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The Association between Maternal Age During Pregnancy and the Incidence of Stunting among Children Under Five at Noebeba Public Health Center, Noebeba District, South Central Timor, 2022–2024

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A B S T R A C T

Stunting is a chronic nutritional problem caused by prolonged malnutrition and impaired linear growth. This study analyzed the relationship between maternal age and stunting among toddlers at Noebeba Community Health Center, South Central Timor, during 2022–2024. An analytical cross-sectional design was applied using secondary medical record data from 200 respondents selected through total sampling. Among 81 stunting cases, 61 occurred among mothers aged <20 or >35 years, while 20 occurred among mothers aged 20–35 years. The chi-square test showed a significant association between maternal age and stunting (p=0.001). Mothers in high-risk age groups had 6.256 times greater odds of having stunted children (95% CI: 3.320-11.791). Optimal pregnancy planning and maternal nutrition education should therefore be strengthened.

INTRODUCTION

Stunting remains a major public health and nutritional challenge among children under five, particularly in low- and middle-income countries. It reflects chronic nutritional deprivation that impairs linear growth and is commonly identified when a child's height-for-age is below the expected standard for their age and sex. The condition often develops during the first 1,000 days of life, beginning from conception and continuing through the first two years after birth. This period represents a critical window for fetal growth, neurological development, and long-term health. According to the World Health Organization (WHO), stunting is defined as a height-for-age *z*-score below -2 standard deviations from the WHO Child Growth Standards, while a value below -3 standard deviations indicates severe stunting (World Health Organization [WHO], 2022). Anthropometric assessment, particularly height-for-age, remains an important method for identifying growth impairment and monitoring child nutritional status (Mikawati et al., 2023; Rahmadhita, 2020).

Globally, stunting continues to affect a substantial proportion of children under five. Approximately 148.1 million children worldwide were affected by stunting in 2023, with a large proportion of cases concentrated in Asia and Africa. The persistence of this problem indicates that inadequate nutrition, maternal health, household conditions, and access to essential health services remain important challenges in efforts to improve child growth and development (WHO, 2022). Stunting is therefore not only an indicator of inadequate child nutrition but also reflects broader maternal, socioeconomic, environmental, and healthcare-related conditions.

Indonesia continues to face a considerable burden of childhood stunting despite recent improvements in national prevalence. National nutritional surveillance has shown a gradual decline in stunting prevalence, but the reduction has not been evenly distributed across provinces and districts. Several regions in eastern Indonesia continue to report substantially higher prevalence than the national average. Nusa Tenggara Timur (NTT) is among the provinces with a persistently high burden of stunting. Previous evidence has also demonstrated that nutritional, maternal, socioeconomic, and environmental conditions contribute to stunting disparities within the province (Badan Kebijakan Pembangunan Kesehatan, 2023; Alfy & A'ini, 2022). South Central Timor Regency represents one of the areas requiring particular attention because of its high reported burden of child growth problems.

The consequences of stunting extend beyond short stature. Children who experience chronic growth restriction may have poorer cognitive, language, sensory, and motor development, which can adversely affect learning capacity and educational achievement. In the longer term, stunting may reduce productivity and earning potential and increase vulnerability to metabolic and non-communicable diseases during adulthood. These consequences demonstrate that stunting affects not only individual health but also the quality of human capital and socioeconomic development (Hariani, 2024; Fatimah et al., 2024). Therefore, early identification of modifiable maternal and child-related risk factors is essential for effective prevention.

Stunting has a multifactorial etiology. Previous studies have identified inadequate antenatal and postnatal care, non-exclusive breastfeeding, inappropriate complementary feeding practices, insufficient micronutrient intake during pregnancy, poor childcare practices, inadequate immunization, infectious diseases, limited access to clean water and sanitation, short birth intervals, and unfavorable socioeconomic conditions as important contributing factors (Annisa, 2020; Anitasari & Safitri, 2023; Pinanggih & Fatmaningrum, 2024; Suhertusi & Sari, 2022; Sutriyawan et al., 2022). Maternal characteristics also play an important role because fetal growth and subsequent child development are strongly influenced by maternal nutritional status, reproductive health, and conditions during pregnancy (Anitya et al., 2023).

