation is more effective when combined with other interventions such as proper sanitation and nutrition education for mothers. For example, children who are given supplementary food but grow up in an environment with poor sanitation are still at high risk of stunting. This is also confirmed by Dewey et al., (2021) who state that a combination of nutrition and psychosocial stimulation plays a major role in supporting children's language and motor development.

Although, the results of interventions are not always the same in every region. Local factors such as parenting patterns, environmental conditions, and access to health care make the results of programmes vary. (Victora et al., 2021) show that socio-economic inequality is often a major obstacle to the success of stunting reduction, so national strategies cannot be applied uniformly in all regions. For example, urban areas with relatively good access to health services usually reduce stunting rates faster than rural areas with minimal facilities. Abdullahi et al., (2021) also emphasises that nutrition programmes must be adapted to local cultures and needs in order to be more accepted by the community. This highlights the need for community-based and contextual intervention approaches.

Local Government Role in Nutrition Intervention

Local governments should play a key role in ensuring that national nutrition policies truly reach the community in a decentralised system (Astuti et al., 2025). However, in reality, many regions still face constraints in terms of budget, coordination and human resources. Research by De Schutter et al., (2020) notes that the implementation of convergence actions often stalls due to weak cross-sectoral coordination, resulting in programmes that are only partially implemented and fail to address the root causes of the problem. This situation shows that the capacity of local governments is not only a matter of administration, but also the ability to innovate in response to conditions on the ground.

One example of a relatively successful intervention is the strengthening of Posyandu as the spearhead of nutrition services. Posyandu is not just a place for weighing toddlers, but also a centre for nutrition education for families. Research by Miranda et al., (2023) shows that trained cadres equipped with extension modules can increase mothers' awareness of the importance of balanced nutrition. Similar findings have also been reported in Sri Lanka, where the empowerment of community cadres has been shown to increase family compliance with nutritional supplementation and child care (Ranisavljev et al., 2025). Therefore, the success of interventions depends heavily on the extent to which communities are actively involved rather than merely being recipients of aid.

Besides the role of health services, programme sustainability is also an important factor. Interventions that are too complex or unsuited to local resources will be difficult to implement consistently. Haselow et al., (2016) emphasise the need for programme designs that are realistic, adaptive, and replicable in various regions. If technical aspects such as nutrition and healthcare services are combined with social aspects such as parenting education at the local level, the intervention model can be more effective and sustainable. Therefore, reducing stunting is not enough with numerical targets alone but must be viewed as part of a broader agenda to improve human resource quality, especially in rural areas.

METHODS

Research was conducted in two main stages. First, an observational study with a cross-sectional approach was used to identify factors affecting children's nutritional intake and stunting among children aged 2–3 years (Ten Hoeve et al., 2016 ; Barrable & Booth, 2020). Through this design, cause and effect variables were examined simultaneously over a specific period of time, thereby providing an accurate picture of the actual conditions in the field without any intervention manipulation. Second stage was conducted through experimental research using a pre-experimental design, namely a preliminary trial of an intervention model developed to prevent stunting in children aged 2–3 years. This approach is relevant for testing the feasibility of social and health interventions at the community level before they are implemented on a larger scale (Milat et al., 2013).

Research population consisted of mothers with children aged 2–3 years, while the accessible population consisted of children of that age living in several selected districts/cities in East Java Province. There were 700 children in the total sample, with 100 children taken from each study area in equal proportions of 50 stunted children and 50 normal children. Sampling was conducted using purposive sampling, considering densely populated areas (villages and subdistricts) that reflect the diversity of socio-economic and health conditions in East Java. This approach can be used in community nutrition studies because it captures the variation in local characteristics that affect children's nutrition and health patterns (Etikan et al., 2016).

Research areas selected included Surabaya, Pamekasan, Banyuwangi, Malang, Lamongan, Tulungagung, and Ponorogo. Selection of these seven areas was based on considerations of East Java's geographical and demographic representation, ranging from large urban areas, coastal villages, to areas with high nutritional vulnerability. This is in line with the view that the local context influences the effectiveness of public health programmes, making it important to include regional diversity in the design of intervention studies (Mirzoev et al., 2017).

