

The Influence of Adolescent Pregnancy on Type of Delivery and Birth Weight

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Abstract:

Objective: This study aims to analyze the influence of adolescent pregnancy on the type of delivery and birth weight at Margono Soekarjo Hospital during the period 2022–2024.

Methods: A cross-sectional study was conducted using secondary data from 198 postpartum mothers—99 adolescents (aged 10–19) and 99 non-adolescents (aged 30–35)—selected through stratified random sampling. Data on maternal age, delivery type, and birth weight were analyzed using chi-square and Mann-Whitney tests, with a significance level of $p < 0.05$.

Results: Significant differences were found between the groups. Vaginal delivery was more common among adolescent mothers (61.5%) compared to non-adolescents (40.4%). Infants of adolescent mothers had lower average birth weights (2516.5 ± 569 g vs. 3031.2 ± 864 g; $p = 0.025$) and lower APGAR scores at 1, 5, and 10 minutes ($p = 0.006$). Cesarean indications differed between groups: fetal distress, cephalopelvic disproportion (CPD), and failed induction were common in adolescents, while prior cesarean section was the primary indication among non-adolescents.

Conclusion: Adolescent pregnancy significantly affects delivery method and neonatal outcomes. While more likely to result in vaginal delivery, it is associated with lower birth weights, reduced APGAR scores, and higher complication risks, underscoring the need for targeted antenatal care in this population.

Keywords: Adolescent pregnancy; Type of delivery; Birth weight.

Pengaruh Kehamilan Remaja Terhadap Jenis Persalinan dan Berat Bayi Lahir

Abstrak

Tujuan: Penelitian ini bertujuan untuk menganalisis pengaruh kehamilan remaja terhadap jenis persalinan dan berat bayi lahir di Rumah Sakit Margono Soekarjo selama periode 2022 - 2024.

Metode: Desain penelitian yang digunakan adalah studi potong lintang (*cross-sectional*) dengan total 198 ibu melahirkan, terdiri atas 99 ibu remaja (usia 10 – 19 tahun) dan 99 ibu bukan remaja (usia 30 – 35 tahun), yang dipilih melalui *stratified random sampling*. Data sekunder diambil dari rekam medis pasien, mencakup usia ibu, jenis persalinan, berat bayi lahir, dan skor APGAR. Analisis data menggunakan uji chi-square untuk variabel kategorik dan uji Mann-Whitney untuk variabel numerik dengan tingkat signifikansi $p < 0,05$.

Hasil: Hasil penelitian menunjukkan bermakna dalam jenis persalinan, persalinan pervaginam lebih banyak terjadi pada ibu remaja (61,5%) dibandingkan dengan ibu bukan remaja (40,4%). Berat bayi lahir juga berbeda signifikan, dengan rata-rata $2516,5 \pm 569$ gram pada kelompok remaja dan $3031,2 \pm 864$ gram pada kelompok bukan remaja ($p = 0,025$). Skor APGAR pada menit pertama, kelima, dan kesepuluh lebih rendah secara signifikan pada bayi dari ibu remaja ($p = 0,006$). Indikasi seksio pada remaja paling sering disebabkan oleh fetal distress, CPD, dan gagal induksi.

Kesimpulan: Kehamilan remaja berpengaruh signifikan terhadap jenis persalinan dan luaran neonatal dengan kecenderungan komplikasi lebih tinggi.

Kata kunci: Kehamilan remaja; Jenis persalinan; Berat bayi lahir.

Introduction

Globally, the adolescent birth rate for girls aged 10–14 years was estimated at 1.5 per 1,000 females in 2022. In 2019, approximately 21 million pregnancies occurred each year among adolescents aged 15–18 in low- and middle-income countries, with about 50% of these pregnancies being unintended.¹ In Indonesia, the fertility rate among adolescents aged 10–14 has shown a significant yearly decline. According to the 2010 Population Census (SP2010), the fertility rate in this age group was 0.928 live births per 1,000 females. This figure dropped to 0.567 live births per 1,000 females based on the 2015 Intercensal Population Survey (SUPAS2015). The downward trend continued in the 2020 Long Form Population Census (LF SP2020), which recorded a fertility rate of 0.297 live births per 1,000 females in the same age group. According to LF SP2020, there were 10.73 million girls aged 10–14 years in Indonesia, representing around 3.89% of the total population. Although the fertility rate in this age group continues to decline,² the birth rate among girls aged 15–19 remains at approximately 26–27 births per 1,000 females.³