Among maternal characteristics, maternal age during pregnancy deserves particular attention. The age range of 20 to 35 years is generally considered the optimal reproductive period, whereas pregnancy at younger than 20 years or older than 35 years is associated with increased maternal and fetal health risks. Adolescent mothers may still be undergoing their own physical growth and may therefore experience competition for nutrients with the developing fetus. Reproductive organs and uteroplacental circulation may also not be fully mature, potentially affecting nutrient transfer and fetal development. In addition, younger mothers may have limited knowledge, experience, and resources for pregnancy care and infant feeding. These conditions may increase the likelihood of adverse birth outcomes, including low birth weight, which is closely associated with subsequent growth restriction (Pamungkas et al., 2021; Pusmaika et al., 2022; Trisyani et al., 2020).

Pregnancy at an advanced maternal age may also increase the risk of impaired fetal growth. Women older than 35 years may experience age-related physiological changes, reduced reproductive function, a higher prevalence of pregnancy complications, and altered nutrient absorption or metabolism. Such conditions can affect maternal health, placental function, and nutrient availability to the fetus. Evidence from previous studies suggests that maternal age outside the optimal reproductive range is associated with an increased likelihood of stunting among children, although the strength and consistency of this association may vary across populations and settings (Pusmaika et al., 2022; Sani et al., 2020; Wiartin et al., 2025).

Although maternal age has been investigated as a determinant of stunting in several regions of Indonesia, evidence from South Central Timor, particularly the Noebeba area, remains limited. Local socioeconomic conditions, maternal healthcare access, nutritional practices, environmental factors, and the relatively high burden of stunting in NTT may produce a different pattern of association compared with other regions. Context-specific evidence is therefore required to support maternal health interventions and stunting prevention programs at the primary healthcare level. Identifying the relationship between maternal age during pregnancy and stunting may also help strengthen pregnancy planning, antenatal counseling, nutritional interventions, and early child growth monitoring in high-risk communities.

Therefore, this study aimed to analyze the association between maternal age during pregnancy and the incidence of stunting among children under five at Noebeba Public Health Center, Noebeba District, South Central Timor Regency, during the 2022–2024 period.

THEORETICAL REVIEW

Stunting as a Chronic Growth Disorder

Stunting is a form of chronic growth impairment that develops from prolonged nutritional deficiencies and repeated exposure to adverse health conditions during critical periods of child growth. According to the World Health Organization (WHO), stunting is identified using the height-for-age z-score (HAZ), with children classified as stunted when their HAZ is below -2 standard deviations (SD) from the WHO Child Growth Standards and severely stunted when the value is below -3 SD (World Health Organization [WHO], 2022). Anthropometric assessment, particularly height-for-age measurement, is therefore widely used to assess linear growth and detect chronic nutritional problems in children under five (Mikawati et al., 2023; Rahmadhita, 2020).

Stunting generally develops during the first 1,000 days of life, beginning at conception and continuing until the child reaches approximately 24 months of age. Nutritional and health disturbances during this period can restrict fetal and postnatal growth and may produce consequences that persist throughout the life course. In addition to short stature, stunting has been associated with impaired cognitive, motor, and sensory development, reduced educational performance, and lower productivity later in life (Fatimah et al., 2024; Hariani, 2024).

The development of stunting is multifactorial. Maternal nutritional status, pregnancy conditions, infant feeding practices, exclusive breastfeeding, complementary feeding, immunization status, infectious diseases, sanitation, and socioeconomic conditions may influence children's growth outcomes (Anitasari & Safitri, 2023; Annisa, 2020; Pinanggih & Fatmaningrum, 2024; Suhertusi & Sari, 2022; Sutriyawan et al., 2022). Maternal characteristics before and during pregnancy are particularly important because fetal growth depends heavily on maternal physiological conditions and nutrient availability.

