

An Analysis of Reproductive Health Risks, Health Worker Role, and Family Prosperity as a Determinant of Stunting Prevention

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ABSTRACT

Background: Stunting is a complex public health issue, influenced by various biological aspects, medical services, and socioeconomic conditions. In Lebong Regency, the prevalence of stunting showed variability, with a recent increase that requires a thorough investigation of its determinants. Reproductive risks in couples of childbearing age (PUS) related to the 4T criteria (too young, too old, too close pregnancy interval, and too many children), the role of health workers, and family prosperity are thought to correlate with stunting prevention.

Method: This study employed a quantitative analytical design with a cross-sectional approach, utilizing secondary data from the National Population and Family Planning Board (BKKBN) in 2024. A total of 20,327 families in Lebong Regency became the study population. Following validation and data cleaning stages, 17,922 families were selected as samples using purposive sampling based on the criteria of adequate data completeness. The analyzed variables included reproductive risks of PUS 4T, the role of health workers, family prosperity, and stunting prevention. Data analysis included univariate analysis, bivariate analysis using the chi-square test, and multivariate analysis through multiple logistic regression to determine the most influential factors.

Result: The investigation revealed that factors including reproductive risk of PUS 4T, health workers' involvement, and family prosperity conditions significantly correlated with stunting prevention efforts ($p < 0.001$). Multivariate analysis identified reproductive risk of PUS 4T as the most dominant predictive indicator ($OR = 2.109$; 95% CI: 1.958–2.273). Therefore, this study emphasized the need to strengthen reproductive health programs, increase the effectiveness of the role of health workers, and improve family prosperity through an integrated approach.

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INTRODUCTION

Stunting remains a significant public health issue characterized by its complex and intergenerational nature.(1) According to a report by the WHO in 2023, stunting was defined as a condition of stunted growth in children due to chronic nutritional deficiencies from the first 1,000 days of life.(2) This condition affects cognitive development, productivity, and the risk of degenerative diseases in adulthood.(3) The factors contributing to stunting extend beyond mere nutritional intake; they encompass a complex interaction of biological elements, the provision of health services, and socioeconomic conditions.(4)

Stunting arises from persistent nutritional deficiencies that occur from the prenatal period through the first two years of life.(2) Inhibited linear growth in children is significantly associated with the accumulation of nutritional deficiencies, recurrent infections, and limited access to health facilities.(5) Children who experience

stunting tend to have subpar academic achievement. This phenomenon indicates the long-term effects of stunting on an individual's academic abilities and future income potential.(6)

Nutrition interventions that address the fundamental issues, including sanitation and hygiene, social safety nets, the agricultural sector, and education, are essential. They have demonstrated positive effects on nutritional outcomes. This is particularly evident when combined with interventions that specifically focus on children.(7) Moreover, the integration of nutritional supplementation for pregnant women, the promotion of exclusive breastfeeding, the improvement of complementary food quality, and the fortification of food significantly reduces the risk of stunting.(8) The effectiveness of interventions increases when aligned with the fortification of the primary health care system and the provision of socioeconomic support for families.(9)

In the context of reproductive health, several maternal risk factors, such as advanced or adolescent gestational age, short interpregnancy intervals, and high birth weight, are significantly associated with growth and developmental disorders in children.(10) Various maternal risk factors, including comorbidities, complications during pregnancy, or placental abnormalities, can potentially lead to intrauterine growth restriction (IUGR). This condition is characterized by inadequate nutritional intake for the fetus, thereby hindering its development during pregnancy.(11) The maternal nutritional status during pregnancy and maternal anemia have a significant correlation with the prevalence of stunting in children under five years old.(12)

In addition to biological factors, the role of health workers is a crucial determinant in stunting prevention initiatives.(13) Health workers serve as the first line in the health service system, responsible for maintaining service quality standards, mitigating access disparities, and facilitating the implementation of successful health programs.(14) Furthermore, nutritional counseling for mothers, regular home visits, and regular growth and development monitoring significantly improve child feeding practices and reduce the potential for stunting.(15) Integrating health promotion and preventive therapies into primary health services has demonstrated more effectiveness than interventions that only focus on one aspect.(16)