The definition of adolescence according to the Indonesian Ministry of Health refers to individuals aged 10 to 18 years,⁴ which slightly differs from the World Health Organization (WHO) definition of 10 to 19 years. The phenomenon of adolescent pregnancy has complex implications for both maternal and infant health. Nevertheless, studies examining the relationship between adolescent pregnancy, type of delivery, and birth weight remain limited in Indonesia, particularly at Margono Soekarjo Hospital.

The health consequences of adolescent pregnancy are particularly acute in clinical settings. Younger mothers face higher risks of delivery complications such as obstructed labor, postpartum hemorrhage, and neonatal

distress.⁵ Their infants are more likely to be born prematurely or with low birth weight, factors that can have lifelong health implications.⁶ Physiological immaturity in adolescent mothers is associated with higher risks of adverse birth outcomes, including increased likelihood of vaginal delivery but also greater potential for complications requiring cesarean section.⁷ These young mothers also demonstrate elevated rates of delivering low birth weight infants (<2500g), which may be attributed to both biological factors and socioeconomic barriers to adequate prenatal care.⁸ Despite these known risks, there remains limited research examining specific birth outcomes among adolescent mothers in Indonesian hospital settings, particularly regarding delivery methods and infant health indicators. This study aims to address this knowledge gap by analyzing pregnancy outcomes at Margono Soekarjo Hospital, with the goal of informing more effective clinical protocols and preventive strategies for this vulnerable population.

In Indonesia, studies on the relationship between adolescent pregnancy and both the type of delivery and birth weight remain limited, including at Margono Soekarjo Hospital. Therefore, this study aims to identify the association between adolescent pregnancy, type of delivery, and birth weight at Margono Soekarjo Hospital. The findings are expected to serve as a reference for future updates to Clinical Practice Guidelines (CPG I) and hospital protocols for managing adolescent pregnancies at Margono Soekarjo Hospital, with the potential to be adapted by hospitals across Indonesia.

Methods

This study was conducted in accordance with ethical research standards and received official approval from the institutional ethics committee under approval number

B/1807/UN23.11/PT.01.04/2025. All procedures adhered to ethical guidelines for medical research involving human subjects, particularly concerning the use of secondary data from patient medical records. To ensure confidentiality and privacy, all identifiable patient information was anonymized prior to analysis. The research protocol was reviewed and approved by the ethics committee of Margono Soekarjo Hospital, confirming compliance with principles of beneficence, non-maleficence, and respect for participant autonomy. This ethical clearance validates that the study upholds integrity, minimizes risks, and contributes responsibly to scientific knowledge while protecting patient rights.

This study used a quantitative analytic observational design with a cross-sectional approach to examine the relationship between maternal factors and neonatal outcomes. Secondary data were extracted from medical records at Margono Soekarjo Hospital in Purwokerto, Indonesia, covering deliveries from October 1, 2022, to August 10, 2024. Data collection took place from March to August 2024.

This study compared two groups:

- **Adolescent group:** Pregnant individuals aged 10–19 years who delivered at the hospital during the

study period with complete medical records.

- **Non-adolescent group:** Pregnant individuals aged 30–35 years who met the same criteria.

Exclusion criteria (applied to both groups) included:

- Deliveries outside the hospital,
- Incomplete medical records,
- Multiple pregnancies (twins or higher-order),
- Pre-existing diabetes mellitus or heart disease.

A total of 3,057 records were compiled using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). Data analysis was performed in SPSS v25.0 (IBM Corp., Armonk, NY, USA), including descriptive statistics for variables such as delivery type, birth weight, maternal age, pre- and post-pregnancy weight, maternal height, infant length, and APGAR scores (1st, 5th, and 10th minutes). Chi-square tests assessed categorical variables, while the Mann-Whitney test evaluated ordinal/numerical variables. Statistical significance was set at $p\text{-value} < 0.05$.