Maternal Age During Pregnancy

Maternal age is an important reproductive characteristic that may influence pregnancy outcomes and subsequent child growth. The age range of 20 to 35 years is generally considered an optimal reproductive period because women within this range tend to have greater physiological readiness for pregnancy. In contrast, pregnancies occurring before the age of 20 years or after 35 years are commonly classified as higher-risk pregnancies because they may be associated with maternal, obstetric, and fetal complications (Pusmaika et al., 2022; Trisyani et al., 2020).

Pregnancy before the age of 20 years may occur while the mother's physical development is still ongoing. Young mothers may therefore experience competition for nutrients between their own growth requirements and fetal development. Inadequate maternal nutritional reserves may restrict the

availability of nutrients required for optimal fetal growth. Younger maternal age may also be associated with limited reproductive maturity, insufficient pregnancy-related knowledge, inadequate antenatal care, and less experience in infant feeding and childcare practices (Pamungkas et al., 2021; Pusmaika et al., 2022).

Previous research has indicated an association between young maternal age and stunting. Pamungkas et al. (2021), for example, reported that pregnancy at a young age was associated with stunting among children aged 12–59 months. Pusmaika et al. (2022) similarly found that maternal age during pregnancy was associated with stunting among children under five. These findings suggest that maternal age may influence child growth through biological and behavioral pathways.

Advanced maternal age may also increase the risk of unfavorable pregnancy outcomes. Women who become pregnant after the age of 35 years may experience age-related changes in reproductive and metabolic function and have a higher probability of pregnancy complications. Such conditions may interfere with fetal growth and maternal nutrient utilization. Previous studies have therefore categorized pregnancy at older maternal ages as a potential maternal risk factor for impaired child growth (Sani et al., 2020; Trisyani et al., 2020; Wiartin et al., 2025).

Biological Pathway Linking Maternal Age and Stunting

The theoretical relationship between maternal age and stunting can first be explained through a biological pathway. Maternal age outside the optimal reproductive range may contribute to suboptimal pregnancy conditions. Among younger mothers, incomplete physiological maturation and inadequate maternal nutritional reserves may limit the supply of nutrients required for fetal development. Among older mothers, declining reproductive function and increased vulnerability to pregnancy-related complications may similarly affect fetal growth.

Suboptimal fetal growth may subsequently increase the likelihood of adverse birth outcomes, including low birth weight. Low birth weight is an established condition associated with later growth restriction because infants who begin life with inadequate nutritional reserves may experience difficulty achieving optimal catch-up growth, particularly when they are subsequently exposed to inadequate nutritional intake or infectious diseases (Hariani, 2024). Maternal nutritional status during pregnancy is therefore an important component of this pathway. Anitya et al. (2023) demonstrated that maternal nutritional status during pregnancy was related to stunting, supporting the importance of maternal health in determining child growth outcomes. Accordingly, the proposed biological pathway can be described as follows:

Non-optimal maternal age → suboptimal pregnancy conditions → inadequate maternal and fetal nutritional status → impaired fetal and child growth → stunting.

This pathway suggests that maternal age does not necessarily affect stunting directly. Instead, maternal age may influence physiological conditions during pregnancy that subsequently affect fetal development and postnatal linear growth.

Behavioral and Childcare Pathway

Maternal age may also be associated with stunting through behavioral and caregiving mechanisms. Younger mothers may have less experience and knowledge related to antenatal care, exclusive breastfeeding, complementary feeding, growth monitoring, sanitation, and the prevention of childhood infections. Inadequate feeding practices have been repeatedly identified as important determinants of stunting (Anitasari & Safitri, 2023; Annisa, 2020; Pinanggih & Fatmaningrum, 2024).

Appropriate breastfeeding and complementary feeding are essential to provide sufficient nutrients during infancy and early childhood. Suhertusi and Sari (2022) highlighted the relationship between exclusive breastfeeding and stunting, while studies by Annisa (2020) and Anitasari and Safitri (2023) emphasized the importance of appropriate complementary feeding practices in preventing child growth failure.

Growth monitoring and environmental health also contribute to this pathway. Inadequate hygiene and sanitation may increase children's exposure to infectious diseases. Recurrent infection can reduce food intake, interfere with nutrient absorption, and increase nutritional requirements, creating conditions that contribute to growth restriction. Sutriyawan et al. (2022) reported an association between infectious disease history and stunting, indicating that repeated childhood illness is an important component of the stunting pathway.

