



Research Article

Effectiveness of Specific Interventions to Address Stunting in East Java Province in 2023: An Ecological Analysis

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ABSTRACT

The Indonesian Health Survey in 2023 indicates that the prevalence of stunting in Indonesia remains high, at approximately 21.5%. The objective of the present study is to evaluate the efficacy of specific strategies designed to mitigate stunting in East Java Province. The research utilised secondary data, which was gathered ecologically. The study utilised a cross-sectional design, with the prevalence of stunting serving as the dependent variable and eleven distinct interventions as independent variables. The analysis revealed ten strategies that were found to be effective in mitigating stunting. These include anemia screening, iron tablet supplementation for adolescent girls, pregnancy examinations, iron tablet supplementation for pregnant women, supplementary nutrition for pregnant women with chronic energy deficiency, monitoring of toddler growth, exclusive breastfeeding, management of toddlers with nutritional deficiencies, enhancement of immunization coverage, and education for pregnant women and their families, including the promotion of open defecation-free practices. Conversely, the provision of supplemental diets rich in animal protein for toddlers was found to be ineffectual in diminishing the prevalence of stunting.

Keywords: Community nutritional status, East Java, Stunting, Specific intervention

INTRODUCTION

Stunting is defined as a condition of impaired development in under-fives caused by prolonged malnutrition, indicating a nutritional condition other than underweight and overweight. (FAO *et al.*, 2022; Laksono, Muis and Wulandari, 2024). The long-term repercussions of stunting on human capital are manifold. Chief amongst these is the diminution of future earnings upon entering the labour market, with a consequent reduction in income of approximately 7% compared to children who have not been subject to the same conditions. In addition, stunted children encounter considerable difficulties in competing in the labour market, resulting in lower overall income (Akseer *et al.*, 2022).

According to data provided by the World Health Organization (WHO), the proportion of stunting in children under five in 2022 was approximately 22.3% on a global scale. This estimate indicates a decline in comparison with the preceding years, from 22.7% in 2020 to 22.5% in 2021



and then to 22.3% in 2022, signifying a decrease of approximately 0.2% on an annual basis (World Health Organization, 2023). The prevalence of stunting in children under-fives is a pervasive issue across WHO intervention areas worldwide, with Southeast Asia exhibiting the second highest rate at 30.1%, closely followed by Africa at 31.0% (World Health Organization, 2023). Reducing stunting in children under five is in line with the programme focus listed in Sustainable Development Goals (SDGs) No. 2.2. This is also part of the WHO's 2025 target, which aims to decline the incidence of stunting by 40% in children under five (Ministry of National Development Planning/Bappenas, 2017; World Health Organization, 2019). In view of these objectives, concerted endeavors across various sectors are imperative to accomplish the SDGs and targets that have been established.

Result of The Indonesian Health Survey (IHS) in 2023 indicated a persistent issue of stunting in Indonesia, with its prevalence of approximately 21.5%. This figure denotes a 0.1% decrease compared to the previous year's survey. The prevalence of stunting in Indonesia is equivalent to nearly every fourth child being affected. Conversely, East Java Province exhibited a stunting prevalence of 17.7%, marking a decline of 1.5% compared to the previous year (Kementerian Kesehatan RI, 2024). East Java Province's achievements are below the national average, but variations between districts/cities are still quite high. There are eight districts in East Java that still have stunting prevalence above the national average (Kementerian Kesehatan RI, 2024).

The Indonesian government promulgated Presidential Regulation No. 72 of 2021 about the Acceleration of Stunting Reduction, which provides the framework for stunting interventions in Indonesia. This presidential regulation replaces Presidential Regulation No. 42 of 2013 on the National Movement for the Acceleration of Nutrition Improvement. By this regulation, the Ministry of Health has introduced two categories of interventions to address stunting, which remains a significant public health concern in Indonesia. The two types of interventions are specific interventions and sensitive interventions. Stunting-specific interventions are defined as activities that directly address the root causes of stunting, including inadequate nutrition and food intake, as well as infectious diseases. These specific interventions are primarily implemented by the health sector. In contrast, sensitive interventions are defined as activities that seek to prevent stunting indirectly, such as through the health education about nutrition and parenting awareness, as well as the provision of clean water facilities and healthy latrines (Kementerian Kesehatan RI., 2023).