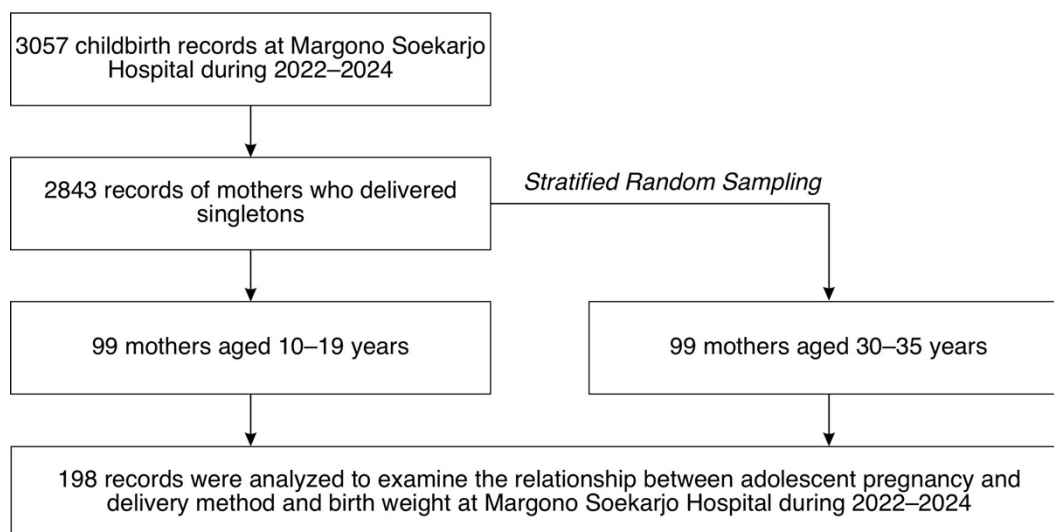


Figure 1 Data and Participants

Table 1 Comparison of maternal and neonatal characteristics between adolescent and non-adolescent mothers

Variable	Adolescent		Non-Adolescent		P-value
	(Mean $\pm$ SD)	Min–Max	(Mean $\pm$ SD)	Min–Max	
Pre-pregnancy Weight (kg)	50.15 $\pm$ 9.5	30-80	60.8 $\pm$ 13.5	37-106	0.000*
Post-pregnancy Weight (kg)	61.5 $\pm$ 10.6	41-89	69.9 $\pm$ 13.3	49-110	0.000*
Height (cm)	154.5 $\pm$ 5.1	144-168	154.2 $\pm$ 7.8	101-169	0.700
Infant Birth Weight (g)	2516.5 $\pm$ 569	640-3700	3031.2 $\pm$ 864	300-3900	0.025*
Infant Length (cm)	45.4 $\pm$ 4.3	22-61	46.3 $\pm$ 3.4	32-52	0.124
APGAR Score – 1 minute	6.3 $\pm$ 1.6	0-8	6.6 $\pm$ 1.6	0-8	0.006*
APGAR Score – 5 minutes	7.2 $\pm$ 1.9	0-9	7.5 $\pm$ 1.8	0-9	0.006*
APGAR Score – 10 minutes	8.13 $\pm$ 2.16	0-10	8.5 $\pm$ 1.9	0-10	0.006*

P-values were calculated using the Mann–Whitney test.

*Statistically significant ($p < 0.05$).

Table 2. Type of delivery

Type of Delivery	Adolescents	Non-Adolescents	P-value
Vaginal	58 (61.5%)	40 (40.4%)	0.005*
Cesarean	41 (38.5%)	59 (59.6%)	

P-value is calculated using the Chi-square test.

*Statistically significant ($p < 0.05$).

Results

As shown in Figure 1, a total of 3,057 childbirth records were documented at Margono Soekarjo Hospital between 2022 and 2024. After excluding multiple pregnancies, 2,843 singleton deliveries remained. From these, 99 adolescent mothers (aged 10–19) were identified. This study employed total sampling to include all 99 adolescent birth records for analysis.

To compare outcomes, a stratified random sampling method was used to select a non-adolescent control group (aged 30–35). From the remaining 2,958 non-adolescent delivery records, 697 mothers fell within the 30–35 age range. A randomized selection process yielded a final comparison group of 99 mothers, matched in sample size to the adolescent cohort.

