

Integrated Stunting Reduction Model through Supplementary Feeding and Deworming: A Cross-Sectional SEM-PLS Study among Toddlers

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ABSTRACT

Background: Stunting remains a major public health problem in coastal areas of Sumenep Regency, Indonesia, with a prevalence of 21.6%, exceeding the provincial average. Government programs such as supplementary feeding (PMT) and deworming have been widely implemented; however, evidence regarding how these interventions interact with maternal characteristics to influence stunting outcomes in coastal populations remains limited. Therefore, an integrated analytical model is needed to clarify the direct and indirect pathways influencing stunting among toddlers in coastal settings

Methods: This analytical observational study employed a cross-sectional design and followed the STROBE guideline for cross-sectional studies. The study was conducted from March to September 2025 in two coastal sub-districts of Sumenep Regency (Batang-batang and Dungkek). A total of 352 mothers with toddlers were selected using stratified random sampling. Inclusion criteria were mothers with children under five years of age who were not suffering from severe illness and consented to participate, while exclusion criteria included absenteeism during data collection. Independent variables included maternal education, maternal knowledge, child sex, child age, supplementary feeding, deworming, and exclusive breastfeeding, while the dependent variable was stunting incidence. Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS version 4, applying a significance level of 5%.

Result: SEM-PLS analysis showed that supplementary feeding had the strongest direct effect on stunting incidence ($\beta = 0.438$; $t = 11.173$; $p < 0.001$). Deworming ($\beta = 0.111$; $t = 2.925$; $p = 0.004$) and maternal education ($\beta = 0.457$; $t = 11.480$; $p < 0.001$) also had significant direct effects. Maternal education indirectly influenced stunting through supplementary feeding and deworming pathways, while maternal knowledge influenced exclusive breastfeeding but did not show an indirect association with stunting. A total of nine significant structural paths were retained in the final model.

Conclusion: Supplementary feeding is the most influential intervention in reducing stunting among toddlers in coastal areas, supported by deworming and maternal education. An integrated stunting reduction strategy combining regular supplementary feeding, routine deworming,

and maternal education strengthening is recommended, particularly for vulnerable coastal populations. These findings provide a clear evidence-based framework to optimize program convergence for stunting prevention.

Keywords: Stunting; Preschool Child; Supplementary Feeding; Deworming; Coastal Population

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Implications for Research, Practice, or Policy

- The integrated SEM-PLS model highlights specific direct and indirect pathways that may inform future longitudinal or intervention-based research examining the mechanisms linking maternal characteristics, nutrition programs, and infection control to stunting outcomes.
- The findings could support clinical and professional practice by encouraging more coordinated implementation of supplementary feeding and routine deworming within child health services, alongside attention to maternal education as a contextual factor influencing program uptake.
- The results may inform health policy and health system planning in resource-limited and coastal settings by supporting program convergence approaches that prioritize supplementary feeding and deworming as complementary components of stunting reduction strategies.

INTRODUCTION

Stunting is a significant nutritional problem, particularly in low- and middle-income countries. Stunting occurs as a result of growth faltering and inadequate catch-up growth, reflecting a child's inability to achieve optimal physical development. The World Health Organization (WHO) reported that in 2020 the global prevalence of stunting among children under five years of age reached 21.3% ([World Health Organization \[WHO\], 2020](#)). This condition represents chronic growth failure caused by long-term nutritional deficiencies that begin during pregnancy and continue until the child reaches 24 months of age. Children affected by stunting have been shown to have a ninefold higher risk of having below-average intelligence quotient (IQ) scores compared to non-stunted children ([Priyono, 2020](#); [Rahmadhita, 2020](#); [Wardita et al., 2021](#)).

Beyond physical growth impairment, stunting has long-term consequences on cognitive development, learning capacity, and

future productivity. Stunted children are more likely to experience reduced educational achievement, increased susceptibility to non-communicable diseases, and lower work productivity in adulthood, which ultimately affects national economic growth and the quality of human resources ([Aulia, 2021](#); [Firmansyah Aji & Novaria, 2025](#); [Syamsuadi et al., 2023](#); [Wardita et al., 2022](#)).