The Ministry of Health has released a set of at least 11 specific interventions that must be implemented by the government in districts and cities throughout Indonesia. These eleven specific interventions are as follows: screening for anemia, administration of blood supplement tablets to adolescents girls, antenatal care, administration of blood supplement tablets to pregnant women, supplementary feeding for pregnant women with chronic energy deficiency, growth monitoring for children under five years of age, exclusive breastfeeding, provision of animal protein-rich complementary foods for children under five, management of children under five with nutritional problems, increased immunization coverage and expansion, education of adolescents pregnant women and families, including open defecation-free triggers (Kementerian Kesehatan RI., 2023).

A considerable number of studies on stunting have been conducted at national and international levels (Kusumawardani *et al.*, 2023; Ashar *et al.*, 2024; Mukisa, Shumba and Lourens, 2024; Supadmi *et al.*, 2024). The novelty of this study lies in its focus on East Java Province, which exhibits distinct social, economic, and geographical characteristics compared to the rest of Indonesia. This enables a more precise and relevant understanding of the challenges and solutions

that apply at the local level. In light of this background, the study aims to analyze the effectiveness of specific interventions to address stunting in East Java Province.

MATERIAL AND METHODS

This study is an ecological study using secondary data. Ecological studies focus on the comparison of groupings rather than individual units. The data examined are aggregated data at a particular group or level, in this study at the district or city level. Ecological analysis variables can be categorized as aggregate measures, environmental measures, or global measures (Utami *et al.*, 2020; Yesica *et al.*, 2021). The research was performed using the stunting-specific intervention report data published by the East Java Provincial Health Office in 2023. Thus, the study was executed in a collective context at the provincial level of East Java, utilizing 38 districts and municipals as the units of analysis.

The dependent variable of the study is the prevalence of stunting in districts/cities in East Java. This is based on a report by the East Java Provincial Health Office, which refers to the results of the Indonesian Health Survey in 2023. Stunting is a measure of a child's nutritional condition based on age or height at a particular period. WHO growth standards produce a height indicator, often known as a z-score or deviation of height from the average size. The classification of stunting is typically into two categories: normal and stunted. The upper limit of the height/age index for nutritional status categories is defined as average (≥ -2.0 standard deviations), with stunting defined as (< -2.0 standard deviations) (Wulandari *et al.*, 2022).