Based on these mechanisms, the behavioral and environmental pathway can be conceptualized as:

Non-optimal maternal age → inadequate caregiving and growth monitoring → unfavorable feeding, hygiene, and health practices → increased risk of recurrent infection and nutritional inadequacy → stunting.

This pathway should not be interpreted as indicating that maternal age alone determines parenting behavior. Rather, maternal age may interact with maternal knowledge, socioeconomic conditions, healthcare utilization, household environment, and other contextual characteristics that collectively influence child growth.

Conceptual Framework of the Study

The conceptual framework of this study positions maternal age during pregnancy as the independent variable and stunting among children under five as the dependent variable. Maternal age is categorized into a non-risk age group of 20–35 years and at-risk age groups of <20 years and >35 years.

The framework proposes two principal mechanisms linking maternal age with stunting. The first is a biological pathway involving maternal reproductive condition, nutritional status, fetal growth, and subsequent child

growth. The second involves maternal caregiving, growth monitoring, nutrition, hygiene, and exposure to childhood infections. Evidence from previous studies supports an association between maternal age and stunting, although the magnitude of this association varies across populations and geographical settings (Pamungkas et al., 2021; Pusmaika et al., 2022; Sani et al., 2020; Trisyani et al., 2020; Wiartin et al., 2025).

Accordingly, the theoretical framework can be summarized as follows:

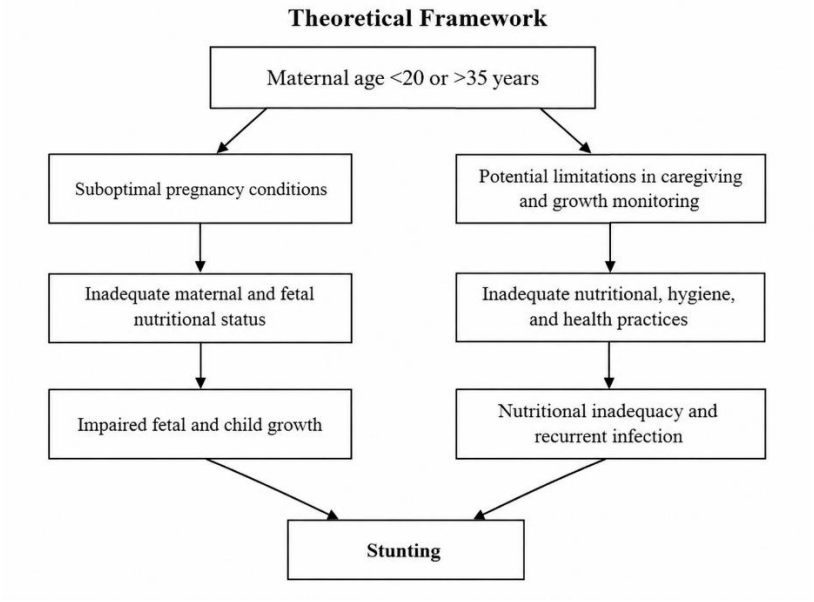

Figure 1. Theoretical Framework

This framework provides the theoretical basis for examining whether maternal age during pregnancy is statistically associated with stunting among children under five in the study population.

Research Hypotheses

Based on the theoretical framework and findings from previous studies, the hypotheses are formulated as follows:

Null Hypothesis (H0): There is no significant association between maternal age during pregnancy and stunting among children under five at Noebeba Public Health Center, Noebeba District, South Central Timor Regency, during 2022–2024.

Alternative Hypothesis (H1): There is a significant association between maternal age during pregnancy and stunting among children under five at Noebeba Public Health Center, Noebeba District, South Central Timor Regency, during 2022–2024.

The alternative hypothesis is supported conceptually by evidence indicating that pregnancies occurring at <20 years or >35 years may involve physiological, nutritional, and reproductive conditions that increase vulnerability to impaired fetal and child growth compared with pregnancies occurring between 20 and 35 years (Pusmaika et al., 2022; Sani et al., 2020; Wiartin et al., 2025).