From the structural determinant perspective, socioeconomic inequality remains the fundamental cause of stunting.(17)(18) A direct correlation exists between increasing family income and maternal education levels and a decrease in the prevalence of stunting.(19) Food and water insecurity simultaneously exacerbate the likelihood of infectious diseases and stunting, indicating a combined effect of environmental conditions and nutritional intake.(20)(21) Additionally, stunting should not be seen merely as a nutritional issue; it also signifies disparities in socioeconomic aspects.(22)

A pertinent issue that necessitates further research is the lack of integration analysis of biological factors (4T reproductive risks), service factors (the role of health workers), and structural factors (family prosperity) in a comprehensive determinant model at the regency level. Most prior research analyzed these factors separately. In fact, stunting arises from the interactions between direct, indirect, and basic determinants.(23) This research gap presents an opportunity to conduct multivariate analysis aimed at identifying the most dominant determinants.

Lebong Regency may have certain reproductive risks and socioeconomic disparities due to its mountainous geographical characteristics and uneven health service distribution. However, there has been no comprehensive research that simultaneously analyzes the effect of

reproductive risks of PUS 4T, the role of health workers, and family prosperity on stunting prevention. Therefore, this study is relevant not only to strengthening evidence-based intervention policies at the regional level but also to its potential to provide scientific contributions to the development of a stunting determinant model that integrates biological, health service, and socioeconomic factors.

The World Health Organization in 2023 indicated that stunting remains a crucial concern for public health when its prevalence exceeds 20%.(24) In 2022, it was documented that 22.3%, amounting to 148.1 million children under five, experienced stunting on a global scale.(25) In Indonesia, the stunting prevalence rate, as reported by the Ministry of Health of the Republic of Indonesia based on SSGI and SKI data, was recorded at 21.6% in 2022, followed by a slight decrease to 21.5% in 2023 and a further decrease to 19.8% in 2024. In Bengkulu Province, the prevalence of stunting was recorded at 19.8% in 2022, which increased to 20.2% in 2023, before ultimately decreasing to 18.8% in 2024. On the other hand, Lebong Regency reported a rate of 20.2% in 2022, which decreased to 15.7% in 2023, followed by a significant increase to 22.7% in 2024. This condition is certainly a serious issue that requires collective attention, involving both the central and regional governments, to effectively reduce the prevalence of stunting.

In response to the significant increase in stunting prevalence rates in Lebong Regency, the author was motivated to conduct study on the analysis of reproductive risks of PUS 4T, the role of health workers, and family prosperity as determinants of stunting prevention. Therefore, this study aimed to determine the correlation between the reproductive risk of PUS 4T, the role of health workers, and family prosperity in stunting prevention in Lebong Regency. The proposed hypothesis is that there is a significant correlation between reproductive risk of PUS 4T, the role of health workers, and family prosperity in stunting prevention in Lebong Regency. It was expected that this study would contribute to reducing the prevalence of stunting or prevent the emergence of new cases of stunting.

METHOD

This study employed a quantitative analytical approach utilizing secondary data and a cross-sectional study design. The target population consisted of all 20,327 families that were registered in the 2024 family data update in Lebong Regency by the Bengkulu Province BKKBN. Following the data review and validation process, a total of 17,922 families that met the inclusion criteria were selected as research subjects. The sampling method used was purposive sampling.(26)

with inclusion criteria that encompassed complete data on all research variables. These variables included the reproductive risks of PUS 4T, the role of health workers, family prosperity levels, and stunting prevention efforts. This method aimed to ensure that only valid, complete, and relevant data were analyzed, thereby increasing the accuracy of estimating the correlation between variables and reducing potential bias due to missing data.