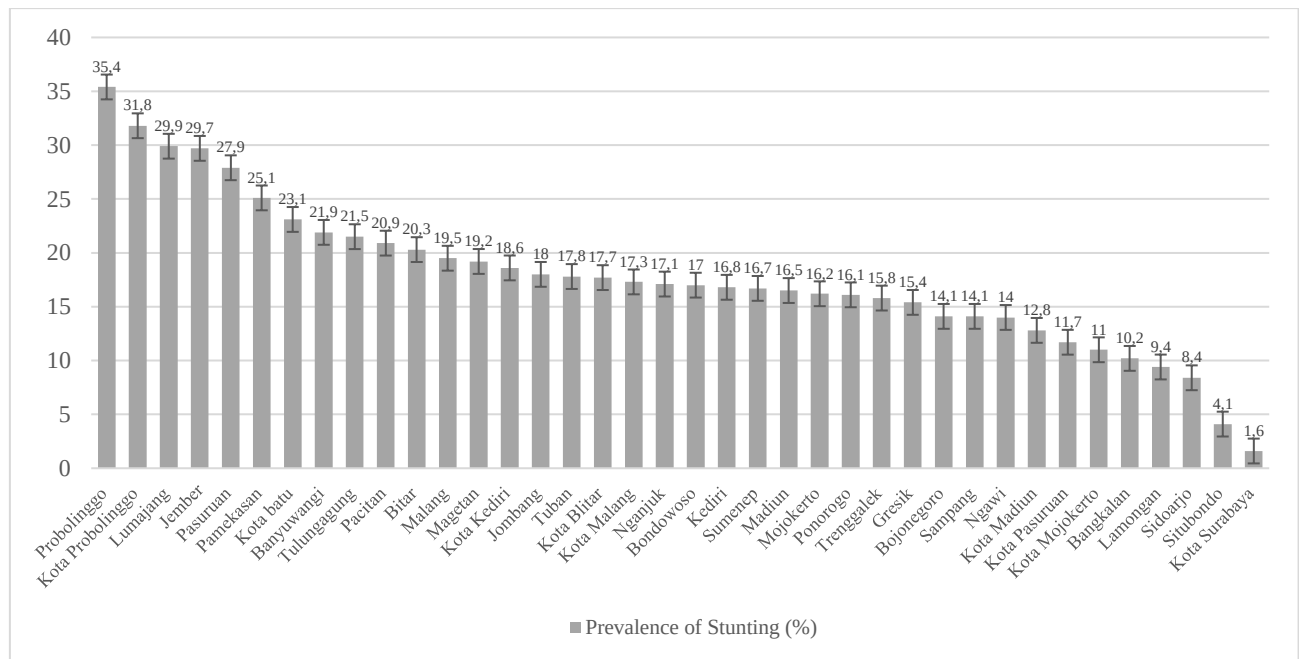
This study analyzed 11 (eleven) independent variables, which are specific interventions released by the Indonesian Ministry of Health (Kementerian Kesehatan RI., 2023). The eleven specific interventions are as follows: screening for anemia, consumption of blood supplement tablets by adolescents girls, antenatal care (ANC), consumption of blood supplements by pregnant women, supplementary feeding for chronically energy-deficient pregnant women, growth monitoring for under-fives, exclusive breastfeeding, provision of animal protein-rich complementary foods for under-fives, management of under-fives with nutritional problems, increased immunization coverage and expansion, and education of pregnant women and their families including open defecation-free triggers.

The eleven interventions were analysed with aggregate outcomes in the form of proportions or ratios at the district level. Analyses were conducted using scatter plots. Bivariate scatter plots were conducted between each specific intervention type and the prevalence of stunting in districts/municipalities in East Java Province.

This study drew upon secondary data from the stunting-specific intervention report, which was released by the East Java Provincial Health Office in 2023. The National Ethics Committee of the National Research and Innovation Agency subsequently classified this study as an exempted study, as outlined in the Letter of Notifications dated 30 January 2025.

RESULTS AND DISCUSSION

As illustrated in Table 2, the prevalence of under-five stunting and stunting-specific intervention variables in East Java, Indonesia, in 2023, exhibit significant inter-district variability. The data reveal a wide range of stunting prevalence levels among children under five, with the lowest recorded at 1.6% (Surabaya) and the highest at 35.40% (Kabupaten Probolinggo) according to Figure 1.



Source: Survei Kesehatan Indonesia 2023 (The Indonesian Health Survey, 2023)

Figure 1. Distribution of Stunting Prevalence in East Java Province, 2023

Table 2. Descriptive Statistic of research Variable

No.	Variabel	N	Minimum	Maximum	Mean	Std. Deviation
1	Prevalence of stunting	38	1.60	35.40	17.7526	7.10264
2	The proportion of screening for anemia	38	16.54	166.53	82.0916	33.05541
3	The proportion of blood supplement tablets consumed by adolescents girls.	38	22.93	100.00	75.7303	19.09831
4	The proportion of pregnant women using antenatal care (ANC)	38	27.28	100.40	86.6084	12.55396
5	The proportion of consumption blood supplement tablets by pregnant women	38	74.55	99.92	90.6213	5.76089
6	The proportion of pregnant women who receive supplementary feeding due to chronic energy deficiency	38	43.98	100.17	85.5526	15.60806
7	The proportion of growth monitoring for under-fives that are being managed	38	60.95	94.82	80.2866	7.12006
8	The proportion of mothers who exclusively breastfed their infants	38	32.00	95.00	68.4474	15.99780
9	The proportion of children under five consuming foods rich in animal protein.	38	81.75	153.34	97.3129	12.68505
10	The proportion of under-fives with nutritional problems that are being managed	38	33.71	100.00	79.9497	20.05227
11	The proportion of improved immunization coverage and expansion	38	63.29	106.38	94.0355	7.03381
12	The proportion of health education for adolescents, pregnant women and their families included open defecation-free triggers.	38	44.55	100.00	92.7605	15.59279