RESULT

Prevalence of Stunting in East Java

Over the past few years, the government has made strenuous efforts to reduce stunting rates through various national and regional programmes. Interventions have included providing supplementary food for toddlers, exclusive breastfeeding campaigns, food fortification programmes, improving access to sanitation, and strengthening the role of Posyandu as the frontline of community-based health services. Various ministries have also launched sensitive and specific programmes, ranging from nutrition education to social assistance for low-income families. However, although this policy framework is relatively comprehensive, the effectiveness of its implementation at the local level still varies, depending on the capacity of health workers, community participation, and the socio-economic conditions of each region.

Findings from a study in seven districts/cities in East Java show that stunting remains a serious problem, even in areas that have long been targeted by government programmes. More than half of the 700 children studied were classified as short or very short, with the highest prevalence found in Pamekasan. These findings confirm that existing interventions have not been fully effective in reducing stunting rates. For example, exclusive breastfeeding coverage reached 60.1 per cent, in line with the government's campaign target, but this figure is not consistent with the decline in stunting prevalence. This shows that even though there have been behavioural changes at the mother level, single interventions such as exclusive breastfeeding are not enough if they are not supported by improvements in balanced nutrition, sanitation, and parenting practices.

Comparing different regions, there are variations that indicate differences in the effectiveness of local government roles. Lamongan is relatively more successful because Posyandu activities are active, health cadres receive adequate training, and health facility support is quite good. Meanwhile, Pamekasan has a higher prevalence of stunting due to weak cadre capacity, low family participation, and limited additional nutritional facilities. Surabaya and Tulungagung show different problems. Although access to health services is better, mothers' knowledge about stunting is still low, so preventive behaviours are not optimal. This shows that the success of government interventions depends heavily on the quality of implementation in the regions, not just on the existence of programmes through existing policies.

Local government's role in overseeing national programmes still faces several obstacles. While initiatives like supplementary feeding and sanitation programmes are underway, their sustainability and consistency remain weak. Some areas even show coordination gaps between health departments, Posyandu cadres, and beneficiary families. As a result, the efforts made have not been able to form a comprehensive intervention pattern from upstream to downstream, especially in terms of prevention from pregnancy to the age of two years.

The research findings also confirm that community participation is a key factor that has not been fully addressed. When communities only play the role of programme recipients without being encouraged to actively participate in the planning and evaluation processes, interventions tend not to be sustainable. Experiences in Lamongan prove that strong community support can increase the effectiveness of nutrition programmes, while in Pamekasan, weak family involvement actually exacerbates the high prevalence of stunting. Thus, the issue of stunting in East Java is not only a matter of the availability of government programmes, but also the extent to which the community is part of the solution.

Factors Causing Stunting in East Java

Social economic conditions of families play an important role in the high incidence of stunting in East Java. More than half of the respondents came from low-income families, with the figure reaching 83% in Ponorogo. This situation limits the ability of families to provide nutritious food, especially animal protein and essential micronutrients. However, in Surabaya and Lamongan, proportion of high-income families is greater, but high income does not automatically guarantee low stunting rates, as other factors such as parenting practices and nutritional knowledge also play a role. Government social assistance programmes do alleviate the economic burden on some families, but they are not yet sufficient to ensure balanced nutrition for young children.

Genetic factors were also found to contribute to the children's condition. Around a quarter of respondents had two parents of short stature, while 43.4% had one parent of short stature. This pattern was most prominent in Ponorogo, while Lamongan had more parents of normal height. However, the results of Draper et al., (2024) show that children of short parents can still grow better if they receive balanced nutrition, proper parenting, and a healthy environment. Although genetic predisposition is not the only determining factor, children who are raised in a healthy environment with good parenting and adequate nutrition still show more optimal growth even if their parents are short.

Sanitation and environmental health, which are still unevenly distributed, have a direct impact on the nutritional quality of toddlers. Children who are frequently exposed to infectious diseases tend to experience a decrease in appetite and suboptimal nutrient absorption, thereby worsening their growth conditions. While most families have adequate sanitation, 5.9% still live in unhygienic conditions, particularly in Banyuwangi. Infectious diseases such as fever and respiratory disorders are also prevalent among

children aged 2–3 years, with the highest incidence occurring in Malang. Government interventions through toilet construction and immunisation programmes have been implemented, but their impact has been uneven, leaving children in some areas highly vulnerable to disease.