In Indonesia, stunting remains a major public health concern. According to the 2023 Indonesia Health Survey (Survei Kesehatan Indonesia), approximately one in five children under five years old (21.5%) experiences stunting, with the highest prevalence observed among children aged 2–3 years. Data from the Indonesia Nutrition Status Survey indicate a declining trend, with stunting prevalence decreasing from 24.4% in 2021 to 21.6% in 2022. The Indonesian government has set an ambitious target to reduce stunting prevalence by 3% annually, aiming to achieve a national rate of 14% by 2024 ([Firmansyah Aji & Novaria,](#)

2025; [Norsanti, 2021](#); [Regita & Prathama, 2023](#); [Supriyanto & Jannah, 2022](#)).

At the regional level, East Java Province has a stunting prevalence of 19.2%, which is below the national average. However, Sumenep Regency remains a high-burden area, with a stunting prevalence of 21.6%, particularly concentrated in coastal communities. In response, the government has implemented a range of specific and sensitive nutrition interventions, including promotion of exclusive breastfeeding, macro- and micronutrient supplementation, supplementary feeding for toddlers and at-risk pregnant women, routine deworming to prevent infectious diseases, iron supplementation for pregnant women, and non-cash food assistance programs.

Among these interventions, the Supplementary Feeding Program (PMT) and deworming initiatives play a critical role in stunting prevention. PMT directly improves children's nutritional intake, while deworming enhances nutrient absorption and reduces infection-related growth impairment. The integration of these two programs addresses both nutritional adequacy and disease prevention, making them essential components of comprehensive stunting reduction strategies ([Firmansyah Aji & Novaria, 2025](#); [Karida et al., 2023](#); [Regita & Prathama, 2023](#)).

Based on this background, this study aims to examine the influence of government interventions on stunting reduction by developing a strategic model tailored to coastal areas, particularly in Sumenep Regency, through the integration of supplementary feeding programs in the form of fortified biscuits and routine deworming interventions.

METHODS

Study Design

This research was conducted over one year. The type of research is observational analytic with a cross-sectional design (Yulia Wardita, Eka

Meiri Kurniyati, Cory Nelia Damayanti, Mujib Hannan, 2022) ([Wardita et al., 2021](#)). The research was conducted in coastal areas in two sub-districts: Batang-batang and Dungkek, from March to September 2025.

Participants

The population in this study comprised all mothers with children under 5 years old, totaling 4155 toddlers in 2024. The study sample was a representative portion of the population, namely 352 mothers with children under 5 years old. Sampling technique used stratified random sampling. Inclusion criteria in this study were mothers with toddlers under 5 years old, toddlers not currently suffering from severe illness, and willingness to be respondents. Exclusion criteria were mothers of toddlers who were absent during the research period.

Instrument

Data collection technique used interviews with a questionnaire guide to determine respondent characteristics, including mother's education, mother's occupation, mother's knowledge, PMT during pregnancy, exclusive breastfeeding, complementary feeding, PMT for toddlers, deworming. Measurements were taken to determine toddler nutritional status by measuring toddler weight and height using scales and a multifunction tool. Documentation study of secondary data regarding the number of mothers with stunting children under 5 years old.

Data Collection

Data collection techniques were adapted to the type of data collected: interviews with a questionnaire guide to determine mother and toddler characteristics, provision of PMT and deworming; measurements to determine toddler nutritional status by measuring toddler weight and height; documentation study of

secondary data regarding the number of mothers with stunting children under 5 years old.

Data Analysis

The data obtained from the above research were then analyzed. The analysis was conducted to determine the relationship between each independent variable and the dependent variable and to create an integrated stunting reduction acceleration model with supplementary feeding and deworming in the coastal area using the Smart PLS test.

Ethical Consideration

This research has obtained approval from the Research Ethics Commission of the Faculty of Health Sciences, Wiraraja University, with Ethical Feasibility Certificate Number 275.2/KEPK/III/2025. Informed consent from respondents was obtained before the research was conducted, and confidentiality was maintained.