As demonstrated in Figure 1, the bivariate analysis employs a scatter plot to illustrate the relationship between various factors in East Java in 2023. These factors include the proportion of

anemia screening, the consumption of blood supplement tablets among adolescents girls, antenatal care, the consumption of blood supplement tablets among pregnant women, supplementary feeding for women due to chronic energy deficiency, and the prevalence of stunting. The analysis reveals a negative correlation between the prevalence of stunting and the four independent variables. This finding suggests that as the proportion of these four independent variables increases in specific districts or cities in East Java, the prevalence of stunting in the region is likely to decrease.

Figure 2 presents a scatter plot illustrating the proportion of protein-energy-deficient supplementary feeding for pregnant women, growth monitoring for children under five, exclusive breastfeeding, animal protein-rich complementary feeding for infants, and the prevalence of stunting in East Java in 2023. The findings indicate a negative relationship between the prevalence of stunting and the proportion of protein-energy deficient supplementary feeding for pregnant women, growth monitoring for under-fives, and exclusive breastfeeding. Conversely, the relationship between the prevalence of stunting among under-fives and the proportion of complementary feeding rich in animal protein for under-fives showed a positive relationship. This suggests that an increase in the proportion of animal protein-rich complementary feeding for under-fives in a district/city in East Java is related with a higher prevalence of stunting in the region.

