



Determinant Factors which Related with Premature Birth

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ARTICLE INFO

Article history:

Received 27 August 2025

Revised 7 November 2025

Accepted 3 December 2025

Available online

<https://talenta.usu.ac.id/IJNS>

E-ISSN: 2685-7162

How to cite: Kusuma, R., Nurita, SC., Gustina, Maidawilis, Mitayani, Mulyani., B. (2025). Determinant factors which related with premature birth. *Caring: Indonesian Journal of Nursing Science*, 7(2), 138-146.

ABSTRACT

In 2023 Indonesian Health Survey reported that 0.6% of Indonesian women had their first pregnancy at ages 10-14, and 25.8% at ages 15-19. Medical records from the MCH Clinic at Putri Ayu Community Health Center in Jambi City stated around 164 adolescent pregnancies (ages 14-19) over the past five years (2020-2024), but only 120 births were recorded. This was a cross-sectional study using secondary data from the MCH Clinic and Independent Midwife Practices in the working area of Putri Ayu Community Health Center in Jambi City from January 01, 2020 to December 31, 2024. This study aims to analyse factors associated with premature births among adolescents in the working area of the Putri Ayu Community Health Centre in Jambi City. The study sample included all 120 pregnant adolescents (ages 14-19). Data were analysed using univariate, bivariate, and multivariate. Univariate analysis was presented as a frequency distribution, and bivariate analysis used a chi-square test to examine the relationship between all characteristic variables and premature birth. Multivariate analysis used logistic regression to determine which variable had the most significant influence on premature birth. The chi-square results indicated that all determinants (maternal age at pregnancy, maternal nutrition during pregnancy, frequency of antenatal care, and history of abortion) were significantly related to premature birth (p -value = 0.05). The logistic regression analysis showed that maternal age at pregnancy was the most dominant factor influencing premature birth, indicated by the highest odds ratio ($OR = 7.034$), while nutritional status was not statistically significant in relation to premature birth (p -value= 0.309).



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<http://doi.org/10.32734/ijns.v7i2.21975>

Keyword: Adolescent Pregnancy, Determinant Factors, Premature Birth

1. Introduction

Adolescent pregnancy is a major public health issue that requires primary attention from the government. Low educational attainment and a lack of knowledge among young women are contributing factors to early marriage, (Siti Saidah Nasution, 2020). Teenage pregnancy has been shown to increase the risk of various obstetric complications, including prematurity, anaemia, and maternal and infant mortality (Reeder, 2012) (Reeder, 1997) (Marilyn J. Hockenberry, 2014) (Marilyn J. Hockenberry, David Wilson, 2017) (World Health Organization, 2020a).

According to WHO in 2019, there were approximately 21 million adolescent pregnancies, and 50% of them were unintended pregnancies, a majority of which ended in abortion, (World Health Organization, 2024). Indonesian Health Survey (2023), reported that around 0.6% of Indonesian women had their first pregnancy at ages 10-14, and 25.8% at ages 15-19, with a significant portion of these cases occurring in Jambi Province. (Kemenkes RI, 2023).

Medical records from the Maternal and Child Health (MCH) Clinic at Putri Ayu Community Health Centre in Jambi City indicate that over the last five years (2020-2024), there were 164 adolescent pregnancies (ages 14-19), but only 120 births were officially recorded. This high number is suspected to be related to school dropout rates, free sex, drug use among adolescents, low education levels, poverty, limited access to information, and a lack of sexual education within families. One of the consequences of this trend is an increase in the number of premature births (Puskesmas Putri Ayu Kota Jambi, 2024).

A premature or preterm baby is a baby born before the gestational age of 37 weeks, regardless of birth weight (Marilyn J. Hockenberry, 2014) (Reeder, 2012). WHO reported that in 2020, 4-16% of premature babies born to adolescent mothers were a leading cause of death in children under 5 years old (World Health Organization, 2020b).

One of the current issues for this research is the findings of the previous researcher (Ratu Kusuma) in 2023. Her study reported that adolescent pregnancies at the Putri Ayu Community Health Center in Jambi City were caused by various factors, including free sex, out-of-wedlock pregnancies, opportunities for sexual intercourse with a partner, personal desire, peer influence, family conflicts, lack of parental affection, boredom with online learning during the COVID-19 pandemic, insufficient understanding of adolescent reproductive and sexual health, and poverty (Kusuma, 2023).