METHODOLOGY

This study employed an analytical observational design with a cross-sectional approach to examine the association between maternal age during pregnancy and stunting among children under five. Maternal age during pregnancy was considered the independent variable, while stunting status was treated as the dependent variable. The study used secondary data obtained from medical records at Noebeba Public Health Center, South Central Timor Regency, East Nusa Tenggara, Indonesia. The medical record data covered the period from 2022 to 2024, while data collection, verification, and analysis were conducted from August to November 2025.

The study population consisted of children aged 0–59 months who were registered within the service area of Noebeba Public Health Center during 2022–2024 and had sufficient medical record information to determine nutritional status and maternal age during pregnancy. A total sampling technique was applied by including all eligible medical records that met the predetermined inclusion and exclusion criteria. After the screening process, 200 mother-child records were included in the final analysis. The inclusion criteria comprised children aged 0–59 months who were officially registered in the Noebeba Public Health Center service area, had received healthcare services during the study period, and had complete records of child age, nutritional status, maternal age during pregnancy, and relevant obstetric history. Children with congenital diseases or genetic abnormalities known to affect physical growth were excluded. Records were also excluded when mothers had documented chronic diseases or other medical conditions that could substantially affect fetal growth. Incomplete records that did not provide sufficient information for determining the main study variables were not included in the analysis.

Maternal age during pregnancy was classified into three initial categories: <20 years, 20–35 years, and >35 years. For the main statistical analysis, maternal age was further grouped into an at-risk category, comprising mothers aged <20 years or >35 years, and a non-risk category, comprising mothers aged 20–35 years. Stunting status was determined using the height-for-age or length-for-age *z*-score. Children with a height-for-age or length-for-age *z*-score below -2 standard deviations from the WHO Child Growth Standards were categorized as stunted, while those with values equal to or above -2 standard deviations were categorized as non-stunted (World Health Organization [WHO], 2022). Child age was obtained from medical records and expressed in months within the range of 0–59 months.

Secondary data were extracted from medical records and child health records maintained by Noebeba Public Health Center. The data collection process focused on maternal age during pregnancy, child age, anthropometric measurements, stunting status, and other information required to determine participant eligibility. All records were reviewed for completeness and consistency before analysis. Eligible data were then coded, entered into a statistical database, cleaned, and verified to minimize data entry errors and ensure consistency with the original medical records.

Statistical analysis was performed using IBM SPSS Statistics for Mac, version 31. Univariate analysis was used to describe the characteristics of the study population, with categorical variables presented as frequencies and percentages. Bivariate analysis was conducted using the Pearson chi-square test to assess the association between maternal age during pregnancy and stunting status. Statistical significance was determined using a two-sided *p*-value of <0.05. The strength of the association was estimated using the odds ratio (OR) with a 95% confidence interval (CI). An OR greater than 1 indicated higher odds of stunting among children born to mothers in the at-risk maternal age group compared with children born to mothers aged 20–35 years.

RESULTS AND DISCUSSION

A total of 200 eligible mother-child records from Noebeba Public Health Center were included in the analysis. The results describe the distribution of maternal age during pregnancy, stunting status among children under five during 2022–2024, and the association between maternal age and stunting.

Maternal Age Distribution

Table 1 presents the distribution of maternal age during pregnancy. Of the 200 mothers included in the study, 100 (50.0%) were aged 20–35 years, representing the largest group. Meanwhile, 51 mothers (25.5%) were younger than 20 years, and 49 mothers (24.5%) were older than 35 years. Thus, half of the mothers were within the non-risk reproductive age range, while the remaining half were classified within the at-risk age categories.

Table 1. Distribution of Maternal Age During Pregnancy

Maternal age	Frequency (n)	Percentage (%)
<20 years	51	25.5
20–35 years	100	50.0
>35 years	49	24.5
Total	**200**	**100.0**

The relatively high proportion of pregnancies occurring at <20 years and >35 years indicates that maternal age-related reproductive risks remain relevant within the population served by Noebeba Public Health Center.

