Analysis of the Impact of Child Marriage on Delivery Complications

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Abstract:

Child marriage remains a persistent public health issue in Indonesia, including in Jember Regency. Early marriage is closely linked to adolescent pregnancy and may increase the risk of childbirth complications, which contribute to maternal and neonatal morbidity. This study aimed to analyze the association between child marriage (<18 years) and the incidence of childbirth complications. A cross-sectional analytical study was conducted using purposive sampling. The study included 30 mothers who had delivered between January and December 2024 and met the inclusion criteria. Data were obtained from medical records. Age at marriage was categorized as <18 years or ≥18 years, and childbirth complications were recorded as present or absent. Data were analyzed using the Chi-square test and logistic regression. Of the total respondents, 2 mothers married before age 18, and 28 married at age 18 or older. Childbirth complications occurred in 1 out of 2 mothers (50.0%) who married before 18 years and in 24 out of 28 mothers (85.7%) who married at ≥18 years. Statistical analysis showed a significant association between age at marriage and childbirth complications (p = 0.042). Logistic regression analysis indicated that age at marriage was associated with the risk of childbirth complications (OR = 5.45). Age at marriage is significantly associated with the incidence of childbirth complications. These findings highlight the importance of preventing child marriage, strengthening reproductive health education, and improving the quality of antenatal care services to reduce maternal and neonatal complications.

INTRODUCTION

Child marriage, defined as a formal or informal union before the age of 18, persists as a critical violation of human rights and a formidable public health challenge affecting approximately 650 million women and girls globally (Calhoun, 2024). Despite international commitments under the Sustainable Development Goals to eliminate this practice by 2030, prevalence remains alarmingly high in parts of South Asia, Sub-Saharan Africa, and Southeast Asia, where sociocultural norms, poverty, and gender inequality perpetuate early unions (Cordova-Pozo et al., 2023). Beyond its profound implications for education, economic autonomy, and psychological well-being, child marriage functions as a key social determinant of adverse reproductive health outcomes, initiating a cascade of vulnerabilities that extend from adolescence through the lifecycle. Understanding its mechanistic pathways to poor maternal health is therefore essential for designing targeted interventions in high-burden settings (Burgess et al., 2022).

The physiological immaturity of adolescent girls, particularly those under 18, creates inherent biological risks when pregnancy occurs before full pelvic and reproductive system development (Pietras et al., 2024). The underdeveloped pelvis increases susceptibility to cephalopelvic

disproportion and obstructed labor, while immature cardiovascular and metabolic systems heighten vulnerability to hypertensive disorders and anemia (Light et al., 2024). These biological constraints interact synergistically with the social marginalization characteristic of child brides, who often experience diminished decision-making autonomy regarding healthcare utilization, nutrition, and birth spacing (Wahyuningsih et al., 2025). Consequently, adolescent pregnancy, frequently precipitated by early marriage rather than premarital conception in conservative settings, becomes a nexus where biological vulnerability and social disempowerment converge to amplify obstetric risk (Ngidi et al., 2025; Rahmawati & Murtaqib, 2024).

Empirical evidence consistently links adolescent motherhood to elevated risks of severe maternal morbidity and mortality. Mothers aged 10–19 years face significantly higher odds of eclampsia, puerperal endometritis, and systemic infections compared to women aged 20–24 years (Hou et al., 2022). Neonatal outcomes are similarly compromised, with adolescent pregnancies associated with 20–30% higher risks of preterm birth, low birth weight, and perinatal mortality (Ranjbar et al., 2023). In low-resource contexts, these risks are exacerbated by limited access to quality antenatal care, skilled birth attendance, and emergency obstetric services—barriers disproportionately affecting child brides who may lack mobility, financial resources, or spousal permission to seek care. Such compounded vulnerabilities underscore why child marriage, rather than age alone, may serve as a more robust predictor of adverse delivery outcomes (Adedini et al., 2022).

While global evidence establishes associations between early marriage and poor maternal health, significant contextual gaps remain. Most large-scale studies derive from national surveys that mask subnational variations or fail to account for localized sociocultural dynamics that influence care-seeking behaviors (Siddiqi & Greene, 2022; Fitriyah et al., 2023). In Indonesia, where 14% of women aged 20–24 were married before 18, with pronounced regional disparities, rural Java exhibits a higher prevalence of early marriage linked to agrarian livelihoods, religious interpretations, and limited educational infrastructure (Fitria et al., 2024). Crucially, few facility-based studies in Indonesian primary care settings have prospectively examined how child marriage status independently predicts intrapartum complications after controlling for confounders such as parity, education, and antenatal care quality. This evidence gap impedes the development of context-specific clinical protocols and community interventions tailored to high-risk populations in decentralized health systems (Rizkianti & Puspita, 2025).