RESULTS

The obtained data is presented in the form of frequency distribution tables and cross-tabulation tables. The researcher presents variable data showing the frequency distribution of stunting incidence, family characteristics, history of PMT provision, and deworming.

Table 1. Distribution of Stunting Incidence and Maternal Characteristics (n = 352)

Variable	Frequency (n)	Percentage (%)
Stunting Status		
Stunted	155	44
Not stunted	197	56
Maternal Education		
Elementary school	105	29.8
Junior high school	49	13.9
Senior high school	185	52.6

Variable	Frequency (n)	Percentage (%)
Diploma/Bachelor's degree	13	3.7
Maternal Occupation		
Employed	28	8
Unemployed	324	92
Maternal Knowledge		
Poor	27	7.7
Fair	281	79.8
Good	44	12.5
Total	352	100

Table 1 shows that more than half of the toddlers did not experience stunting, totaling 197 respondents (56%). Maternal education characteristics show more than half have Senior High School education, totaling 185 respondents (52.6%). Very few mothers had D3/Bachelor's education, totaling 13 respondents (3.7%). Almost all mothers were unemployed, totaling 324 respondents (92%). Most respondent mothers had fair knowledge, totaling 281 respondents (79.8%).

Table 2. Distribution of Stunting Incidence and Toddler Characteristics (n = 352)

Variable	Frequency (n)	Percentage (%)
Stunting Status		
Stunted	155	44
Not stunted	197	56
Exclusive Breastfeeding		
Exclusively breastfed	263	74.7
Not exclusively breastfed	89	25.3

Table 2 shows that more than half of the toddlers did not experience stunting, totaling

197 respondents (56%). Most respondents received exclusive breastfeeding, totaling 263 respondents (74.7%).

Table 3. Distribution of Supplementary Feeding (PMT) and Stunting Incidence Among Toddlers (n = 352)

Variable	Frequency (n)	Percentage (%)
Stunting Status		
Stunted	155	44
Not stunted	197	56
Supplementary Feeding (PMT)		
Regular consumption of PMT	74	21
PMT consumed but not completed	3	0.9
Did not receive or consume PMT	275	78.1

Table 3 shows that more than half of the toddlers did not experience stunting, totaling 197 respondents (56%). Most toddlers did not receive and consume PMT, totaling 275 respondents (78.1%). Very few respondents consumed PMT but did not finish, totaling 3 respondents (0.9%).

Table 4. Distribution of Deworming and Stunting Incidence Among Toddlers (n = 352)

Variable	Frequency (n)	Percentage (%)
Stunting Status		
Stunted	155	44
Not stunted	197	56
Deworming		
Regular deworming	93	26.4
Not dewormed / irregular deworming	259	73.6
Total	352	100

Table 4 shows that more than half of the toddlers did not experience stunting, totaling 197 respondents (56%). Most respondent toddlers were not given deworming medication, totaling 159 respondents (73.6%).

Model Analysis

Diagram of factor loading values for the integrated stunting reduction model with supplementary feeding and deworming is shown in the **figure 1**.