Table 1 presents the distribution of maternal and neonatal characteristics between adolescent and non-adolescent mothers. Pre-

pregnancy and post-pregnancy body weights showed significant differences between the two groups ($p = 0.000$), with adolescent mothers having lower average weights both before and after pregnancy compared to non-adolescent mothers. However, there was no significant difference in maternal height between the groups ($p = 0.700$).

There was a significant difference in infant birth weight, with infants born to adolescent mothers averaging $2,516.5 \pm 569$ grams, compared to $3,031.2 \pm 864$ grams for those born to non-adolescent mothers ($p = 0.025$). In contrast, infant body length did not differ significantly between the groups ($p = 0.124$).

APGAR scores at the first, fifth, and tenth minutes after birth also showed significant differences ($p = 0.006$), indicating a disparity in the early health conditions of newborns between the two maternal age groups.

Table 2 presents the distribution of delivery types between adolescent mothers

Table 3 Indications for cesarean delivery

Indication for Cesarean	Adolescents	Non-Adolescents
Previous Cesarean Section	0	22
Fetal Distress	11	10
Cephalopelvic Disproportion (CPD)	8	5
Failed Induction	7	5
Malpresentation	5	9
Impending Eclampsia	2	0
Eclampsia	2	0
Uterine Rupture	1	0
Mental Disturbance	2	2
Others	3	6

Table 4 Maternal Age, Parity, and Gestational Maturity

Variable	Adolescent	Non-Adolescent	P-value
Age (Mean $\pm$ SD; Min-Max)	17.4 $\pm$ 1.6 (12-19)	32.2 $\pm$ 1.6 (30-35)	0.000*
Parity			NA
P1 (Primipara)	95	15	
P2	4	47	
P3	0	28	
>P4	0	9	
Gestational Maturity			0.000*
Term	65	79	
Preterm	34	20	

P-value is calculated using the Chi-square test.

*Statistically significant ($p < 0.05$).

P1 = first birth; P2 = second birth; P3 = third birth; >P4 = more than four births.

NA = Not Available.

(aged 10–19 years) and non-adolescent mothers (aged 30–35 years) at Margono Soekarjo Hospital. The types of delivery analyzed include vaginal and cesarean deliveries.

In the adolescent group, vaginal delivery was more prevalent, accounting for 61.5% (58 cases), while cesarean delivery occurred in 38.5% (41 cases). Conversely, in the non-adolescent group, a different pattern was observed: cesarean delivery was more common, with a proportion of 59.6% (59 cases), and vaginal delivery occurred in 40.4% (40 cases).

These findings indicate that adolescent mothers are more likely to undergo vaginal delivery compared to non-adolescent mothers. In contrast, non-adolescent mothers have a higher tendency to deliver via cesarean section.

Table 3 presents a comparison of cesarean section indications between the adolescent and non-adolescent groups. In the adolescent group, fetal distress was the most common indication with 11 cases, followed by cephalopelvic disproportion (CPD) with 8 cases and failed induction with 7 cases. Malpresentation was reported in 5 cases,

while impending eclampsia, eclampsia, and mental disturbances each accounted for 2 cases. Uterine rupture occurred in only 1 adolescent case.

In contrast, within the non-adolescent group, previous cesarean section was the leading indication, with 22 cases. Fetal distress was the second most frequent, with 10 cases, followed by malpresentation with 9 cases. Both CPD and failed induction were noted in 5 cases each. Notably, there were no cases of impending eclampsia, eclampsia, or uterine rupture in the non-adolescent group.

According to Table 4, there was a notable difference in the average age between the adolescent and adult groups. The adolescent group had a mean age of 17.4 years, ranging from 12 to 19 years, while the adult group had a mean age of 32.2 years, ranging from 30 to 35 years. This difference is supported by a highly significant p-value ($p = 0.000$), indicating a statistically significant age distinction between the two groups.

In terms of parity, a distinct pattern was observed. The majority of adolescents (95 individuals) were primiparous (P1), whereas parity among adults was more varied. A significant number of adults were classified as P2 (47 individuals) and P3 (28 individuals).

Regarding gestational maturity, Table 4 also shows a significant difference between the two groups ($p = 0.000$). In the adolescent group, 65 pregnancies were term and 34 were preterm. Meanwhile, the adult group had 79 term pregnancies and 20 preterm. The higher proportion of term pregnancies among adults suggests that more mature maternal age may be associated with a more stable pregnancy reaching full term.