Although numerous studies have been conducted on adolescent pregnancy in Indonesia, comprehensive research on the determinants of premature birth using local data in Jambi City is still very limited. Therefore, this study is essential. This study aims to analyse factors associated with premature births among adolescents in the working area of the Putri Ayu Community Health Centre in Jambi City from 2020 to 2024.

2. Methods

This research uses a cross-sectional study that uses secondary data from the Maternal and Child Health (MCH) Clinic and Independent Midwife Practices within the working area of Putri Ayu Community Health Centre in Jambi City. The data covered the period from 1st of January 2020 to 31st of December 2024. The study sample included all 120 pregnant adolescents (ages 14-19). The data was analysed using univariate, bivariate, and multivariate methods. Univariate analysis results were presented in the form of frequency distributions. Bivariate analysis employed the Chi-square test to examine the association between all characteristic factors and premature birth. Multivariate analysis utilized logistic regression to identify the most dominant factors influencing premature birth. The inclusion criteria for this study are adolescent mothers aged 14–19 years who underwent antenatal care visits and gave birth at the Putri Ayu Community Health Centre and independent midwifery practices within the working area of the Putri Ayu Community Health Centre in Jambi City, covering the period from January 01, 2020, to December 31, 2024. Conversely, the exclusion criteria are patient data with incomplete or unverifiable medical records.

3. Results

3.1 Univariate Analysis

Table 1 Respondent characteristics (n=120)

Characteristic	Frequency	Percentage
Maternal age		
a. 14-15 years old (early adolescent)	18	15,0
b. > 5-19 years old (late adolescent)	102	85,0
Maternal nutrition		
a. CED (MUAC < 23,5 cm)	17	14,2
b. Non-CED (MUAC ≥ 23,5 cm)	103	85,8
Antenatal care frequency		
a. Completed (< 6 times)	48	40,0
b. Incomplete (≥ 6 times)	72	60,0
Abortion history		
a. Ever	23	19,2
b. Never	97	80,8
Premature birth		
a. Premature (< 37 weeks)	44	36,7
b. Non-premature (37-42/> 42 weeks)	76	63,3

Table 1 shows that most respondents became pregnant during late adolescence ($>15-19$ years), totalling 102 people (85.0%), while 18 people (15.0%) became pregnant during early adolescence (14-15 years). The majority had normal nutritional status or were Non-Chronic Energy Deficient (CED) (Mid-Upper Arm Circumference/MUAC ≥ 23.5 cm), with 103 people (85.8%), and 17 people (14.2%) experienced Chronic Energy Deficiency. Total of 72 people (60.0%) had complete antenatal care visits (≥ 6 times), while 48 people (40.0%) had incomplete visits (< 6 times). A history of abortion was found in 23 people (19.2%), while 97 people (80.8%) had no history of abortion. Around the 120 pregnant adolescents, 44 people gave birth prematurely (< 37 weeks) and 76 people gave birth at full term or later (37-42/ ≥ 42 weeks).

3.2 Bivariate Analysis

Table 2 Relationship between characteristic variable with premature birth (n =120)

Characteristic Variable	Birth				Total		P value
	Premature	Non-Premature	f	%	f	%	
Maternal age							
a. 14-15 years old (early adolescent)	14	77,8	4	22,2	18	100	0,000
	30	29,4	72	70,6	102	100	
b. $>15-19$ years old (late adolescent)							
Maternal nutrition							
c. CED (MUAC $< 23,5$ cm)	11	64,7	6	35,3	17	100	0,020
d. Non-CED (MUAC $\geq 23,5$ cm)	33	32,0	70	68,0	103	100	
Antenatal care frequency							
a. Incomplete (< 6 times)	25	52,1	23	47,9	48	100	0,008
b. Completed (≥ 6 times)	19	26,4	53	73,6	72	100	
Abortion history							
a. Ever	14	60,9	9	39,1	23	100	0,015
b. Never	30	30,9	67	69,1	97	100	

The chi-square test results indicate a significant effect between maternal age at pregnancy and premature birth (p -value = 0.000). A large proportion of mothers who became pregnant in early adolescence (14-15 years) gave birth to premature babies (77.8%), while the proportion of premature births was lower for those who became pregnant in late adolescence ($>15-19$ years) (29.4%). Maternal nutritional status during pregnancy was also significantly associated with premature birth (p -value = 0.020). Mothers with Chronic Energy Deficiency (CED) had a higher proportion of premature births (64.7%) compared to mothers with good nutritional status (32.0%). The frequency of antenatal care also showed a significant association with premature birth (p -value = 0.008). Mothers with incomplete antenatal care (< 6 times) were at a higher risk of giving birth prematurely (52.1%) compared to those who had complete visits (26.4%). A history of abortion also had a significant association with premature birth (p -value=0.015). Mothers who had a previous abortion were more likely to give birth prematurely (60.9%) compared to those with no history of abortion (30.9%).