Distribution of Stunting During 2022–2024

Table 2 shows the distribution of stunting status according to the year of recorded health services. Overall, 81 children were classified as stunted, while 119 children were classified as non-stunted. In 2022, 31 children were stunted, and 27 were non-stunted. The number of stunted children subsequently decreased to 27 in 2023 and 23 in 2024.

Table 2. Distribution of Stunting Status Among Children Under Five, 2022–2024

Year	Non-stunted, n	Percentage of total sample (%)	Stunted, n	Percentage of total sample (%)	Total, n
2022	27	13.5	31	15.5	58
2023	45	22.5	27	13.5	72

Year	Non-stunted, n	Percentage of total sample (%)	Stunted, n	Percentage of total sample (%)	Total, n
2024	47	23.5	23	11.5	70
Total	**119**	**59.5**	**81**	**40.5**	**200**

Although the number of recorded stunting cases declined across the three observation years, the present study was not designed to assess temporal trends. Therefore, these annual differences should be interpreted descriptively rather than as evidence of a statistically significant reduction over time.

Association Between Maternal Age and Stunting

Maternal age was further categorized into an at-risk group consisting of mothers aged <20 years or >35 years and a non-risk group consisting of mothers aged 20–35 years. Table 3 presents the association between maternal age category and stunting.

Among 100 mothers in the at-risk age category, 61 had children with stunting, whereas 39 had children without stunting. In contrast, among 100 mothers aged 20–35 years, only 20 had children with stunting, while 80 had children without stunting

Table 3. Association Between Maternal Age During Pregnancy and Stunting

Maternal age category	Stunted, n	Non-stunted, n	Total, n	*p*-value	OR	95% CI
At risk (<20 or >35 years)	61	39	100	0.001	6.256	3.320–11.791
Non-risk (20–35 years)	20	80	100			
Total	**81**	**119**	**200**			

Note. OR = odds ratio; CI = confidence interval. A *p*-value <0.05 was considered statistically significant.

The chi-square analysis demonstrated a statistically significant association between maternal age during pregnancy and stunting ($p = 0.001$). The odds ratio was 6.256 (95% CI: 3.320–11.791), indicating that children born to mothers in the at-risk age group had approximately 6.3 times higher odds of stunting than children born to mothers aged 20–35 years. Accordingly, the null hypothesis (H0) was rejected, while the alternative hypothesis (H1) was supported.

The main finding of this study demonstrates a significant association between maternal age during pregnancy and stunting among children under five at Noebeba Public Health Center. Maternal age outside the optimal reproductive range, specifically <20 years or >35 years, was associated with substantially higher odds of stunting compared with maternal age between 20 and 35 years. This finding supports the theoretical assumption that maternal reproductive age represents an important maternal factor associated with fetal development and subsequent child growth.

The distribution of maternal age showed that 50.0% of mothers were aged 20–35 years, while the remaining 50.0% were either younger than 20 years or older than 35 years. The 20–35-year age range is generally considered a more favorable reproductive period because reproductive organs have reached physiological maturity and the risks associated with pregnancy tend to be lower compared with pregnancies occurring at the extremes of reproductive age. Indonesian maternal health policy also emphasizes reproductive health preparation and appropriate pregnancy planning to minimize maternal and fetal complications (Ministry of Health of the Republic of Indonesia, 2021).

The present findings are consistent with those reported by Pusmaika et al. (2022), who identified a significant association between maternal age during pregnancy and stunting among children under five in Tangerang Regency. Similar findings were reported by Sani et al. (2020), who found an association between maternal age during pregnancy and stunting among children aged 24–59 months. Wiartin et al. (2025) also reported that maternal age was significantly related to childhood stunting. Collectively, these findings suggest that maternal age may represent an important component of the maternal risk profile for impaired child growth.

Pregnancy before the age of 20 years may increase vulnerability to adverse nutritional and pregnancy outcomes through several biological and psychosocial mechanisms. Young women may still be undergoing physical growth and therefore require nutrients for their own development in addition to fetal requirements. This condition may contribute to inadequate nutrient availability for optimal fetal growth. Reproductive maturity may also be incomplete among very young mothers, potentially increasing the likelihood of unfavorable pregnancy outcomes (Pamungkas et al., 2021; Pusmaika et al., 2022).