Besides the above, the quality of nutritional intake also plays a role in showing patterns that aren't ideal yet. Research findings show that average energy and protein intake is sufficient, but iron consumption is still low while vitamin C is excessive. It shows that the government's food fortification programme isn't fully effective in addressing micronutrient deficiencies. Low nutritional literacy among mothers also makes things worse. For example, adequate knowledge is only found in Banyuwangi, while Surabaya and Tulungagung show lower levels of understanding. This condition has a direct impact on parenting practices, where areas with low literacy tend to show poor parenting patterns.

Further analysis shows that factors such as family size, maternal age and education, level of knowledge, income, parenting patterns, and frequency of illness have a significant effect on toddler nutrition and development. These findings on the impact of health services further reinforce the link between physical growth and children's intelligence (Saracho, 2023). Toddlers who are short in stature tend to have lower cognitive development than children of normal height, while the best results are shown by children who are tall. This reality makes it clear that stunting not only affects the body, but also has implications for the quality of human resources in the future. Unfortunately, government policies have so far been general and sectoral in nature, and have not been able to fully respond to the complexity of the situation on the ground. Specific and sensitive programmes are available, but limitations in the capacity of officials and health workers have meant that the results have been less than optimal.

Weaknesses of these policies necessitate more integrated interventions. Promotive and preventive strategies need to be strengthened so that prevention efforts can be implemented more comprehensively from early childhood. As a follow-up, this study aims to develop a stunting prevention intervention model that has been proven to affect the growth and intelligence of children aged 2–3 years. This model emphasises that the causes of stunting are not singular, but rather stem from aspects of parenting and maternal knowledge, the quality of health services, particularly the role of Posyandu as the frontline in addressing nutritional issues, and the adequacy of children's nutritional intake.

DISCUSSION

Analysis of the Effect of Short-Term Events on the Intelligence and Development of Early Childhood

Based on the researcher's study, the distribution of intelligence and development of children aged 2–3 years based on short-term events in East Java is shown in the following table:

Table 1. Distribution of the Effect of Short-Term Events on the Intelligence and Development of Children Aged 2–3 Years in East Java

Child Nutritional Status based on height-for-age index	Child Intelligence and Development						Statistical Test Results	
	Deviation		Doubtful		Appropriate		Parameter	Results
	n	%	n	%	n	%		
Very Short	29	21.8	44	33.1	60	45.1	p R ²	0.000 0.031
Shot	37	17.0	82	37.6	99	45.4		
Normal	36	10.5	86	25.1	220	64.3		
High	1	14.3	1	14.3	5	71.4		

Total	103	14.7	213	30.4	384	54.9		
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Source: Researcher analysis, 2025

Results of the study indicate a strong relationship between children's nutritional status and intelligence and growth at ages 2–3 years in East Java. **Table 1** shows that children in the normal height category have a higher proportion of age-appropriate intelligence and growth compared to children in the short and very short categories. Among 218 children in the short category, only 45.4% had age-appropriate growth and development, while among 342 children in the normal category, the number reached 64.3%. In fact, the highest proportion was seen in children in the tall category, where 71.4% were in line with their age-appropriate development. Statistical analysis reinforced these results with a p-value of 0.000 ($p < 0.05$), indicating a significant effect of short stature on children's intelligence and growth. However, the R^2 value of only 0.031 indicates that the direct effect of short stature only accounts for 3.1%, while other factors not examined in this study contribute significantly more, at 96.9%.

These conditions confirm that stunting is not only related to physical aspects, but also affects the long-term quality of human resources. Previous studies have shown that children with short stature are at higher risk of low academic achievement, shorter education, and lower income as adults (Backeljauw et al., 2021 ; Scheffler & Hermanussen, 2022). They are also more susceptible to non-communicable diseases in adulthood. Thus, short children are often seen as an indicator of low-quality human resources, which in turn can reduce national productivity. This situation shows that malnutrition can contribute to a cycle of poverty that is difficult to break.