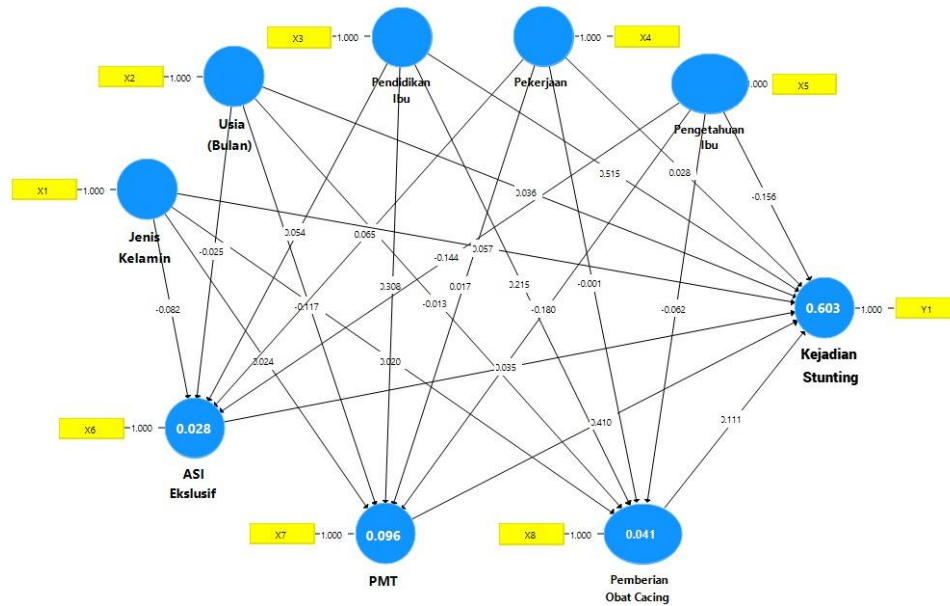


Figure 1. Measurement Model Analysis (Outer Model)

Based on the convergent validity test output, all constructs have a value of 1.00 (> 0.5), meaning the factor loading value is higher than the cross-loading value; in this case, it can be said that the factor loading value is Valid.

From the table above, all constructs have an Average Variance Extracted (AVE) value of 1.00 (>0.5) and a composite reliability value of 1.00 (>0.6). Thus, it can be concluded that all constructs are reliable and able to explain their factors.

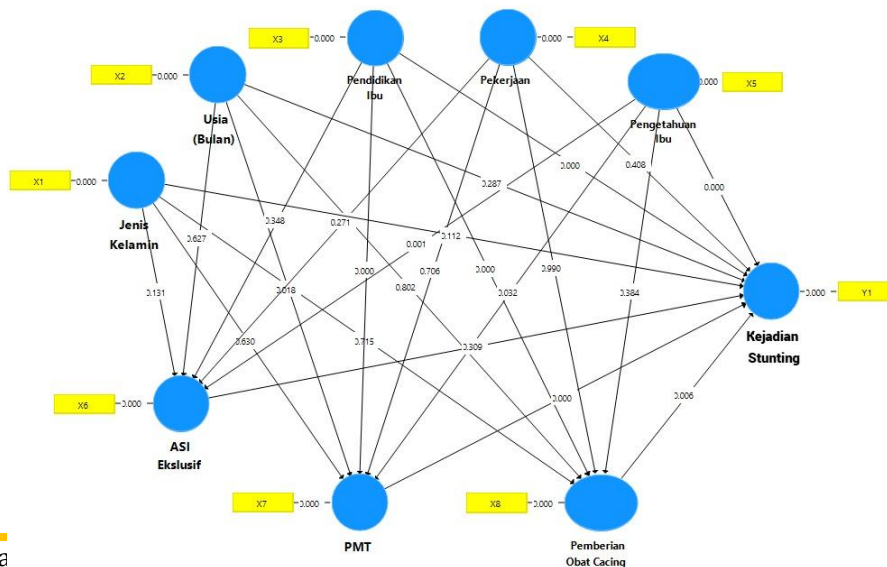


Figure 2 Structural Model Analysis (Inner Model), P value before model fit

Analysis technique of the model using Structural Equation Modeling (SEM) was conducted to test the influence between variables. SEM is used to examine and justify a model, the value used as a reference is the p

Value (>0.05). Based on the table above, it shows that there are 14 paths from the total that are not significant. The next stage, non-significant paths will be removed one by one until all paths are significant (**Figure 2**).

Table 5. Structural Model Path Coefficients Before Model Trimming (SEM-PLS Analysis)