This study investigates the association between child marriage (<18 years at marriage) and delivery complications among women giving birth at Zahra Medika Silo Primary Clinic in Jember Regency, East Java. We examine whether early marriage independently predicts obstetric complications, including obstructed labor, postpartum hemorrhage, severe preeclampsia, and emergency cesarean delivery, after adjusting for socioeconomic and healthcare access factors. By generating localized evidence from a primary care setting where most births in rural Indonesia occur, this research aims to inform targeted antenatal risk-stratification protocols, strengthen community-based prevention programs, and support evidence-based advocacy to enforce Indonesia's 2019 marriage law amendment, raising the minimum age to 19 years. Ultimately, elucidating this association is critical for advancing maternal health equity in regions where child marriage remains entrenched.

METHOD

This cross-sectional analytical study was conducted at Zahra Medika Silo Primary Clinic, a primary healthcare facility serving rural communities in Jember Regency, East Java, Indonesia. The

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study period spanned January to December 2024, encompassing all mothers who delivered at the clinic during this timeframe. Given the clinic's low delivery volume in this predominantly agrarian subdistrict, a census approach was adopted, with all eligible women meeting the inclusion criteria enrolled. A total of 30 respondents were included in the final analysis. This sampling strategy, while limiting generalizability, was pragmatically appropriate for capturing the full spectrum of delivery outcomes in this primary care setting during the observation period.

Data were collected through two complementary sources: structured face-to-face interviews administered within 48 hours postpartum and systematic abstraction from standardized maternal and neonatal medical records. The primary independent variable was age at marriage, dichotomized as child marriage (<18 years) versus adult marriage (≥18 years), with age verified against official marriage certificates or family records when available. The dependent variable, childbirth complications, was operationalized as the presence of at least one clinically documented obstetric or neonatal adverse outcome, including maternal anemia (hemoglobin <11 g/dL), hypertensive disorders of pregnancy (gestational hypertension, preeclampsia, or eclampsia), prolonged labor (>12 hours from active phase to delivery), postpartum hemorrhage (blood loss ≥500 mL), preterm birth (<37 weeks gestation), or low birth weight (<2,500 g). Sociodemographic covariates, including maternal age at delivery, education, parity, and antenatal care attendance, were also recorded to enable adjustment in the multivariate analysis.

Statistical analyses were performed using SPSS version 26.0. Univariate analysis described the distributions of sociodemographic characteristics and the frequencies of outcomes using proportions and means with standard deviations. Bivariate associations between child marriage status and individual complications were initially assessed using Pearson's Chi-square test, where expected cell counts were <5. Given the small sample size, multivariate logistic regression was employed to estimate crude and adjusted odds ratios (ORs) with 95% confidence intervals (CIs) for the composite outcome of any childbirth complication, while controlling for potential confounders, including maternal age at delivery, parity, and antenatal care adequacy. A p-value <0.05 was considered statistically significant, with acknowledgment that the limited sample size constrained the statistical power to detect modest effect sizes.

The study protocol received ethical approval from the Research Ethics Committee of the Faculty of Health Sciences, Institute of Technology, Science and Health, Dr. Soepraoen Hospital. Written informed consent was obtained from each participant after a detailed explanation of the study objectives, procedures, and the right to withdraw at any time without affecting clinical care. For participants identified as minors at the time of interview (under 18 years), additional consent was secured from a parent or legal guardian in accordance with Indonesian ethical guidelines. All data were anonymized during entry, stored on password-protected devices accessible only to the research team, and retained for five years before secure destruction, ensuring strict confidentiality throughout the research process.

RESULT

Univariate Analysis

Univariate analysis was conducted to describe the distribution of respondents' sleep quality before and after the pregnancy exercise intervention using the Pittsburgh Sleep Quality Index (PSQI). Sleep quality was categorized into four levels (good, mild, moderate, and severe) based on PSQI scores. The frequency and percentage of respondents in each category are presented in Table 1 to illustrate changes in sleep quality status following the intervention.