However, it is important to emphasise that stunting is not entirely caused by hereditary or genetic factors that cannot be changed. Environmental factors such as parenting practices, health services, sanitation, and food availability are actually more dominant. Therefore, the first 1,000 days of life are crucial as a point of intervention in preventing stunting. However, the low level of public understanding of stunting poses a challenge. This study found that 61.3% of mothers had a low understanding of stunting. According to the health belief model developed by Rosentock, knowledge and perception form the basis of preventive behaviour (Daniati et al., 2025). If parents believe that short stature is not a health or intelligence problem, they are less likely to be motivated to improve their children's nutrition.

Within this context, the role of primary healthcare services, particularly Posyandu, is crucial. The four functions of Posyandu should be able to detect early childhood nutrition problems, provide counselling, and ensure appropriate interventions are carried out. However, this role is often not optimally fulfilled due to limited personnel and a weak ongoing counselling system. Revitalisation of Posyandu is necessary so that mothers and families receive adequate support, while also ensuring that there is a connection between field data and services at the community health centre (Puskesmas) level.

Family economic factors greatly determine children's nutritional quality. Animal protein sources rich in micronutrients, such as meat, fish, eggs, and milk, are relatively more expensive than other food sources. As a result, poor families tend to face a higher risk of stunting due to limited purchasing power. Based on data from the Central Statistics Agency in 2024, the prevalence of people with moderate or severe food insecurity (using the Food Insecurity Experience Scale / FIES) in East Java Province was recorded at around 3.16 (Badan Pusat Statistik, 2025). This condition indicates a serious threat to access to nutritionally balanced food at the household level, which has a direct impact on vulnerable groups, especially mothers, infants, and toddlers.

Indonesia's government has actually set the direction for nutrition policy through Law No. 36 of 2009 on Health, which emphasises the importance of improving dietary

patterns, nutrition awareness, physical activity, and access to and quality of nutrition services. In 2014, the Ministry of Health, through the Director General of Nutrition and Maternal and Child Health, also confirmed that improving nutrition must be part of the national development agenda. However, interviews with provincial and district/city health officials in East Java revealed that there are still many challenges in terms of their implementation.

“The issue of stunting is often positioned as merely a complement to health development, when in fact it should be a top priority. In addition, cross-sectoral awareness is still limited, coordination is weak, and the availability of qualified nutritionists is still insufficient.”

Another challenge that has emerged is the gap in people's purchasing power, demographic changes with an increasing proportion of elderly people, and unhealthy lifestyles, such as increased consumption of processed foods high in sugar, salt and fat, but low in fruit, vegetables and animal protein. The high number of cases of pregnant women with chronic energy deficiency and the high prevalence of infectious diseases in children further exacerbate the situation. In such conditions, the appropriate intervention is a combination of sensitive and specific interventions. Sensitive interventions include improving food security, purchasing power, women's education, family planning, and the provision of clean water. Specific interventions include behavioural change, micronutrient supplementation, infectious disease prevention, and malnutrition management.

Analysis confirms that short stature has a significant impact on the intelligence and growth of early childhood, even though its direct contribution is relatively small compared to other more complex factors. Therefore, stunting prevention cannot be directed solely at increasing height, but must involve comprehensive strategies that include nutritional interventions, improving the socio-economic status of families, increasing community knowledge, and strengthening basic health services. Only through integrated and continuous interventions can the problem of stunting in East Java be addressed more effectively while preventing its impact on the quality of human resources in the future.

Development of a Short Stature Prevention Intervention Model

Statistical analysis shows that factors directly affecting the nutritional intake of children aged 2–3 years include family size, maternal age, maternal education level, maternal knowledge, family income, child care practices, and frequency of illness. These factors describe three broad dimensions, namely family economic conditions, availability of information and knowledge, and parenting patterns in child care. These findings confirm that the quality of children's nutrition is not only determined by food availability, but also by the family's capacity to manage resources, absorb health knowledge, and apply appropriate parenting behaviours.