3.3 Multivariate Analysis

Table 3 Factors that can influence or determine premature birth (n =120)

Characteristic	OR 95% CI	P value
Maternal age	7.034	0,007
Maternal nutrition	2.161	0,309
Antenatal care frequency	3.539	0,005
Abortion history	5.107	0,003

Based on the multivariate analysis results, three variables were found to be significantly associated with premature birth: maternal age at pregnancy, frequency of antenatal care, and history of abortion. Mothers who

were pregnant in early adolescence (14-15 years old) had a 7.034 times greater risk of experiencing premature birth compared to mothers who were pregnant in late adolescence (>15-19 years old), with a p-value of 0.007. Incomplete antenatal care visits (p-value < 6 times) increased the risk of premature birth by 3.539 times compared to complete antenatal visits (p-value = 0.005). Mothers with a history of abortion had a 5.107 times higher risk of experiencing premature birth than mothers with no history of abortion (p-value = 0.003). In contrast, nutritional status was not statistically significant for premature birth (OR = 2.161; p-value = 0.309). Maternal age at pregnancy was the most dominant factor influencing premature birth, as indicated by the highest odds ratio (OR = 7.034).

4. Discussion

4.1 Univariate Interpretation

4.1.1 Maternal Age

Based on the research findings, the majority of respondents were pregnant in late adolescence (>15-19 years old). Although most pregnancies occurred in this age group, there was still a proportion of pregnancies in early adolescence (14-15 years old). This research is consistent with the study conducted by Indarti, *et al.*, which reported that out of 33 adolescent pregnancies, 55.6% occurred in the 16–19 age group. This phenomenon was suspected to be associated with low educational attainment, cultural norms, and a lack of knowledge regarding reproductive health (Junita Indarti, Adly Nanda Al Fattah, Zulfitri Dewi & Fitri Adinda Novianti Mahdi, 2020). According to (Bawono *et al.*, 2022) stated that the practice of early marriage in Indonesia is one of the causes of the high rate of very young pregnancies, which has implications for an increase in pregnancy and childbirth complications.

Teenage pregnancy is caused by various factors such as early marriage driven by cultural and economic factors, low levels of education and knowledge about reproductive health, lack of access to adolescent health services, and a social environment that is permissive of premarital sexual relations (Sholihah *et al.*, 2019) (DeMarco *et al.*, 2021). Therefore, the WHO recommends that the ideal age for pregnancy is 19-35 years, because within this age range, the reproductive organs have matured optimally, hormonal function is stable, nutritional reserves are adequate, and the risk of obstetric complications is relatively low (World Health Organization, 2024).

According to the researcher's analysis, the high rate of teenage pregnancies at Putri Ayu Community Health Centre in Jambi City is likely related to school dropouts, suboptimal education on reproductive health, and a lack of parental involvement in providing accurate sexual information. Furthermore, socioeconomic factors play a role, as families with economic limitations tend to marry off their children at a young age to reduce the family burden.

4.1.2 Maternal Nutrition

Based on the research findings, the majority of mothers had a good nutritional status or were Non-CEW (Chronic Energy Deficiency), as indicated by a Mid-Upper Arm Circumference (MUAC) of ≥ 23.5 cm. Pregnant women who experience CEW have a higher risk of obstetric complications and premature birth compared to mothers with a good nutritional status or who are Non-CEW (Maheshwari *et al.*, 2022) (Chia *et al.*, 2019). Theoretically, the nutritional status of pregnant women can be assessed using MUAC (Mid-Upper Arm Circumference) as an indicator of energy reserves and muscle mass, (Indrawati, 2023). The Indonesian Ministry of Health recommends that pregnant women ideally have a MUAC (Mid-Upper Arm Circumference) of ≥ 23.5 cm to minimize the risk of premature birth and other complications. Good nutritional status is also characterized by appropriate weight gain during pregnancy, normal hemoglobin levels, and adequate intake of energy, protein, and micronutrients throughout the pregnancy (Kusuma, 2020a) (Kemenkes RI, 2020).