The measurement tool used in this study referred to the standard instrument of family data developed by the National Population and Family Planning Board (BKKBN), which has been validated by experts and its reliability tested through a national survey. Variables related to reproductive risk for PUS 4T were measured through maternal age, number of children (parity), and interval between births; the role of health workers was assessed based on the availability of assistance, counseling, and visits; family prosperity was determined based on the classification of family stages, while stunting prevention was measured through indicators related to parenting practices and fulfillment of nutritional needs. Despite the fact that this study was based on secondary data, validity rechecks were conducted by testing consistency, completeness, and conformity between variables (data consistency check) to ensure that data quality was maintained for analysis purposes.

The data collection procedure was carried out indirectly through secondary data processing, which was derived from the official family data collection database. The initial stage involved obtaining data access, followed by a data cleaning process to eliminate duplicate, incomplete, or inappropriate data entries. Subsequently, data coding and variable grouping were conducted in accordance with the operational definition of the study. After the data was cleaned, it was analyzed using statistical software through three main stages: univariate analysis to describe the frequency distribution; bivariate analysis using the chi-square test to test the correlation between variables; and multivariate analysis with multiple logistic regression to identify dominant factors in stunting prevention.

RESULT AND DISCUSSION

The results of the study indicated that among the 17,922 families in Lebong Regency, a small proportion of families (31.1%) had reproductive risks of PUS 4T. Furthermore, a significant majority (65.9%) did not receive assistance from health workers regarding stunting prevention. Additionally, it was observed that 52.4% of pre-

prosperous families and 21.4% exhibited less effectiveness in stunting prevention efforts.

The reproductive risk of PUS 4T was present in 31.1% of families, which indicated that almost one-third of the total number of families were at significant reproductive risks. These results are in line with previous research indicating that birth spacing of less than 24 months substantially increased the likelihood of stunting in developing countries.(27) Furthermore, research indicated a correlation between high parity (large number of children) and extreme maternal age (under 20 years or over 35 years) with an increased risk of linear growth disorders in children.(28)

The results of this study demonstrated that a significant proportion of families (65.9%) did not receive support from health workers in efforts to prevent stunting. This percentage indicated the existence of gaps that need to be addressed in the implementation of promotive and preventive services. This finding contrasted with other previous research that reported over 60% of mothers in the research area had received nutritional consultations and had integrated antenatal visits, which were shown to positively influence practices related to monitoring child growth and development.(29) Furthermore, other research conducted has shown a significant correlation between the frequency of mentoring provided by cadres and health workers and a decrease in stunting prevalence rates in rural areas.(30) In contrast to these findings, the limited mentoring observed in Lebong Regency may be considered a structural factor that weakens the effectiveness of stunting prevention efforts.

Table 1. Frequency distribution overview of reproductive health risks, the role of health workers, family prosperity, and stunting prevention

Variable	f	%
Reproductive health risks		
Risky	5,565	31.1
Not Risky	1,2357	68.9
The role of health workers		
Poor	11,809	65.9
Good	6,113	34.1
Family prosperity		
Pre-prosperous	9,397	52.4
Prosperous	8,525	47.6
Stunting prevention		
Poor	3,837	21.4
Good	14,085	78.6

From the perspective of family prosperity, 52.4% of respondents were categorized as pre-prosperous families. This condition implied that a majority of families encountered limitations in socioeconomic aspects, which may affect their food security and access to health services. These results are in line with research that confirmed the significant effect of increasing household income on reducing stunting rates in various developing countries.(31) It was also observed that there was a significant correlation between the wealth of households and the prevalence of stunting in children under the age of five. Children from families with lower economic status had a higher prevalence of stunting compared to children from more prosperous families.(32) Thus, the prevalence of pre-prosperous families in Lebong Regency emerged as a fundamental determinant that may exacerbate the risk of stunting.