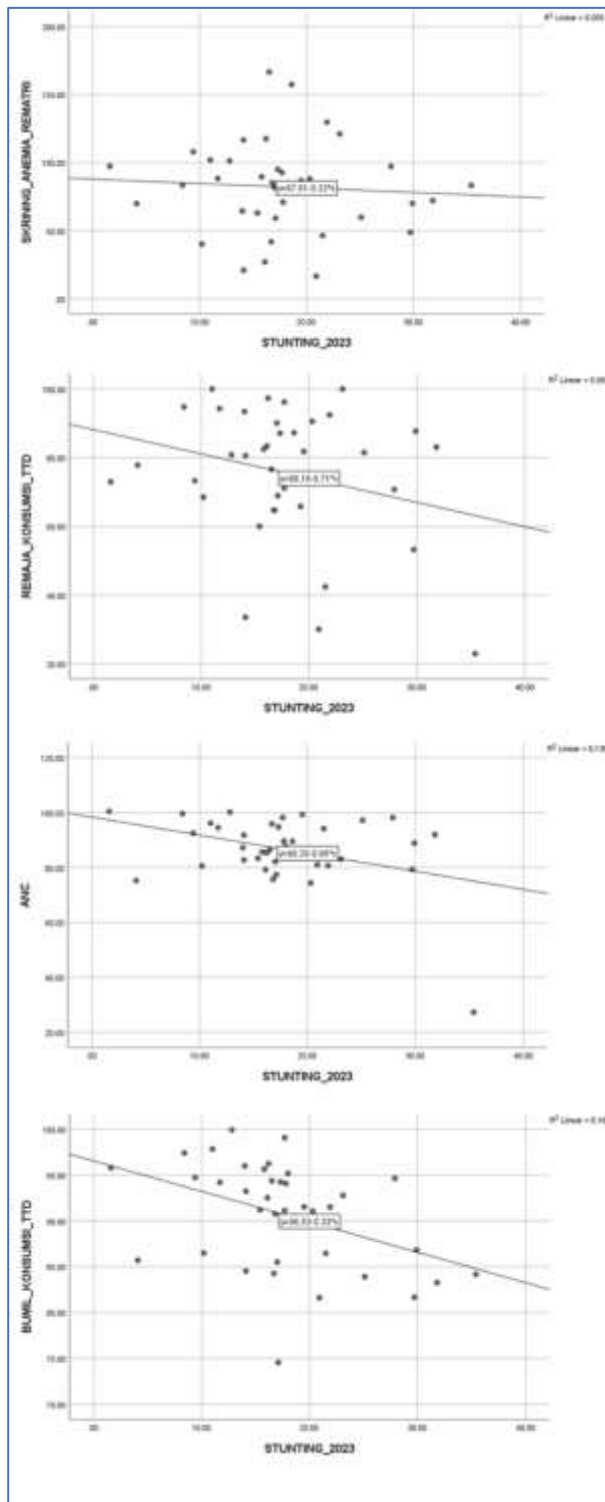


Figure1. Scatter plot of anemia screening, the consumption of blood supplement tablets among adolescent girls, antenatal care, the consumption of blood supplement tablets among pregnant women, and the prevalence of stunting in East Java in 2023

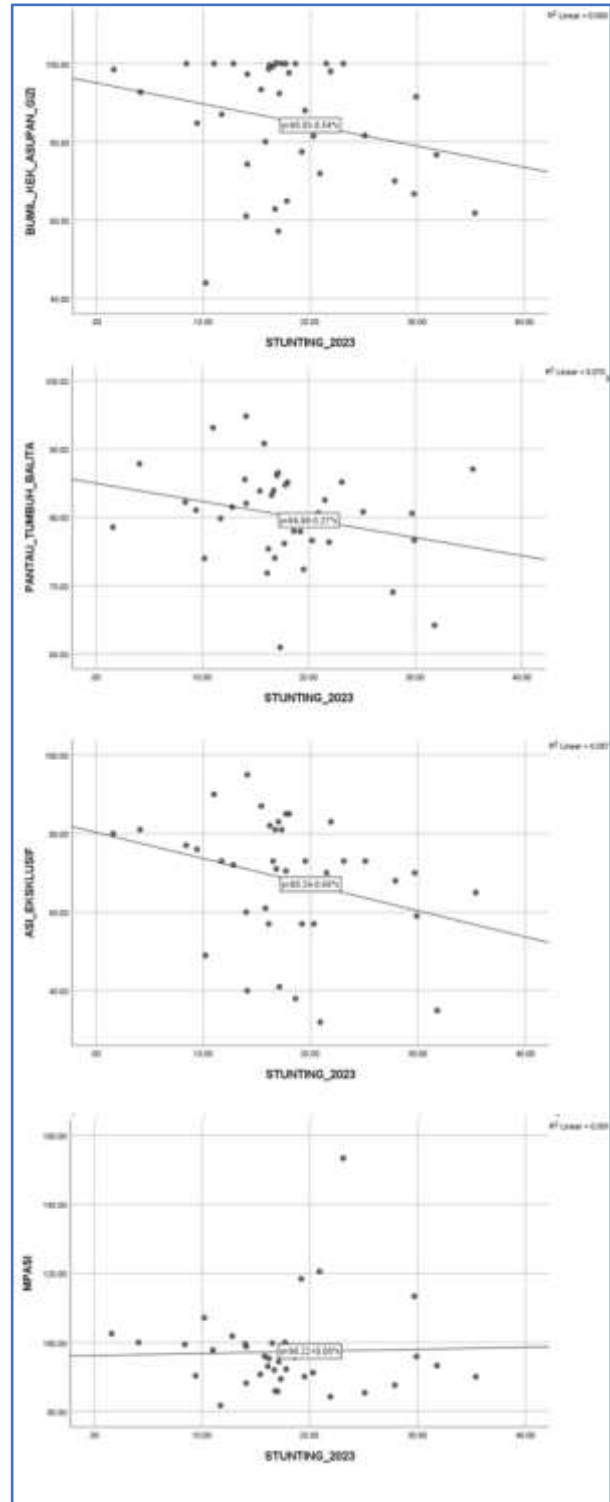


Figure 2. Scatter plot of the proportion of supplementary feeding for women due to chronic energy deficiency, the proportion of growth monitoring for under-fives that are being managed, the proportion of mothers who exclusively breastfed their infants, the proportion of children under five consuming foods rich in animal protein the prevalence of stunting in East Java in 2023

As demonstrated in Figure 3, the analysis of the scatter plot reveals a negative correlation between the prevalence of stunting and three independent variables in East Java in 2023. These variables include the proportion of under-five children with nutritional problems, increased immunization coverage and expansion, adolescents education for pregnant women and families including open defecation-free triggers, and the prevalence of stunting. This suggests that as the proportion of the three independent variables increases in districts/municipalities across East Java, the prevalence of stunting in the region experiences a decline.