Chronic Energy Deficiency in pregnant women is caused by various factors, including low nutritional intake before and during pregnancy, short spacing between pregnancies, high physical workload, chronic infections, and low socioeconomic conditions that limit access to nutritious food. A lack of knowledge and limited access to health services also worsen the situation (Kusuma, 2020b) (Na *et al.*, 2024) (Karemoi *et al.*, 2020) (Qin & Xie, 2023).

According to the researcher's analysis, the nutritional status of pregnant women at Putri Ayu Community Health Centre in Jambi City is likely caused by low-quality eating habits before and during pregnancy, economic limitations of families that make it difficult to meet the need for nutritious food, and a lack of participation in pregnant mother nutrition programs provided by health facilities. Cultural factors, such as the habit of reducing food portions during pregnancy out of fear of having a large baby, also have the potential to influence the occurrence of Chronic Energy Deficiency (CEW).

4.1.3 Antenatal Care Frequency

Based on the research findings, the majority of mothers had a complete antenatal visit (≥ 6 times). This indicates that while most pregnant women have utilized antenatal services as recommended, there is still a proportion of mothers who did not get optimal antenatal care. This proportion occurred in 2020-2022, when Indonesia experienced the COVID-19 pandemic, which limited visits to health services.

The standard for antenatal visits during pregnancy is a minimum of 6 times (1 visit in the first trimester, 2 visits in the second trimester, and 3 visits in the third trimester, (Kemenkes RI, 2021). The purpose is to monitor the health of the mother and fetus, to detect pregnancy risks early, and to provide necessary interventions. Antenatal care includes physical examinations, laboratory screening, immunization, nutritional counseling, and education on preparing for childbirth and baby care (Kemenkes RI, 2021) (Kemenkes RI, 2020).

Antenatal visits are influenced by various factors, such as the mother's knowledge about the benefits of antenatal care, geographical and transportation barriers, financial constraints, a high workload or household burden, negative attitudes toward healthcare providers or the services provided, and cultural factors, for example, the belief that pregnancy check-ups are only necessary when the mother feels a complaint (Maheshwari et al., 2022) (Wenling et al., 2024).

According to the researcher's analysis, the suboptimal frequency of antenatal visits at Putri Ayu Community Health Centre in Jambi City is likely caused by the long distance from home to the health facility, limited transportation costs, inflexible service schedules, and a lack of family support. Other factors that may influence this are the low awareness among mothers about the benefits of routine check-ups even when they have no complaints, as well as limited information regarding the recommended schedule and frequency of antenatal care.

4.1.4 Abortion History

Based on the research findings, almost one in five pregnant mothers in the working area of Putri Ayu Health Center in Jambi had experienced an abortion in a previous pregnancy, (Maheshwari et al., 2022) melaporkan bahwa riwayat abortus pada kehamilan sebelumnya merupakan salah satu faktor risiko terjadinya persalinan prematur (Rejina Gurung, Mats Malqvis, Zhou Hong, Pragya Gautam Poudel, Avinash K. Sunny & Sangeeta Mishra, 2020). In Nepal, it was also confirmed that women with a history of abortion have a greater chance of experiencing premature birth.

Abortion is defined as the termination of a pregnancy before the fetus is viable outside the womb, usually before 20 weeks of gestation or when the fetal weight is less than 500 grams, (Indrawati, 2023) (Kusuma, 2020a). Abortion is associated with various factors, including chromosomal abnormalities, uterine abnormalities such as cervical incompetence, hormonal disorders, genital infections, chronic diseases like diabetes mellitus and hypertension, physical trauma, exposure to toxic substances, and unhealthy lifestyles such as smoking or alcohol consumption (Bobak, 2012) (Sun et al., 2023).

According to the researcher's analysis, the occurrence of abortion in teenage mothers at Putri Ayu Community Health Centre in Jambi City is likely caused by the uterus not being ready to accept a pregnancy at a young age. Other factors that may contribute are physical exhaustion, inadequate nutritional intake, socioeconomic factors, and the stress of undergoing pregnancy as a teenager.

4.1.5 Premature Birth

Based on the research findings, 44 teenage mothers gave birth to premature babies with a gestational age of < 37 weeks. Teenage mothers have a greater risk of experiencing premature birth compared to adult mothers (Sun et al., 2023). In the other hand, research by (Radu et al., 2022) in Rumania shows that 34.5% of pregnant adolescents gave birth prematurely, which is influenced by nutritional status socioeconomic conditions and limited access to antenatal services. Premature birth is a birth that occurs before 37 weeks of gestation, which can be caused by maternal, fetal, and environmental factors. It is stated that very young pregnancies are a factor that can increase the risk of premature birth (Sun et al., 2023) (DeMarco et al., 2021) (Town et al., 2024).