Discussion

The findings of this study reveal a significant difference in the birth weight of infants born to adolescent mothers compared to those born to non-adolescent mothers. Infants born

to adolescent mothers had a lower average birth weight (2516.5 ± 569 grams) compared to those born to non-adolescent mothers (3031.2 ± 864 grams), with a p-value of 0.025, indicating statistical significance.

This disparity in birth weight may be attributed to several factors that commonly affect adolescent pregnancies. One key factor is the physiological immaturity of adolescent mothers, whose bodies are still developing and may not yet be fully equipped to meet the nutritional demands of pregnancy and fetal development. In addition, psychosocial factors such as limited knowledge about prenatal care, emotional stress, and lack of social support can also contribute to suboptimal pregnancy outcomes among adolescents.^{5,6}

Low birth weight in infants born to adolescent mothers can have long-term implications for the child's health and development. Infants with low birth weight are at a higher risk of experiencing various health issues, including cognitive developmental delays, respiratory problems, and increased susceptibility to infections. Therefore, these findings highlight the importance of comprehensive antenatal care and targeted support for pregnant adolescents to improve pregnancy outcomes.⁷

The results of this study are consistent with several previous studies that have also reported differences in birth weight between infants born to adolescent mothers and those born to adult mothers. For instance, a study by Kawakita et al. found that adolescent pregnancy is associated with an increased risk of preterm birth and low birth weight. Similarly, research by Ganchimeg et al. showed that adolescent mothers have a higher risk of delivering low birth weight infants compared to older mothers.^{9,10}

The results of this study reveal a significant difference in APGAR scores at the first, fifth, and tenth minutes between infants born to adolescent mothers and those born

to non-adolescent mothers, with a p-value of 0.006. This finding indicates a disparity in the initial health status of newborns between the two groups.

The APGAR score is a rapid assessment tool used to evaluate a newborn's condition and determine whether immediate medical intervention is required. The significant differences in APGAR scores may be attributed to several factors associated with adolescent pregnancy, including physiological immaturity, suboptimal antenatal care, and a higher risk of pregnancy and delivery complications among adolescent mothers.¹¹

Adolescent pregnancy is often associated with an increased risk of preterm birth, low birth weight, and other delivery complications. These factors can significantly affect the condition of the newborn at birth, often reflected in lower APGAR scores. Additionally, adolescent mothers frequently experience higher levels of psychosocial stress and inadequate social support during pregnancy, both of which can negatively impact fetal development and the newborn's condition at delivery.^{12,13}

The difference in APGAR scores has important implications for neonatal care. Newborns with lower APGAR scores often require more intensive medical interventions immediately after birth and closer monitoring during the early neonatal period. This highlights the importance of ensuring that medical teams are well-prepared to manage deliveries involving adolescent mothers and that adequate neonatal care facilities are available.¹⁰

These findings further highlight the urgent need to improve the quality of antenatal care for pregnant adolescents. Targeted programs for this group—such as intensive health education, nutritional support, and closer pregnancy monitoring—are essential to improve pregnancy outcomes and reduce the risk of complications for the newborn. In addition, efforts to prevent

adolescent pregnancy through comprehensive sexual education and improved access to contraceptive services are crucial to lowering its prevalence and mitigating its negative impacts on maternal and infant health.

This study also reveals differences in delivery patterns between adolescent and non-adolescent mothers at Margono Soekarjo Hospital during the 2022–2024 period. Among adolescents, vaginal delivery was more common, accounting for 61.5% of cases. In contrast, abdominal delivery was more prevalent among non-adolescents, at 59.6%. These findings suggest that maternal age may influence the type of delivery experienced.