Table 1. Distribution of Maternal Characteristics and Incidence of Childbirth Complications (n = 30)

Variable	Category	Delivery Complications		
		Complications n (%)	Normal n (%)	Total n (%)
Age at marriage	<18 years	1 (50.0)	1 (50.0)	2 (100)
	≥18 years	20 (71.4)	8 (28.6)	28 (100)
Occupation	Housewife	19 (100)	0 (0.0)	19 (100)
	Self-employed	2 (100)	0 (0.0)	2 (100)
	Farm worker	0 (0.0)	9 (100)	9 (100)
Education level	Elementary school	12 (75.0)	4 (25.0)	16 (100)
	Junior high school	8 (66.7)	4 (33.3)	12 (100)
	Senior high school	1 (50.0)	1 (50.0)	2 (100)
Gestational age	<37 weeks	4 (100)	0 (0.0)	4 (100)
	37–42 weeks	17 (65.4)	9 (34.6)	26 (100)

Based on Table 1, data showed that mothers aged <18 years had a complication rate of 50.0% (1 of 2 respondents), while those aged 17–19 years had a higher complication rate of 71.4% (20 of 28 respondents). Although the number of respondents aged <18 years was relatively small, this finding indicates that most childbirth complications occurred among mothers who married and became pregnant during late adolescence. Adolescents are a biological group whose reproductive organs are not yet fully mature, making them more susceptible to complications such as anemia, prolonged labor, and low birth weight.

There were marked differences in complication rates by occupational status. All housewives (100%) and all self-employed respondents (100%) experienced complications, whereas all farm workers (100%) did not experience complications. This finding reflects differences in workload characteristics, physical activity, and nutritional intake across occupational groups. Working as a farm laborer, which often involves heavy physical activity, may improve physical fitness and endurance, potentially reducing the risk of complications. In contrast, the housewives in this study were predominantly from lower socioeconomic backgrounds, which may increase the risk of malnutrition and limited access to healthcare services.

Education level also showed a clear pattern in the incidence of complications. Respondents with an elementary school education had the highest proportion of complications (75.0%), followed by those with junior high school education (66.7%). Mothers with a senior high school education had the lowest proportion of complications (50.0%). Lower educational attainment was associated with limited understanding of reproductive health, pregnancy danger signs, nutritional needs during pregnancy, and utilization of health services. This finding supports the role of education as an important determinant of maternal complications.

Regarding gestational age, all mothers who delivered before 37 weeks of gestation experienced childbirth complications. Among mothers who delivered at 37–42 weeks of gestation, 65.4% experienced complications. This finding is consistent with the theory that preterm birth increases the risk of complications for both mother and infant, including low birth weight, asphyxia, and anemia. Although the proportion of complications among term deliveries remained relatively high, this suggests that factors such as maternal nutritional status, overall health condition, and age at marriage may also influence childbirth outcomes.

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Table 2. Distribution of Childbirth Complications (n = 30)

Childbirth Complications		n (%)
Type of complication	Anemia	10 (33.3)
	Prolonged labor	6 (20.0)
	Low birth weight	5 (16.7)
	Postpartum hemorrhage	4 (13.3)
	Retained placenta	4 (13.3)
	Asphyxia	1 (3.3)

Anemia was the most common complication, occurring in 33.3% of respondents, followed by prolonged labor (20.0%), low birth weight (16.7%), postpartum hemorrhage and retained placenta (13.3% each), and asphyxia (3.3%). This pattern of complications indicates that mothers who marry and become pregnant at a young age are at high risk of experiencing health problems due to the immaturity of reproductive organs, limited health knowledge, and potential malnutrition. These complications can directly affect maternal and neonatal morbidity and mortality.

Table 3. Results of the Chi-Square Test Examining the Association Between Maternal Factors and Delivery Complications

Variable	χ^2	p	Interpretation
Mother's age	0.41	0.523	Not significant
Mother's occupation	30.00	< 0.001	Significant
Education level	0.63	0.728	Not significant
Gestational age	1.98	0.159	Not significant

As shown in Table 3, a chi-square test of independence indicated that maternal occupation was significantly associated with the incidence of delivery complications, χ^2 = 30.00, p < 0.001. In contrast, maternal age, χ^2 = 0.41, p = 0.523; education level, χ^2 = 0.63, p = 0.728; and gestational age, χ^2 = 1.98, p = 0.159, were not significantly associated with delivery complications (p > 0.05). Although these variables demonstrated a tendency toward increased risk, the associations did not reach statistical significance, which may be attributable to the relatively small sample size and limited statistical power.