Young maternal age may also be associated with anemia, inadequate nutritional intake, limited pregnancy-related knowledge, insufficient utilization of antenatal services, and reduced experience in infant feeding and childcare practices. These factors may contribute to adverse birth outcomes such as intrauterine growth restriction, prematurity, and low birth weight. Low birth weight has subsequently been associated with an increased likelihood of childhood stunting because inadequate fetal growth can reduce children's capacity to achieve optimal postnatal linear growth (Hariani, 2024).

Maternal nutritional conditions during pregnancy represent an important mechanism linking maternal characteristics with child growth. Anitya et al. (2023) found an association between maternal nutritional status during pregnancy and stunting, while Qoyyimah et al. (2023) identified a relationship between a maternal history of chronic energy deficiency and stunting among children. These findings support the biological pathway proposed in the theoretical framework of the present study, in which maternal reproductive conditions may influence nutritional status and fetal growth, which subsequently affect postnatal growth.

Pregnancy after the age of 35 years also presents specific reproductive challenges. Increasing maternal age may be accompanied by age-related physiological changes and an increased prevalence of pregnancy complications.

Ratnaningtyas and Indrawati (2023) described maternal age as one of the characteristics associated with high-risk pregnancy. Older pregnant women may have greater susceptibility to hypertension, diabetes mellitus, anemia, obstetric complications, and other conditions that can potentially interfere with placental function, maternal nutritional status, and fetal growth.

The relationship between maternal age and stunting should therefore not be interpreted as a simple direct biological effect. Maternal age can operate through multiple pathways involving reproductive health, maternal nutrition, fetal growth, birth outcomes, caregiving behavior, socioeconomic circumstances, feeding practices, infection, and environmental conditions. Trisyani et al. (2020) emphasized that several maternal factors contribute to stunting, suggesting that maternal age should be considered within a broader maternal and household context rather than as an isolated determinant.

Child nutritional intake after birth also plays an essential role in determining whether early growth limitations persist. Appropriate exclusive breastfeeding and complementary feeding practices are important during infancy and early childhood. Previous studies have demonstrated associations between feeding practices and stunting, particularly inadequate breastfeeding and inappropriate complementary feeding (Anitasari & Safitri, 2023; Annisa, 2020; Pinanggih & Fatmaningrum, 2024; Suhertusi & Sari, 2022). Consequently, children who experience suboptimal fetal growth may face an even greater risk of persistent growth restriction when postnatal nutritional requirements are not adequately met.

Recurrent infection represents another important pathway. Infection can reduce appetite, increase metabolic requirements, and interfere with nutrient absorption, creating a cycle of infection and nutritional deficiency. Sutriyawan et al. (2022) reported that a history of infectious disease was associated with stunting among children under five. This mechanism supports the theoretical pathway in which inadequate caregiving, nutrition, hygiene, and health practices contribute to recurrent infection and ultimately impair linear growth.

From a physiological perspective, normal linear growth depends on complex interactions among nutritional availability, endocrine function, and skeletal development. Growth hormone stimulates the production of insulin-like growth factor 1, which plays an important role in cartilage and long-bone development. Chronic nutritional deficiencies can interfere with this growth-regulating pathway and contribute to impaired linear growth (Candra, 2020). Therefore, prolonged nutritional inadequacy beginning during fetal development may have consequences that extend into infancy and childhood.

The health consequences of stunting extend beyond reduced height. Stunting has been associated with impaired motor, cognitive, and developmental outcomes. Children affected by stunting may experience delayed maturation and poorer motor development compared with children who achieve normal growth. These developmental consequences may subsequently affect learning capacity, academic performance, and long-term human capital (Laily & Indarjo, 2023). The effects may also persist into adulthood and contribute to increased vulnerability

to metabolic disorders and reduced productivity (Fatimah et al., 2024; Tiwery et al., 2023).

These findings are particularly important because fetal development and the first two years of life constitute the first 1,000 days, a critical period for physical growth, neurological development, and nutritional programming. Nutritional and health disturbances during this period may produce persistent consequences that are difficult to reverse completely. Interventions aimed at preventing stunting should therefore begin before conception and continue throughout pregnancy, infancy, and early childhood.