Furthermore, 21.4% of families were identified to have inadequate stunting prevention practices. Although most families have demonstrated good practice, the proportion of families with limited preventive practices still requires special attention. The high stunting rate in children under five is associated with a variety of improper dietary patterns, including pre-breast feeding and limiting food intake. This indicates that feeding practices play a significant role in the occurrence of stunting.(33) This re-emphasizes the importance of interventions aimed at changing behavior as a key element in prevention strategies.

The results of the bivariate analysis showed that among families with reproductive risk of PUS 4T, 1,738 (31.2%) were less good in preventing stunting, whereas 3,827 (68.8%) were good in preventing stunting. In contrast, families without reproductive risk of PUS 4T showed that 2,099 (17.0%) were less good in preventing stunting, while 10,258 (83.0%) families were good in preventing stunting. To determine the correlation between the reproductive risk of PUS 4T and stunting prevention, statistical testing was carried out using the chi-square test, resulting in a p-value of 0.000. These findings indicated a significant correlation between the reproductive risk of PUS 4T and stunting prevention in Lebong Regency. These results were supported by the odds ratio (OR) value of 2.219 (95% CI: 2.062–2.389), suggesting that families with reproductive risk of PUS 4T have a 2.219 times higher risk of poorly implementing stunting prevention efforts compared to families without reproductive risk of PUS 4T.

The correlation between the role of health workers and stunting prevention revealed that 2,829 (24.0%) without health worker assistance were less good at preventing stunting, whereas 8,980 (76.0%) families were good at preventing stunting. Additionally, among families receiving health worker assistance, 1,008 (16.5%) were less good at preventing stunting, while 5,105 (83.5%) were good

at preventing stunting. To determine the correlation between the role of health workers and stunting prevention, statistical testing was carried out using the chi-square test, generating a p-value of 0.000. These findings indicated a significant correlation between the role of health workers and stunting prevention in Lebong Regency. These results were supported by an OR value of 1.595 (95% CI: 1.473–1.728), indicating that families without health worker assistance had a 1.595 times higher risk of poorly implementing stunting prevention compared to families with health worker assistance.

Based on the correlation between family prosperity and stunting prevention, it was evident that 2,363 (25.1%) pre-prosperous families were less good at preventing stunting, while 7,034 (74.9%) families were good at preventing stunting. Furthermore, 1,474 (17.3%) prosperous families were less good at preventing stunting, while 7,051 (82.7%) families were good at preventing stunting. To determine the correlation between family prosperity and stunting prevention, statistical testing was carried out using the chi-square test, generating a p-value of 0.000. These findings indicated a significant correlation between family prosperity and stunting prevention in Lebong Regency. These results were supported by an OR value of 1.607 (95% CI: 1.494–1.729), indicating that pre-prosperous families had a 1.607 times higher risk of poorly implementing stunting prevention compared to prosperous families.

According to the bivariate analysis presented in Table 2, the proportion of families with inadequate stunting prevention practices was higher in PUS with 4T reproductive risk (31.2%) compared to the PUS group without 4T reproductive risk (17.0%). The chi-square test showed a significant statistical correlation between the reproductive risk of PUS 4T and stunting prevention in Lebong Regency, in which families with 4T reproductive risks were 2.2 times more likely to demonstrate suboptimal stunting prevention practices compared to families without reproductive risks.

The results of this study align with several previous research studies, which have indicated that adequate spacing between births significantly contributed to the reduction of stunting and underweight conditions in children. This indicated a direct correlation between maternal reproductive factors and children's nutritional status.(27) Furthermore, research conducted in Indonesia revealed a significant correlation between maternal reproductive attributes, including age and number of births, and cases of stunting in children under the age of five. This underscored the significance of maternal factors as a primary determinant.(34) This study is also in line with a systematic review and meta-analysis conducted in the Asia-Pacific region indicating that short birth spacing

substantially increased the likelihood of maternal conditions, including anemia. This consequently carried significant implications for child development and increases the risk of stunting.(35)