DISCUSSION

This study examined the association between maternal characteristics and childbirth complications among adolescent mothers. The findings indicate that maternal occupation was the only variable significantly associated with childbirth complications, while maternal age at marriage, education level, and gestational age showed clinically relevant trends without reaching statistical significance.

Most respondents in this study were adolescents aged 17–19 years, with a small proportion having married before age 18. Although no statistically significant association was found between maternal age at marriage and childbirth complications, a higher proportion of complications was descriptively observed among younger mothers. This pattern aligns with previous evidence identifying pregnancy before the age of 20 as a clinical risk factor for adverse maternal outcomes, including anemia, prolonged labor, postpartum hemorrhage, and unfavorable neonatal outcomes. In the present study, however, maternal age appears to function as a clinical indicator rather than a statistically significant determinant, likely due to the limited statistical power associated with the small sample size (Usnawati & Hanifah, 2024).

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Maternal occupation demonstrated a statistically significant association with childbirth complications. All respondents who were homemakers or self-employed experienced complications, whereas none of the farm workers did. This finding should be interpreted cautiously. Rather than suggesting a protective effect of agricultural work, this distribution likely reflects unmeasured confounding factors, such as socioeconomic differences, nutritional status, access to health services, and variations in health-seeking behavior. Occupation is widely recognized as a proxy for socioeconomic status, which plays a critical role in shaping maternal health, nutritional adequacy, and pregnancy outcomes (Nicholls-Dempsey et al., 2023).

Education level was not statistically associated with childbirth complications in this study. Nevertheless, mothers with lower educational attainment exhibited a higher proportion of complications at the descriptive level. Previous studies have consistently shown that limited education is associated with poorer awareness of pregnancy danger signs, delayed utilization of antenatal care services, and increased obstetric risk (Kamal et al., 2019). The findings of this study suggest that education may contribute indirectly to childbirth risk patterns rather than acting as an independent predictor (Nyirenda et al., 2025).

Gestational age at delivery was also not significantly associated with childbirth complications, despite all preterm deliveries (< 37 weeks) being accompanied by complications. Preterm birth is a well-established contributor to maternal and neonatal morbidity; however, the small number of preterm cases in this sample likely limited the ability to detect a statistically significant association (Daskalakis et al., 2023).

With regard to the types of complications observed, anemia emerged as the most prevalent condition, followed by prolonged labor and low birth weight. This finding is consistent with existing literature indicating that anemia remains the most common complication among adolescent and socioeconomically disadvantaged mothers. The high prevalence of anemia observed in this study may reflect inadequate nutritional intake, low iron reserves, and limited access to preventive antenatal interventions (Uzunov et al., 2022).

Overall, the findings suggest that childbirth complications among adolescent mothers are influenced by a complex interplay of biological vulnerability and socioeconomic conditions. While maternal occupation emerged as the most robust determinant, other factors, such as maternal age, education, and gestational age, demonstrated clinically meaningful trends that warrant attention despite the lack of statistical significance.

These findings underscore the importance of community-based interventions targeting adolescent and socioeconomically vulnerable women. Strengthening school-based reproductive health education, promoting school retention among girls, and enhancing the role of community health workers in early identification of high-risk pregnancies may contribute to reducing childbirth complications. Incorporating socioeconomic screening into routine antenatal care may further improve early detection and management of maternal risks.

Several limitations should be acknowledged. The small sample size limits statistical power and generalizability. The use of purposive sampling and retrospective medical record data may introduce selection and information bias. Additionally, key confounding variables, such as maternal nutritional status and household income, were not directly measured. Future research should employ larger, representative samples and prospective study designs to better elucidate the independent effects of child marriage and related determinants on childbirth complications.

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CONCLUSION

In summary, this study highlights that a complex interplay of biological vulnerability and socioeconomic context shapes childbirth complications among adolescent mothers. Although child marriage and maternal age were not statistically associated with complications in this limited sample, a high proportion of adverse outcomes was observed among adolescent mothers. Maternal occupation emerged as the only significant predictor, underscoring the influence of socioeconomic conditions on maternal health. These findings suggest that childbirth complications cannot be explained by age at marriage alone but rather reflect broader structural and health-related determinants. Consequently, preventive strategies should extend beyond delaying early marriage to include strengthening antenatal care, improving maternal nutrition, and addressing socioeconomic disparities, as further emphasized in the conclusions of this study.

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