The predominance of vaginal delivery among adolescents may be attributed to several factors. One possible explanation is the physical condition of adolescents, who generally possess greater flexibility and tissue elasticity compared to older women, which may facilitate a smoother vaginal delivery process. However, it is important to note that despite the higher proportion of vaginal deliveries, 38.5% of adolescents still underwent abdominal delivery. This highlights that adolescent pregnancies still carry significant risks of complications that may necessitate surgical intervention.^{13,14}

The high percentage of abdominal deliveries among non-adolescents can be linked to various risk factors more commonly observed in older maternal age, such as pregnancy-induced hypertension, gestational diabetes, or a history of previous cesarean sections. These conditions may increase the likelihood of requiring operative delivery. Nevertheless, 40.4% of non-adolescent mothers still delivered vaginally, indicating that advanced maternal age does not preclude the possibility of a normal delivery.¹⁵

These findings highlight the importance of an individualized approach in labor management—one that takes into account not only maternal age but also factors such

as overall health status, obstetric history, and pregnancy development. Moreover, the results underscore the critical need for comprehensive education and antenatal care, particularly for pregnant adolescents, to better prepare them for the birthing process and to reduce the risk of complications.¹⁶

In the adolescent group, fetal distress emerged as the most common indication for intervention, followed by CPD and failed induction. These conditions may be associated with the physical and physiological immaturity of adolescents, which can increase the risk of pregnancy and labor complications. The high incidence of CPD in this group likely reflects underdeveloped pelvic structures, leading to a mismatch between the fetal head and the maternal pelvis. This finding aligns with previous studies suggesting that adolescent anatomy may not be fully prepared to support a term pregnancy and vaginal delivery.^{8,9}

In the adult group, a history of previous cesarean section was the leading indication for abdominal delivery. This highlights the significant influence of prior birth history on the mode of subsequent deliveries. Fetal distress and malpresentation were also common indications, though less frequently observed compared to the adolescent group. This difference may be attributed to the greater physical and psychological maturity of adult mothers, which better equips them to cope with pregnancy and childbirth.⁵

In this study, cases of impending eclampsia and eclampsia were found exclusively in the adolescent group, with no such cases recorded in the adult group. This suggests that adolescent pregnancies carry a higher risk of hypertensive disorders, which can pose serious threats to both maternal and fetal health. Additionally, the presence of mental health disorders among pregnant adolescents emphasizes the importance of addressing mental well-being in this vulnerable population.¹⁰

The findings of this study confirm that

adolescent pregnancies carry a higher risk of complications compared to pregnancies in adulthood. Therefore, a tailored approach is essential in managing pregnancy and childbirth among adolescents, including close monitoring of fetal development, adequate birth preparedness, and comprehensive psychosocial support.

This study also revealed a higher proportion of preterm births in the adolescent group (34.3%) compared to the non-adolescent group (20.2%), indicating that younger maternal age is a risk factor for preterm delivery. This can be explained by several biological and psychosocial mechanisms.^{17,18}

Biologically, adolescents are still undergoing physical growth and maturation, which may lead to nutritional competition between the mother and fetus. This nutritional deficit can impair placental development and fetal growth, thereby increasing the risk of preterm labor. Furthermore, the immature cervix of adolescents is more susceptible to ascending infections, which may also trigger preterm birth.^{20,21}

From a psychosocial perspective, adolescent pregnancies are often unplanned and receive limited social support. This can lead to prolonged psychological stress, which negatively impacts pregnancy outcomes, including an increased risk of preterm birth. Adolescents also tend to exhibit less optimal health behaviors, such as delayed or inconsistent antenatal care visits, which further contribute to the risk of pregnancy complications.⁶

Conversely, the higher proportion of term pregnancies among the non-adolescent group (79.8%) suggests that greater maternal age is correlated with more stable pregnancy outcomes. Adult mothers generally demonstrate better physical and psychological readiness, have greater access to healthcare services, and are more likely to adopt healthy behaviors during pregnancy. These factors

collectively contribute to a lower risk of preterm labor and a greater likelihood of achieving a full-term pregnancy.⁶

Conclusion

The study demonstrates that adolescent pregnancy significantly influences delivery mode and birth weight at Margono Soekarjo Hospital (2022–2024). Adolescent mothers had a higher prevalence of vaginal delivery (61.5% vs. 40.4%) and delivered infants with lower average birth weights (2516.5 ± 569 g vs. 3031.2 ± 864 g) compared to non-adolescent mothers. Significant disparities in APGAR scores further underscored differences in neonatal health between the two groups. These findings emphasize the need for enhanced antenatal care and tailored interventions for pregnant adolescents to mitigate risks and improve outcomes for both mothers and newborns.

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