No.	Pathway	Original Sample (β)	t-Statistic	p-Value
1	Exclusive Breastfeeding → Stunting Incidence	0.035	1.019	0.309
2	Child Sex → Exclusive Breastfeeding	-0.082	1.513	0.131
3	Child Sex → Supplementary Feeding (PMT)	0.024	0.482	0.63
4	Child Sex → Deworming	0.02	0.366	0.715
5	Child Sex → Stunting Incidence	0.057	1.593	0.112
6	Supplementary Feeding (PMT) → Stunting Incidence	0.41	11.466	< 0.001
7	Maternal Occupation → Exclusive Breastfeeding	0.065	1.102	0.271
8	Maternal Occupation → Supplementary Feeding (PMT)	0.017	0.378	0.706
9	Maternal Occupation → Deworming	-0.001	0.012	0.99
10	Maternal Occupation → Stunting Incidence	0.028	0.827	0.408
11	Deworming → Stunting Incidence	0.111	2.74	0.006
12	Maternal Education → Exclusive Breastfeeding	0.054	0.94	0.348
13	Maternal Education → Supplementary Feeding (PMT)	0.308	6.088	< 0.001
14	Maternal Education → Deworming	0.215	4.117	< 0.001
15	Maternal Education → Stunting Incidence	0.515	11.081	< 0.001
16	Maternal Knowledge → Exclusive Breastfeeding	-0.144	3.209	0.001
17	Maternal Knowledge → Supplementary Feeding (PMT)	-0.180	2.154	0.032
18	Maternal Knowledge → Deworming	-0.062	0.871	0.384
19	Maternal Knowledge → Stunting Incidence	-0.156	3.539	< 0.001
20	Child Age (months) → Exclusive Breastfeeding	-0.025	0.486	0.627
21	Child Age (months) → Supplementary Feeding (PMT)	-0.117	2.382	0.018
22	Child Age (months) → Deworming	-0.013	0.25	0.802
23	Child Age (months) → Stunting Incidence	0.036	1.066	0.287