These findings showed that reproductive factors had an influence not only on biological outcomes, such as low birth weight, but also on family behavior and the ability to implement stunting prevention measures. Experiencing pregnancy at a very young or advanced age, having too close a pregnancy interval, and bearing a large number of children can adversely affect the physical, psychological, and economic readiness of families to ensure adequate care and nutrition.(36,37) Moreover, it was observed that children born with a birth spacing of at least 24 months demonstrated a lower likelihood of experiencing stunting compared to those born with a birth spacing of less than 24 months, indicating a protective benefit from a more substantial birth spacing.(27)

The frequency of births a mother experiences was strongly correlated with cases of stunting. Mothers who have experienced multiple births were recognized as having a higher likelihood of their children experiencing stunting compared to mothers who have had fewer births.(38) Furthermore, parity history is one of the determinants of stunting risk. This is consistent with findings in Lebong Regency, where families with 4T reproductive risks showed a higher tendency to have suboptimal stunting prevention practices. Stunting is influenced by various elements, including maternal characteristics, family financial conditions, environmental facilities, and toddler feeding methods, implying that the correspondence between socioeconomic aspects and maternal variables increases the likelihood of chronic malnutrition in children.(39) Mothers with lower educational backgrounds and families with lower incomes face an increased likelihood of their children experiencing stunting. This is due to limitations in accessing health services and the capacity to implement appropriate nutritional practices, indicating that socioeconomic status

influences reproductive determinants of child health.(40) This supports the interpretation that the 4T reproductive risks do not operate in isolation but rather function as interrelated determinants with social factors and access to health services.

The OR value of 2.219 in this study was notably quite strong compared to previous research, which reported risk ratios ranging from 1.5 to 2.0 concerning birth spacing and maternal age factors on stunting.(41) Thus, the OR value in this study was slightly higher, suggesting the influence of local contextual factors, including limited access to health services and the dominance of pre-prosperous families. The bivariate analysis results strengthened empirical evidence indicating that 4T reproductive risks are crucial determinants in preventing stunting. The significant correlation and large OR values indicated that reproductive health interventions, including education on the ideal age of pregnancy, birth spacing through family planning programs, and limiting the number of children, are relevant prevention strategies for reducing the risk of stunting at the family level.

Maternal parameters such as advanced or young age and short birth spacings significantly influenced the prevalence of stunting. This can occur through the mechanisms of intrauterine growth restriction and ongoing nutritional deficiencies.(42) Children born to mothers under 18 years old, with a birth spacing of less than 24 months, or those who had four or more births, showed higher rates of stunting. This indicated the correlation between maternal reproductive risk factors and linear developmental delays in children under the age of five.(43) Prenatal conditions, including maternal nutritional intake and maternal reproductive aspects during the gestational period, have an impact on the occurrence of stunting in children aged 0 to 2 years. This phenomenon, particularly in the Southeast Asian context, highlights the interconnection between biological pathways and socioeconomic factors.(44)

Table 2. The correlation between reproductive health risks, the role of health workers, and family prosperity in stunting prevention

Variable	Stunting Prevention				P-value	OR	95% CI	
	Poor (n = 3,873)		Good (n = 14,085)				Lower	Upper
	f	%	f	%				
Reproductive health risks								
Risky	1,738	31.2	3,827	68.8	0.000	2.219	2.062	2.389
Not Risky	2,099	17.0	10,258	83.0				
The role of health workers								
Poor	2,829	24.0	8,980	76.0	0.000	1.595	1.473	1.728
Good	1,008	16.5	5,105	83.5				
Family prosperity								
Pre-prosperous	2,363	25.1	7,034	74.9	0.000	1.607	1.494	1.729
Prosperous	1,474	17.3	7,051	82.7				

Analysis of the correlation between the role of health workers and stunting prevention indicated that the proportion of families who demonstrated inadequate stunting prevention practices was identified as more common in the group, in which they did not receive guidance from health workers (24.0%) compared to the group that did (16.5%). The chi-square test confirmed a significant correlation between the involvement of health workers and stunting prevention in Lebong Regency, indicating that unaccompanied families were 1.6 times more likely to implement suboptimal stunting prevention practices compared to families receiving assistance.