Further analysis also shows that stunting in children aged 2–3 years is significantly influenced by two main factors, namely health services and heredity. Posyandu, as the frontline in preventing nutritional problems, plays a crucial role in providing basic health services, early detection, and counselling to families. However, when these services are not optimal, the risk of children experiencing stunting becomes higher. Meanwhile, hereditary factors do contribute, but their influence can be minimised if the child's growth and development environment, particularly nutritional intake and health services, are well managed.

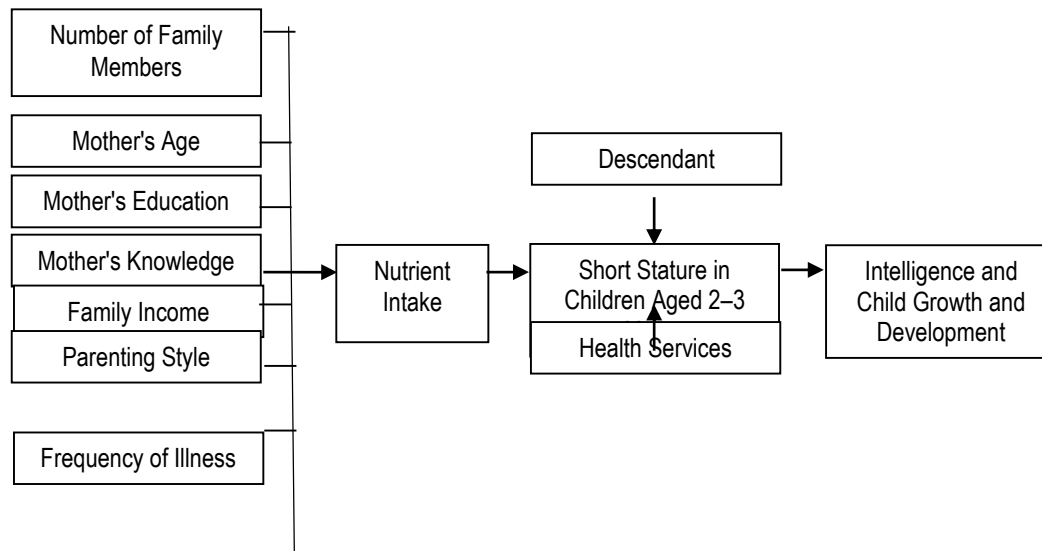


Figure 1. Development of an Intervention Model to Prevent Stunting

Based on **Figure 1**, this study developed an intervention model to prevent stunting in children aged 2–3 years. This model explains that stunting has a direct impact on children's intelligence and growth and development, while stunting itself is influenced by a combination of genetic factors, health services, and nutritional adequacy. Thus, stunting prevention requires strategies that target the root causes of child malnutrition, namely improving family economic status, increasing mothers' nutritional literacy through education and counselling, and strengthening healthy child-rearing practices.

Interventions designed in this model emphasise the importance of improving children's nutritional intake through integrated efforts. At the family level, support is needed to improve purchasing power so that parents can provide animal protein sources rich in micronutrients, such as meat, fish, eggs, and milk. On the other hand, adequate information on balanced diets must be provided continuously, especially to mothers, to ensure that their knowledge can be translated into healthy parenting behaviours. At the same time, revitalising Posyandu (integrated health service posts) must be a priority so that the four functions of the Posyandu can run optimally in early detection, growth recording, counselling, and basic health services.

Based on the findings of this study, the intervention model shows that preventing stunting cannot be done partially. Improvement efforts must target the economic aspects of families so that they can provide nutritious food, increase mothers' knowledge through education and counselling, and strengthen healthy parenting patterns. At the same time, basic health services, especially Posyandu, need to be revitalised so that they can once again optimally perform their functions in monitoring child growth and providing nutritional counselling. If these interventions are implemented simultaneously, the chances of reducing stunting rates while improving the intelligence and growth and development of early childhood in East Java will be even greater.

CONCLUSIONS

Research shows that stunting in children aged 2–3 years has a significant impact on their intelligence and development. Results of the analysis show that children with normal nutritional status have a higher proportion of age-appropriate development compared to children in the short and very short categories, with the highest achievements shown by children in the tall category. This shows that stunting cannot be viewed solely as a physical problem, but has long-term implications for the quality of human resources,

including academic achievement, education levels, and economic productivity. Thus, the existence of short children is a clear indicator of the low quality of human development at the regional level.