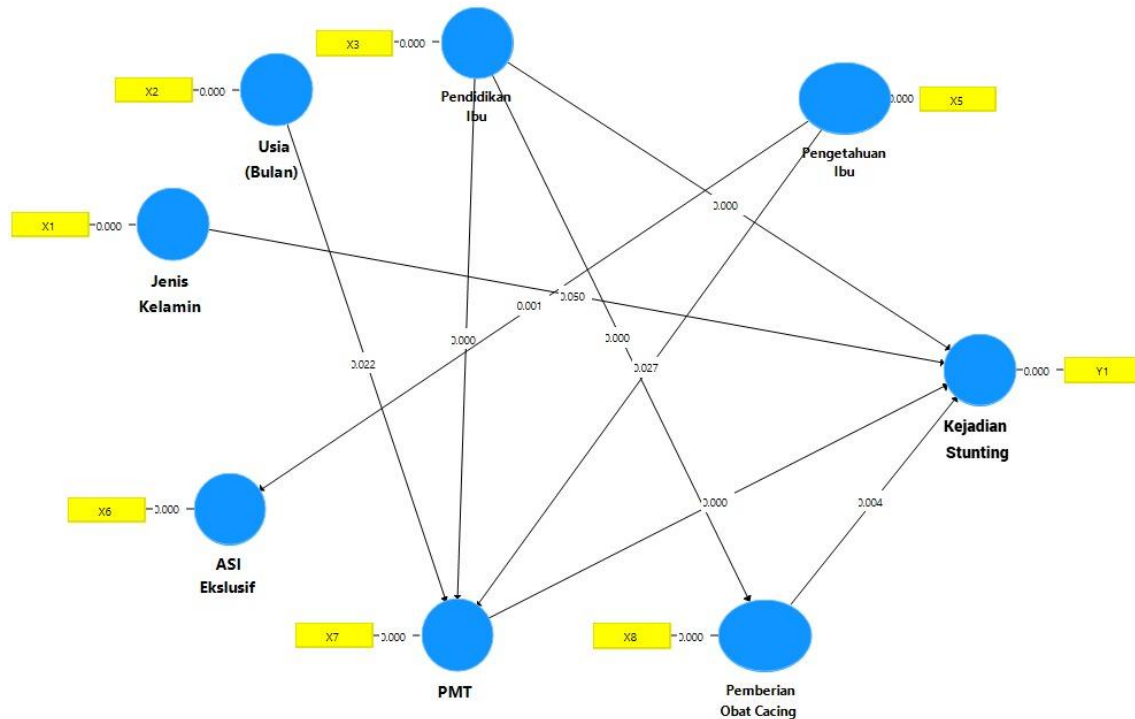


Figure 4. Structural Model Path Coefficients Before Model Trimming

Table 5. Structural Model Results of the Final SEM-PLS Model

No.	Pathway	Path Coefficient (β)	<i>t</i> -Statistic	<i>p</i> -Value
1	Sex → Stunting Incidence	0.07	1.966	0.05
2	Supplementary Feeding (PMT) → Stunting Incidence	0.438	11.173	< 0.001
3	Deworming → Stunting Incidence	0.111	2.925	0.004
4	Maternal Education → Supplementary Feeding (PMT)	0.31	6.141	< 0.001
5	Maternal Education → Deworming	0.193	3.954	< 0.001
6	Maternal Education → Stunting Incidence	0.457	11.48	< 0.001
7	Maternal Knowledge → Exclusive Breastfeeding	-0.121	3.276	0.001
8	Maternal Knowledge → Supplementary Feeding (PMT)	-0.184	2.213	0.027
9	Child Age (months) → Supplementary Feeding (PMT)	-0.119	2.299	0.022

After sequential removal of non-significant paths, the final SEM-PLS model retained 9 statistically significant pathways ($p < 0.05$) out of the initial 23 structural paths. The results

indicate that child sex, supplementary feeding (PMT), deworming, and maternal education have direct effects on stunting incidence. In addition, maternal education, maternal

knowledge, and child age (in months) show indirect associations with stunting incidence through the supplementary feeding pathway. The analysis further demonstrates that maternal education indirectly affects stunting incidence via the deworming pathway, whereas maternal knowledge influences exclusive breastfeeding but does not exhibit an indirect relationship with stunting incidence (*Figure 4, Table 4 and 5*).

DISCUSSION

The Relationship Between Maternal Characteristics and Stunting Reduction

The results show that maternal characteristics—including education, occupation, and knowledge—have a significant influence on child nutritional status. Some 52.6% of mothers had senior high school education, while only 3.7% had a D3/Bachelor's degree. The majority of mothers (92%) were unemployed, and most (79.8%) had sufficient knowledge about nutrition and health.

Based on SEM analysis, mother's education has a significant direct influence on child nutritional status (p -value = 0.000). This finding aligns with previous studies indicating that higher maternal education improves understanding of parenting practices, nutrition, and health, thereby reducing the risk of stunting ([Aulia, 2021](#); [Ahnafani et al., 2024](#)). Educated mothers tend to have better cognitive skills in processing health information, accessing health services, and applying optimal childcare practices.

Meanwhile, mother's knowledge shows a significant negative relationship with child nutritional status (p -value = 0.000). This paradox may be explained by the presence of a *knowledge-practice gap*, where adequate theoretical knowledge does not necessarily translate into appropriate behavior due to economic, cultural, or environmental barriers

([Hermawati et al., 2025](#)). Although most mothers possessed sufficient knowledge, limitations in food access, household income, and social support may have hindered its practical application.

The research results reveal that maternal characteristics play a fundamental role in stunting reduction through the interaction of education, occupation, and knowledge. Although the majority of mothers had secondary education, stunting prevalence remained high at 44%, indicating that education alone is insufficient without supporting socioeconomic and environmental factors ([Wardita et al., 2022](#)).

Regarding occupation, 92% of mothers were unemployed, which influences both childcare dynamics and household economic conditions. Previous research suggests that unemployed mothers may have more time for caregiving but often face financial constraints that limit access to nutritious food and health services ([Ahnafani et al., 2024](#)). This explains why maternal occupation was not statistically significant in the final SEM model, as its effect is mediated by family income and resource accessibility ([Elisaria et al., 2025](#)).

The paradoxical finding related to maternal knowledge is consistent with earlier studies identifying that knowledge alone does not guarantee behavioral change ([Aulia, 2021](#); [Hermawati et al., 2025](#)). Measurement tools that focus solely on cognitive aspects without considering contextual and practical dimensions may also contribute to biased interpretations ([Wardita et al., 2021](#)).

Overall, the interaction of maternal education, knowledge, and occupation creates a complex dynamic in stunting prevention. Higher education may enhance knowledge, but without economic empowerment and a supportive environment, this knowledge cannot be optimally implemented. Therefore, stunting reduction interventions should adopt a holistic approach that integrates education, economic

strengthening, and social support systems for mothers.