The OR of 6.256 observed in this study indicates a strong statistical association. However, this result should be interpreted as higher odds rather than direct causation. Because the study used a cross-sectional observational design and secondary medical record data, it cannot establish that maternal age alone causes stunting. Factors such as maternal education, household income, maternal nutritional status, parity, birth spacing, antenatal care utilization, low birth weight, exclusive breastfeeding, complementary feeding, sanitation, and childhood infection may act as potential confounding variables.

The study also has several limitations. First, the use of secondary medical record data restricted the analysis to variables that were consistently available in the records. Second, the study was conducted at a single public health center, which may limit the generalizability of the findings to other populations. Third, the bivariate analysis did not simultaneously adjust for potential confounding factors. Future studies should employ multivariable logistic regression and incorporate maternal, neonatal, nutritional, socioeconomic, and environmental variables to determine whether maternal age remains independently associated with stunting after adjustment for these factors.

Despite these limitations, the findings provide relevant local evidence for stunting prevention in Noebeba District and South Central Timor Regency. Maternal age should be incorporated into reproductive health screening and pregnancy planning programs. Particular attention should be directed toward pregnancies occurring before 20 years and after 35 years through strengthened preconception counseling, antenatal care, nutritional assessment, micronutrient support, fetal growth monitoring, breastfeeding counseling, and child growth surveillance. These interventions may help identify vulnerable mother-child pairs earlier and support efforts to reduce stunting during the critical first 1,000 days of life.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrated a significant association between maternal age during pregnancy and stunting among children under five at Noebeba Public Health Center, South Central Timor Regency, during 2022–2024. Of the 200 mothers included in the study, 100 (50.0%) were classified as being in the at-risk maternal age group, defined as <20 years or >35 years, while the remaining 100 (50.0%) were aged 20–35 years and classified as the non-risk group. Among the 200 children assessed, 81 (40.5%) were stunted and 119 (59.5%) were non-stunted. Of the 81 stunting cases, 61 occurred among children born to mothers in the at-

risk age group, while 20 occurred among children born to mothers aged 20–35 years. Statistical analysis showed a significant association between maternal age and stunting (p = 0.001). Mothers in the at-risk age group had 6.256 times higher odds of having a stunted child than mothers aged 20–35 years (95% CI: 3.320–11.791). Therefore, the null hypothesis was rejected, and the alternative hypothesis was supported. These findings indicate that maternal age during pregnancy is an important factor associated with childhood stunting in the study population. However, because this study used a cross-sectional design, the findings should be interpreted as an association rather than a causal relationship.

Based on these findings, future studies are recommended to involve larger and more diverse populations, multiple healthcare facilities, and broader observation periods. Further research should also include potential confounding factors such as maternal nutritional status, education, parity, birth spacing, antenatal care utilization, low birth weight, breastfeeding practices, complementary feeding, household socioeconomic conditions, sanitation, and childhood infections. Multivariable analysis is particularly recommended to determine whether maternal age remains independently associated with stunting after adjustment for these factors. Noebeba Public Health Center should strengthen stunting prevention by incorporating maternal age into preconception, antenatal, and child growth risk assessments. Women who become pregnant before the age of 20 years or after 35 years should receive closer nutritional assessment, antenatal monitoring, health education, and counseling regarding fetal growth and child nutrition. Regular growth monitoring through community-based health services should also be strengthened to support early identification of children at risk of growth impairment. Adolescents and communities should receive continuous education on reproductive health, appropriate pregnancy planning, balanced nutrition, and the health consequences associated with high-risk maternal age. Community participation in *Posyandu* and other maternal and child health services should be encouraged to improve nutritional monitoring and early detection of growth problems. Local governments and health authorities should also strengthen family planning, reproductive health education, high-risk pregnancy assistance, and stunting prevention programs. Collaboration among public health centers, community health workers, schools, families, and local government is essential to promote healthier reproductive choices and improve maternal and child nutritional outcomes, thereby contributing to the sustainable reduction of stunting in South Central Timor Regency.

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