This study also found that the factors causing stunting are very complex and interrelated. Family economic factors, maternal education and knowledge, parenting behaviours, environmental health conditions, and access to basic health services have been shown to play an important role in determining children's nutritional status. Low nutritional literacy among mothers and the inconsistent role of Posyandu (integrated health service posts) in some areas have prevented government programmes from achieving optimal results. Although there are various specific policies, their implementation remains partial, sectoral, and lacking in integration. This situation underscores the need for a more comprehensive approach, one that focuses not only on food distribution or social assistance, but also on efforts to strengthen community awareness, participation, and capacity in preventing stunting.

Intervention models developed in this study emphasise the importance of improving family economic conditions, strengthening nutrition education, and revitalising basic health services, particularly Posyandu. These efforts must be carried out simultaneously in order to address the complex causes of stunting. In addition, it is important to build public understanding that stunting has an impact on the quality of human resources, intelligence, and productivity of the nation. Counselling and dissemination of information through mass media and social media can be effective means of raising collective awareness. The 1,000 HPK movement can be a catalyst for acceleration, so that stunting prevention can be positioned as a cross-sectoral programme that becomes a key performance indicator for regional heads. Success in reducing stunting is not only a health achievement, but also an important investment in building the quality of the nation's future generations.

Acknowledgment : The author would like to thanks for Regional Research and Innovation Agency, East Java Province for supporting this research.

REFERENCES

- Abdullahi, L. H., Rithaa, G. K., Muthomi, B., Kyallo, F., Ngina, C., Hassan, M. A., & Farah, M. A. (2021). Best practices and opportunities for integrating nutrition specific into nutrition sensitive interventions in fragile contexts: a systematic review. *BMC Nutrition*, 7(1), 46.
- Astuti, S. J. W., Dwiningwarni, S. S., & Atmojo, S. (2025). Modeling environmental interactions and collaborative interventions for childhood stunting: A case from Indonesia. *Dialogues in Health*, 6, 100206.
- Aurora, W. I. D., Sitorus, R. J., & Flora, R. (2021). Effect of stunting on intelligence quotient (IQ) of school-age children. *The 3rd Green Development International Conference (GDIC 2020)*, 176–180.
- Backeljauw, P., Cappa, M., Kiess, W., Law, L., Cookson, C., Sert, C., Whalen, J., & Dattani, M. T. (2021). Impact of short stature on quality of life: a systematic literature review. *Growth Hormone & IGF Research*, 57, 101392.
- Badan Pusat Statistika. (2025). *Prevalensi Penduduk Dengan Kerawanan Pangan Sedang Atau Berat, Berdasarkan Pada Skala Pengalaman Kerawanan Pangan (Persen)*. BPS. <https://www.bps.go.id/id/statistics-table/2/MTQ3NCMy/prevalensi-penduduk-dengan-kerawanan-pangan-sedang-atau-berat-berdasarkan-pada-skala-pengalaman-kerawanan-pangan.html>
- Barrable, A., & Booth, D. (2020). Nature connection in early childhood: A quantitative