The Relationship Between PMT Program Provision and Stunting Reduction

The findings show that 78.1% of toddlers did not receive the Supplementary Feeding Program (PMT), while only 21% consumed it regularly. SEM analysis indicates that PMT provision has a positive and significant effect on stunting reduction (p -value = 0.000). This confirms that PMT interventions are effective in improving child nutritional status, particularly when delivered consistently and appropriately targeted.

This result is supported by studies demonstrating that PMT plays a critical role in fulfilling toddlers' energy and protein requirements in areas with high stunting prevalence ([Ferial & Wijaya, 2024](#); [Nurmala Meilasari, 2024](#)). Additionally, maternal education significantly influences PMT utilization (p -value = 0.000), suggesting that educated mothers are more proactive in accessing and utilizing nutrition intervention programs ([Pontang et al., 2024](#)).

SEM analysis further reveals that PMT has a path coefficient of 0.438, indicating a strong direct contribution to improved nutritional status. PMT functions as a source of essential macronutrients and micronutrients—including protein, iron, zinc, vitamin A, and iodine—which are critical for linear growth and cognitive development, particularly during the First 1000 Days of Life ([Husnah et al., 2022](#); [Ferial et al., 2025](#)).

However, PMT coverage remains limited, with the majority of toddlers not receiving the program. This low coverage is attributed to budget constraints, uneven distribution, and limited community awareness regarding PMT benefits ([Norsanti, 2021](#)). The influence of maternal education on PMT utilization is consistent with findings that socioeconomic

factors play a significant role in the effectiveness of nutrition programs ([Elisaria et al., 2025](#)).

Compliance and consumption consistency also determine PMT effectiveness. The low proportion of children who did not finish PMT (0.9%) indicates good acceptability. PMT not only improves nutritional intake but also serves as a practical nutrition education tool, enabling mothers to learn about food composition, feeding frequency, and appropriate preparation methods ([Pontang et al., 2024](#); [Nurmala Meilasari, 2024](#)).

In a broader context, PMT should be implemented as part of an integrated nutrition strategy. WHO emphasizes that PMT yields optimal outcomes when combined with micronutrient supplementation, exclusive breastfeeding promotion, and improvements in water, sanitation, and hygiene ([WHO, 2024](#)). These findings reinforce PMT as a cost-effective and essential intervention in national stunting reduction efforts.

The Relationship Between Deworming and Stunting Reduction

The study found that 73.6% of toddlers did not receive deworming medication regularly. Nevertheless, SEM analysis demonstrates that deworming has a positive and significant influence on child nutritional status (p -value = 0.004). Worm infections interfere with nutrient absorption and contribute to chronic malnutrition, making routine deworming a crucial intervention in stunting prevention ([Bria & Susilawati, 2024](#)).

The path coefficient of 0.111 indicates that although deworming has a smaller effect compared to nutritional interventions, its contribution remains important within a multifactorial stunting reduction framework. Soil-transmitted helminth infections cause nutrient malabsorption, chronic blood loss, and inflammatory responses that disrupt growth

hormone and IGF-1 activity, ultimately impairing linear growth ([Setyoningsih et al., 2024](#)).

Low deworming coverage is associated with limited drug distribution, infrequent program implementation, and inadequate public awareness. Evidence from Tanzania shows that routine deworming every six months can reduce stunting risk by 15–20% in high-endemic areas ([Elisaria et al., 2025](#)). Maternal education significantly influences deworming uptake (p -value = 0.000), highlighting the importance of health literacy in preventing infectious diseases.

Deworming effectiveness is highest when administered regularly to children aged 12–23 months and combined with improvements in sanitation and hygiene. Studies indicate that integrating deworming with WASH interventions can increase stunting reduction effectiveness by up to 35% compared to deworming alone ([Setyoningsih et al., 2024](#); [Syamsuadi et al., 2023](#)).

Thus, deworming should be viewed not as a standalone intervention but as an essential component of integrated nutrition programs that enhance the effectiveness of PMT and micronutrient supplementation.