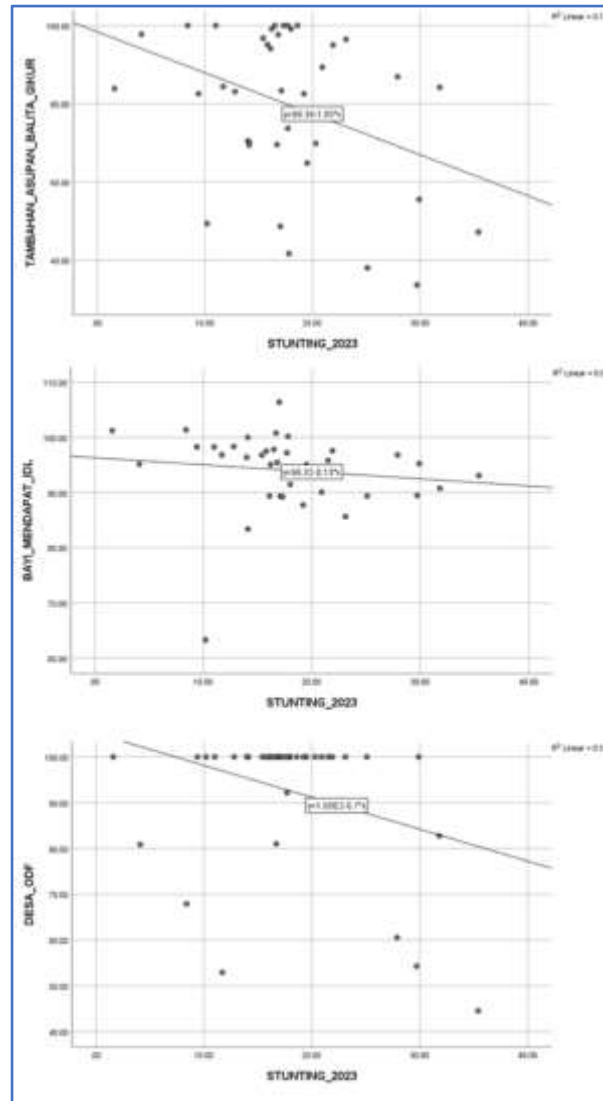


Figure 3. Scatter plot of the proportion of under-fives with nutritional problems that are being managed, the proportion of improved immunization coverage and expansion and the proportion of health education for adolescent, pregnant women and their families included open defecation-free triggers.

Many studies have demonstrated the efficacy of specific stunting prevention interventions in Indonesia in reducing stunting rates, particularly through enhanced nutrition and maternal and child health services. A number of initiatives have been implemented with the objective of reducing the prevalence of stunting in Indonesia. These include the administration of blood supplements to pregnant women and adolescents, the provision of nutritional support to energy-deficient pregnant women, the enhancement of access to prenatal care, and the promotion of exclusive breastfeeding alongside high-quality supplemental foods. The effectiveness of these treatments is determined by the coverage and quality of implementation in varied locations, given the numerous geographic and socioeconomic barriers present. The Indonesian government has determined that enhancing the capacity of health workers, advancing health systems, and fostering cross-sector collaboration are essential. These measures aim to ensure that targeted interventions effectively reach all vulnerable populations and maximize their impact on accelerating the decrease of stunting in Indonesia (Domili *et al.*, 2023; Gumilang, 2023; Yuniarti *et al.*, 2024).