- cross-sectional study. *Sustainability*, 12(1), 375.
- Cusick, S. E., & Georgieff, M. K. (2016). The role of nutrition in brain development: the golden opportunity of the “first 1000 days.” *The Journal of Pediatrics*, 175, 16.
- Danaei, G., Andrews, K. G., Sudfeld, C. R., Fink, G., McCoy, D. C., Peet, E., Sania, A., Smith Fawzi, M. C., Ezzati, M., & Fawzi, W. W. (2016). Risk factors for childhood stunting in 137 developing countries: a comparative risk assessment analysis at global, regional, and country levels. *PLoS Medicine*, 13(11), e1002164.
- Daniati, N., Widjaja, G., Olalla Gracià, M., Chaudhary, P., Nader Shalaby, M., Chupradit, S., & Fakri Mustafa, Y. (2025). The health belief model’s application in the development of health behaviors. *Health Education and Health Promotion*, 9(5), 521–527.
- De Onis, M., & Branca, F. (2016). Childhood stunting: a global perspective. *Maternal & Child Nutrition*, 12, 12–26.
- De Schutter, O., Jacobs, N., & Clément, C. (2020). A ‘Common Food Policy’ for Europe: How governance reforms can spark a shift to healthy diets and sustainable food systems. *Food Policy*, 96, 101849.
- Desmond, C., Erzse, A., Watt, K., Ward, K., Newell, M.-L., Hofman, K., & group, Inp. (2021). Realising the potential human development returns to investing in early and maternal nutrition: The importance of identifying and addressing constraints over the life course. *PLOS Global Public Health*, 1(10), e0000021.
- Dewey, K. G., Stewart, C. P., Wessells, K. R., Prado, E. L., & Arnold, C. D. (2021). Small-quantity lipid-based nutrient supplements for the prevention of child malnutrition and promotion of healthy development: overview of individual participant data meta-analysis and programmatic implications. *The American Journal of Clinical Nutrition*, 114, 3S-14S.
- Draper, C. E., Yousafzai, A. K., McCoy, D. C., Cuartas, J., Obradović, J., Bhopal, S., Fisher, J., Jeong, J., Klingberg, S., & Milner, K. (2024). The next 1000 days: building on early investments for the health and development of young children. *The Lancet*, 404(10467), 2094–2116.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4.
- Fontaine, F., Turjeman, S., Callens, K., & Koren, O. (2023). The intersection of undernutrition, microbiome, and child development in the first years of life. *Nature Communications*, 14(1), 3554.
- Gernand, A. D., Schulze, K. J., Stewart, C. P., West Jr, K. P., & Christian, P. (2016). Micronutrient deficiencies in pregnancy worldwide: health effects and prevention. *Nature Reviews Endocrinology*, 12(5), 274–289.
- Gusnedi, G., Nindrea, R. D., Purnakarya, I., Umar, H. B., Susilowati, A., & Lipoeto, N. I. (2023). Risk factors associated with childhood stunting in Indonesia: A systematic review and meta-analysis. *Asia Pacific Journal of Clinical Nutrition*, 32(2), 184–195.
- Haselow, N. J., Stormer, A., & Pries, A. (2016). Evidence-based evolution of an integrated nutrition-focused agriculture approach to address the underlying determinants of stunting. *Maternal & Child Nutrition*, 12, 155–168.
- Heidkamp, R. A., Piwoz, E., Gillespie, S., Keats, E. C., D’Alimonte, M. R., Menon, P., Das, J. K., Flory, A., Clift, J. W., Ruel, M. T., Vosti, S., Akuoku, J. K., & Bhutta, Z. A. (2021). Mobilising evidence, data, and resources to achieve global maternal and child undernutrition targets and the Sustainable Development Goals: an agenda for action. *The Lancet*, 397(10282), 1400–1418. <https://doi.org/10.1016/S0140->