The Role of Exclusive Breastfeeding in Stunting Reduction

Descriptive analysis shows that 74.7% of toddlers received exclusive breastfeeding, while 25.3% did not. However, SEM analysis revealed no significant direct effect of exclusive breastfeeding on child nutritional status (p -value = 0.309), although indirect effects through mediating variables were identified. This finding aligns with recent literature suggesting that the impact of exclusive breastfeeding on stunting is context-dependent and influenced by maternal condition, duration, and breastfeeding practices ([Dewi & Ariani, 2022](#); [Hermawati et al., 2025](#)).

Exclusive breastfeeding protects against stunting through immunological and metabolic mechanisms. Breast milk contains bioactive

components—such as oligosaccharides, lactoferrin, lysozyme, and immunoglobulins—that promote healthy gut microbiota and reduce infection risk, a key determinant of stunting ([Meliyana, 2019](#)). It also provides hormones and growth factors, including leptin and IGF-1, which regulate metabolism and growth ([Hermawati et al., 2025](#)).

Interestingly, SEM analysis shows a significant negative relationship between maternal knowledge and exclusive breastfeeding (p -value = 0.001), reflecting a knowledge–practice gap. Factors such as workplace constraints, lack of social support, cultural beliefs, and psychological stress often hinder breastfeeding practices despite adequate knowledge ([Dhohirrobi, 2025](#)). Moreover, maternal education was not significantly associated with exclusive breastfeeding (p -value = 0.348), emphasizing the importance of environmental and policy support.

From a life-cycle perspective, exclusive breastfeeding offers long-term protective effects. Infants exclusively breastfed for six months have a significantly lower risk of stunting at two years of age due to optimal nutrition and metabolic programming ([Wardita et al., 2021](#)). Therefore, exclusive breastfeeding promotion remains a foundational investment in stunting reduction strategies, even when short-term statistical associations appear weak.

Practical Applications of the Findings

The refined structural model indicates that supplementary feeding and deworming function as key proximal pathways through which maternal and child characteristics are associated with stunting outcomes. Practically, this suggests that the effectiveness of stunting reduction efforts may depend not only on the availability of nutrition and infection-control programs but also on how maternal education, knowledge, and child age shape engagement with these interventions. The findings highlight the importance of aligning program delivery with maternal capacity and child developmental

stage to enhance the functional impact of existing child health services.

Limitations

The study may be limited by its cross-sectional design, which does not allow assessment of temporal or directional relationships among maternal factors, program participation, and stunting outcomes. Several key variables were measured using self-reported questionnaires, which may be subject to recall or reporting bias. In addition, the analysis focused on a specific coastal context, which may constrain the applicability of the findings to other settings. The SEM-PLS approach identifies statistical associations, and the results should therefore be interpreted with caution in terms of underlying mechanisms.

CONCLUSION

Based on the SEM PLS path analysis results, it was found that providing supplementary food for toddlers was the most influential factor on reducing stunting incidence with a t-statistic value of $11.173 > 1.96$. Mother's Education is a strong factor influencing stunting incidence, both directly and indirectly (through PMT and Deworming). Meanwhile, for the variables of mother's education, knowledge, sex, and age are factors that significantly influence the provision of supplementary feeding and deworming. Good mother's education and knowledge and child's age can influence the provision of supplementary feeding and deworming for toddlers.

This research explains that Mother's Education indirectly influences Stunting Incidence through the Deworming pathway, while mother's knowledge influences Exclusive Breastfeeding but has no indirect relationship with Stunting Incidence. The higher the education of mothers of toddlers, the more it increases the mother's knowledge of the importance of PMT provision, while the older

the toddler's age, PMT provision actually decreases; this could be because PMT focuses on early age.

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Contributors

Yulia Wardita: Conceptualization, Methodology, Formal analysis, Supervision, Writing – original draft.

Eka Meiri Kurniyati: Data curation, Investigation, Validation, Writing – review & editing.

Dian Permatasari: Data curation, Investigation, Writing – review & editing.

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Conflicts of interest

Not declared.

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