The results of this study are in line with previous research, including research indicating that the involvement of health cadres through educational efforts, family counseling guidance, and routine household visits significantly contributed to raising awareness and encouraging the implementation of stunting prevention practices at the family level.(45) This study is also in line with research indicating that the knowledge, skills, and active participation of health cadres are positively correlated with the success of stunting prevention initiatives in the community.(46) A recent systematic review, which is in line with this study, demonstrated that interventions involving community health workers significantly contributed to reducing the prevalence of stunting, primarily through nutritional counseling, monitoring child growth and development, and support for families.(47)

The presence and quality of guidance provided by health workers significantly influenced the development of stunting prevention behaviors at the family level. Health workers played a crucial role in providing education to families, offering nutritional counseling, conducting home visits, monitoring child development indicators, and facilitating family involvement in health programs. This indicated a positive influence on stunting prevention practices at the community level.(45) The health education methods employed by health professionals and cadres have effectively fostered community awareness about stunting, subsequently increasing parental knowledge and practices in providing nutrition and caring for early childhood.(48)

Strengthening community capabilities through the involvement of health workers makes a substantial contribution to strategies aimed at preventing stunting. This

can be achieved by improving volunteer competency, optimizing the use of regional assets, and promoting better hygiene and dietary practices within the household.(49) Direct intervention through home visits by health professionals or cadres, aimed at delivering nutrition education and guidance to families, was recognized as an effective method for addressing stunting through increasing awareness, improving feeding practices, and promoting healthy habits within the family environment.(50)

The proportion of families that were less effective in preventing stunting is higher in the pre-prosperous family group (25.1%) compared to prosperous families (17.3%). The chi-square test indicated a statistically significant correlation between family prosperity status and stunting prevention in Lebong Regency. In particular, pre-prosperous families were 1.6 times more likely to carry out suboptimal stunting prevention measures compared to prosperous families.

The results of this study are in line with several previous research studies, including a national analysis conducted in Laos, which revealed a significant correlation between the household wealth index and the prevalence of stunting. In particular, children from economically disadvantaged households showed a higher likelihood of experiencing stunting. (32) A systematic review revealed findings consistent with this study, in which the majority of studies (62.5%) identified a correlation between household financial status and the prevalence of stunting.(51) The most recent systematic analysis further confirmed the results of this study, discovering that socioeconomic factors and family situations were the main determinants that influenced the prevalence of stunting in children.(52)

Family socioeconomic conditions are a major determinant in stunting prevention practices. Moreover, pre-prosperous families often face obstacles in obtaining nutritious food, adequate sanitation facilities, medical services, and health information. These factors collectively limit their ability to implement preventative behaviors optimally. The household prosperity index, serving as a measure of socioeconomic status, demonstrated strong predictive power for stunting cases. In addition, children from economically disadvantaged households showed a higher vulnerability to stunting compared to children from more affluent families.(32)

Table 3. Multivariate analysis of reproductive health risks, the role of health workers, and family prosperity in stunting prevention

Variables	B	Sig	Exp (B)	95% CI
Reproductive health risks	0.746	0.000	2.109	1.958 – 2.273
The role of health workers	0.440	0.000	1.443	1.339 – 1.555
Family prosperity	0.367	0.000	1.552	1.431 – 1.683

Household income, maternal education level, and parental occupational conditions were significantly correlated with the prevalence of stunting, which highlighted the strong association between socioeconomic conditions and the risk of stunting.(53) In addition to demonstrating that socioeconomic factors need to be considered in stunting prevention interventions, maternal nutritional knowledge and family economic conditions are important determinants in the occurrence of stunting.(54) Socioeconomic disparities remained a crucial determinant in the prevalence of stunting in developing countries. Household expenses, maternal education level, and sanitation conditions contributed to the disparities in stunting prevalence between low- and high-income households and between urban and rural areas.(55) Sociodemographic attributes, such as limited maternal education, low household asset index, and inadequate sanitation conditions, served as important indicators of child malnutrition (including stunting), underscoring the influence of socioeconomic disparities.(56) Children from families with higher incomes showed a decreasing likelihood of experiencing stunting over time. In contrast, children from lower-income segments continue to show high rates of stunting prevalence, underscoring persistent inequalities.(57)