6736(21)00568-7

- Jain, S., Maheshwari, A., & Jain, S. K. (2022). Maternal nutrition and fetal/infant development. *Clinics in Perinatology*, 49(2), 313–330.
- Kementerian Kesehatan RI. (2025). *SSGI 2024 Dalam Angka*.
- Koletzko, B., Godfrey, K. M., Poston, L., Szajewska, H., Van Goudoever, J. B., De Waard, M., Brands, B., Grivell, R. M., Deussen, A. R., & Dodd, J. M. (2019). Nutrition during pregnancy, lactation and early childhood and its implications for maternal and long-term child health: the early nutrition project recommendations. *Annals of Nutrition and Metabolism*, 74(2), 93–106.
- Lestari, E., Siregar, A., Hidayat, A. K., & Yusuf, A. A. (2024). Stunting and its association with education and cognitive outcomes in adulthood: A longitudinal study in Indonesia. *Plos One*, 19(5), e0295380.
- Liliana, N., Tresiana, N., & Duadji, N. (2025). Risk Management Model for the Stunting Reduction Acceleration Program. *Proceedings International Indonesia Conference on Interdisciplinary Studies*, 1, 522–548.
- Marc, H., Maryse, U., Lawrence, R., Fabric, H., & Cyprien, M. (2021). Prevalence of Stunting and Effect of Nutrition Intervention Package on Stunting in Rwanda. *Journal of Food Science and Nutrition Therapy*, 10, 147. <https://www.foodscigroup.us/articles/JFSNT-10-147.php>
- Martorell, R. (1999). The nature of child malnutrition and its long-term implications. *Food and Nutrition Bulletin*, 20(3), 288–292.
- Milat, A. J., King, L., Bauman, A. E., & Redman, S. (2013). The concept of scalability: increasing the scale and potential adoption of health promotion interventions into policy and practice. *Health Promotion International*, 28(3), 285–298.
- Miranda, A. V., Sirmareza, T., Nugraha, R. R., Rastuti, M., Syahidi, H., Asmara, R., & Petersen, Z. (2023). Towards stunting eradication in Indonesia: Time to invest in community health workers. *Public Health Challenges*, 2(3), e108. <https://doi.org/https://doi.org/10.1002/puh2.108>
- Mirzoev, T., Das, M., Ebenso, B., Uzochukwu, B., Rawat, B., Blok, L., Russo, G., Thepthien, B., & Huss, R. (2017). Contextual influences on the role of evidence in health policy development: what can we learn from six policies in India and Nigeria? *Evidence & Policy*, 13(1), 59–79.
- Prendergast, A. J., & Humphrey, J. H. (2014). The stunting syndrome in developing countries. *Paediatrics and International Child Health*, 34(4), 250–265. <https://doi.org/10.1179/2046905514Y.00000000158>
- Ranisavljev, M., Kurniawan, A. L., Ferrero, E., Shinde, S., Zhao, S., Partap, U., Mkwanzazi, N., Dah, N. C., Agure, E., & Berhane, H. Y. (2025). Community-based interventions addressing multiple forms of malnutrition among adolescents in low- and middle-income countries: a scoping review. *Nutrition Journal*, 24(1), 69.
- Rusdianti, A., Suparji, S., Nugroho, H. S. W., Santosa, B. J., & Sunarto, S. (2025). Evaluating Acceleration of Stunting Prevention in Indonesia (2018-2024): A Roadmap-Based Program Analysis. *Health Dynamics*, 2(5), 199–203.
- Saleh, A., Syahrul, S., Hadju, V., Andriani, I., & Restika, I. (2021). Role of maternal in preventing stunting: a systematic review. *Gaceta Sanitaria*, 35, S576–S582.
- Saracho, O. N. (2023). Theories of child development and their impact on early childhood education and care. *Early Childhood Education Journal*, 51(1), 15–30.
- Scheffler, C., & Hermanussen, M. (2022). Stunting is the natural condition of human height. *American Journal of Human Biology*, 34(5), e23693.
- Stein, A. D., Adair, L. S., Donati, G., Wray, C., Richter, L. M., Norris, S. A., Stein, A., Martorell, R., Ramirez-Zea, M., & Menezes, A. M. B. (2023). Early-life stature,

- preschool cognitive development, schooling attainment, and cognitive functioning in adulthood: a prospective study in four birth cohorts. *The Lancet Global Health*, 11(1), e95–e104.
- Syafrawati, S., Lipoeto, N. I., Masrul, M., Novianti, N., Gusnedi, G., Susilowati, A., Nurdin, A., Purnakarya, I., Andrafikar, A., & Umar, H. B. (2023). Factors driving and inhibiting stunting reduction acceleration programs at district level: A qualitative study in West Sumatra. *Plos One*, 18(3), e0283739.
- Ten Hoeve, Y., Castelein, S., Jansen, W., Jansen, G., & Roodbol, P. (2016). Predicting factors of positive orientation and attitudes towards nursing: A quantitative cross-sectional study. *Nurse Education Today*, 40, 111–117.
- Victora, C. G., Christian, P., Vdaletti, L. P., Gatica-Domínguez, G., Menon, P., & Black, R. E. (2021). Revisiting maternal and child undernutrition in low-income and middle-income countries: variable progress towards an unfinished agenda. *The Lancet*, 397(10282), 1388–1399.
- Yani, D. I., Rahayuwati, L., Sari, C. W. M., Komariah, M., & Fauziah, S. R. (2023). Family household characteristics and stunting: an update scoping review. *Nutrients*, 15(1), 233.