The study's findings indicate an inverse relationship between the prevalence of stunting and the increased availability of health interventions, such as antenatal care services, the utilization of blood supplement tablets by pregnant women and teenage girls, and anemia screening. This suggests that as the proportion of individuals receiving these interventions increases within a region, the prevalence of stunting will concomitantly decrease. The study emphasizes the significance of nutritional adequacy during pregnancy in instances of chronic energy deficit, evidenced by the reduced incidence of stunting in children whose mothers received supplemental feeding during gestation. These data suggest that a multisectoral approach to enhancing maternal and child nutrition, particularly through public health interventions, can effectively reduce stunting prevalence and improve nutritional status for future generations. (Latief, 2021; Ekholuenetale *et al.*, 2022; Gumilang, 2023).

The findings indicated that an increased percentage of supplemental feeding for pregnant women with protein-energy shortage, growth monitoring for children under five, and exclusive breastfeeding correlated with a reduced prevalence of stunting in children under five. These findings underscore the necessity of preventing stunting through treatments from conception to the first 1,000 days of a child's life, or the initial two years. The study's results indicated a favorable link between the proportion of under-fives receiving animal protein-rich complementary feeding (MP-ASI) and the incidence of stunting. This association may be attributable to a number of factors, including dietary restrictions, limited food variety, improper timing of complementary feeding, or health conditions that affect the absorption of nutrients in children (Diana *et al.*, 2018; Kusriani, Ipa and Laksono, 2019; Yuliarsih, 2020; Laksono and Wulandari, 2021). Consequently, while the consumption of animal protein is crucial for optimal growth in children, there is a necessity for parental assistance and education on the appropriate timing and method of complementary feeding to ensure optimal nutritional benefits (Afira Septia Gunawan and Prameswari, 2022; Fitrotuzzaqiyah and Rahayu, 2023).

The analysis demonstrates that health interventions and education play a pivotal role in the reduction of stunting prevalence. It is evident that as the proportion of under-fives with nutritional problems, immunization coverage and expansion, and education for adolescents, pregnant women, and families-including triggering efforts to eliminate open defecation- increases, the stunting rate among under-fives decreases. This finding suggests that the early treatment of nutritional problems in children under five, the protection from disease that is provided by immunization, and the increased public awareness of clean and healthy living practices contribute significantly to the

prevention of stunting (Nuzula, Oktaviana and Yunita, 2021; Lagiono *et al.*, 2023; Marume, Archary and Mahomed, 2023). Accordingly, a comprehensive strategy encompassing elements of nutrition, health, and sanitation must be perpetually reinforced to establish a milieu conducive to children's optimal development.

Moreover, the study emphasised the necessity to augment the scope and efficacy of nutrition programmes in regions characterised by high stunting rates. This necessitates the enhancement of access to health services, the dissemination of nutrition education within communities, and the implementation of data-driven policies that bolster food security and child nutrition. Consequently, a multisectoral approach encompassing the health, education, and social sectors is imperative to expedite the sustainable reduction of stunting in East Java (Muthia, Oscco and Yantri, 2020; Nuzula, Oktaviana and Yunita, 2021).

CONCLUSION AND SUGGESTION

The study findings suggest that in order to reduce stunting in East Java Province as quickly as possible, efforts should focus on enhancing and broadening the use of ten specific interventions that have been shown to be effective. These include screening for anemia, supplementing blood, monitoring the growth of pregnant women and toddlers, providing supplemental feeding for pregnant women who have a chronic energy deficiency, and managing toddlers who have nutritional issues. The study further emphasizes the importance of enhancing vaccine coverage and nutrition education for adolescents, expectant mothers, and families, as well as sanitation initiatives such as trigger-free open defecation. Concurrently, the study calls for further evaluation of the efficacy of animal protein-rich complementary feeding, which has not demonstrated a favorable impact on reducing stunting. A more profound analysis of the quality, timing of provision, and other factors that influence uptake should be conducted to optimize this intervention. Local governments and stakeholders must ensure that these interventions are implemented in a synergistic manner, with robust policy support, trained health workers, and active communities.

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CONFLICT OF INTEREST

There is no potential for a conflict of interest to arise from the completion of this research project.

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