The results of the bivariate analysis showed a significant correlation for all variables. Therefore, all independent variables were integrated into a multivariate analysis using multiple logistic regression to determine the dominant factors related to stunting prevention. The modeling results showed that the three independent variables had a significant correlation with stunting prevention in Lebong Regency. In examining the correlation between the reproductive risk of PUS 4T and stunting prevention, a p-value of 0.000 was obtained, with an OR value of 2.109 (95% CI: 1.958-2.273). Furthermore, the correlation between the role of health workers in preventing stunting produced a p-value of 0.000 and an OR value of 1.443 (95% CI: 1.339-1.555). In addition, the correlation between family prosperity and stunting prevention obtained a p-value of 0.000 and an OR value of 1.552 (95% CI: 1.431-1.683). Among the three independent variables, the reproductive risk variable PUS 4T was identified as the dominant variable correlated with stunting prevention, as indicated by the highest OR value.

Multivariate analysis revealed that the reproductive risk of PUS 4T was identified as the most influential factor in preventing stunting in Lebong Regency, evidenced by the highest OR value. These results indicated that maternal reproductive aspects had a greater influence than other variables included in the analysis model. Biologically, the 4T condition caused intrauterine growth restriction (IUGR), maternal anemia, and a depletion of

nutritional reserves due to close gestational periods. This subsequently contributes to the child's delayed linear growth during the first 1,000 days of life.(58) Additionally, the 4T reproductive risks can be considered as early determinants in the sequence of stunting events. Thus, it is essential that prevention efforts are aligned with reproductive health and family planning programs to disrupt the intergenerational cycle of malnutrition.

The results of this study indicated that stunting management strategies, which previously focused on behavioral changes and nutritional supplementation, have not comprehensively addressed fundamental upstream factors. The significance of the reproductive risks of PUS 4T showed that maternal reproductive health played a crucial role in the causal sequence of stunting. Therefore, this issue should be prioritized within the UNICEF framework rather than being considered as a supporting element.(27,42) Furthermore, the role of health workers has been proven to be significant; however, it has not yet covered the entire population, indicating a discrepancy between the program design and its implementation. This underscored that the mere existence of a program does not automatically ensure its effectiveness, in accordance with the principles of the Health Belief Model.(45,48) Additionally, the significant influence of family prosperity levels strengthened the argument that stunting is closely related to the structure of social inequality, in line with the social determinants of Health framework. (32,53) Therefore, these findings provide a critique of partial approaches and emphasize the importance of transitioning to a systems-oriented intervention model. This model will integrate aspects of reproductive health, improving the quality of health services and socioeconomic interventions simultaneously.

CONCLUSION

This study indicated that there was a significant correlation between the reproductive risks of PUS 4T, the role of health workers, and family prosperity with stunting prevention in Lebong Regency. Multivariate analysis showed that reproductive risk (PUS 4T) served as a significant predictor in influencing stunting prevention. Scientifically, this study contributed by presenting an analytical model that simultaneously integrated biological factors, health services, and socioeconomic factors. Furthermore, this study provides empirical evidence that compared the strength of influence of each determinant within a multivariate framework at the regency level.

From a policy and practical implementation perspective, these findings highlighted the importance of strengthening interventions that focus not only on child nutrition but also include improving reproductive health services (particularly in addressing the 4T risks), optimizing

the role of health workers in providing family support, and providing cross-sectoral support to improve family well-being. This integrated approach has the potential to increase the effectiveness of stunting prevention efforts if implemented effectively and sustainably.

Conflict of Interest

The authors declare no conflicts of interest relevant to the conduct of this study.

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