According to the researcher's analysis, premature births at Putri Ayu Community Health Centre in Jambi City are influenced by the mother's age at pregnancy, her nutritional status during pregnancy, incomplete antenatal visits, and a history of abortion. Other possible factors include maternal illnesses during pregnancy (anemia, hypertension, hyperemesis gravidarum), fatigue, the stress of a teenage pregnancy, as well as socioeconomic factors and a low level of education.

4.2 Bivariate Interpretation

4.2.1 The Relationship Between Maternal Age During Pregnancy and Premature Birth

The chi-square test results show that there is a significant relationship between maternal age during pregnancy and premature birth (p -value = 0.000). Mothers who were pregnant in early adolescence (14–15 years) were more likely to give birth to premature babies compared to those in late adolescence (>15–19 years). According to (Diabelková et al., 2023) was reported that mothers who are pregnant at age ≤ 19 years have more than double the risk of experiencing premature delivery compared to mothers who are pregnant at age 20–34 years. This is related to the suboptimal function of the reproductive system, hormonal imbalances, and limited physiological adaptation to pregnancy. Marriage and pregnancy at a very young age increase the risk of prematurity, which is also associated with poor nutritional status, high exposure to infectious diseases, and a low frequency of antenatal visits (Miller et al., 2022).

Pregnancies at a very young age, especially under 16 years old, have a high risk of premature birth because the reproductive organs are not yet capable of sustaining the pregnancy to full term (Maheshwari et al., 2022). Additionally, hormonal imbalances of estrogen and progesterone can trigger premature uterine contractions. Socioeconomic and psychological factors also play a role, as young mothers tend to have limited access to healthcare, adequate nutrition, and family support, which ultimately contributes to prematurity (Husna et al., 2021) (Nurianti et al., 2021) (Kusuma, 2023c) (Syintha Ida & Amin, 2021).

4.2.2 The Relationship Between Nutritional Status During Pregnancy and Premature Birth

The chi-square test results show that the nutritional status of pregnant women is significantly related to premature birth p -value = 0.020. Mothers with Chronic Energy Deficiency (CED) had a higher proportion of premature births compared to mothers with good nutritional status. Research by (Zhang et al., 2020) in China, it was reported that pregnant women with poor nutrition have almost a twofold risk of premature birth compared to mothers with good nutrition. Chronic Energy Deficiency in pregnant women is associated with fetal growth disorders, placental insufficiency, and an increased risk of birth before 37 weeks of gestation (Maheshwari et al., 2022) (Gete et al., 2020).

Chronic Energy Deficiency reduces energy and protein reserves, affects the production of pregnancy hormones like progesterone, and lowers the capacity of the uterus and placenta to support the fetus. Deficiencies in important micronutrients such as iron, folic acid, and zinc can also disrupt cell and tissue formation, trigger obstetric complications, and increase the risk of premature contractions and premature rupture of membranes (Kemenkes, 2023) (Paknahad et al., 2019) (Qin & Xie, 2023).

4.2.3 The Relationship Between the Frequency of Antenatal Care and Premature Birth

The chi-square test results showed a significant relationship between the frequency of antenatal visits and premature birth p -value = 0.008. Pregnant mothers who had incomplete antenatal visits (< 6 times) had a higher proportion of premature births compared to mothers who had complete visits (Syintha Ida & Amin, 2021). Mothers with incomplete antenatal care have a twofold risk of experiencing premature birth compared to mothers who complete their antenatal care. (Wulandari et al., 2023) it also shows that the regularity of antenatal care visits plays an important role in the early detection of pregnancy complications that can trigger premature labor. Antenatal care is a means for the early detection, prevention, and management of related issues of pregnancy. The Ministry of Health mandates a minimum of 6 antenatal visits during pregnancy: 1 visit in the first trimester, 2 visits in the second trimester, and 3 visits in the third trimester (Kemenkes RI, 2020). Antenatal care services include examining nutritional status, blood pressure, signs of infection, fetal growth, as well as providing nutrition counselling and preparation for childbirth. Incomplete antenatal visits increase the likelihood of missing the detection of risk factors such as preeclampsia, infections, and fetal growth disorders, which can lead to premature birth (WHO, 2017) (Permenkes RI, 2021).

4.2.4 The Relationship Between A History of Abortion and Premature Birth

The chi-square test results showed that a history of abortion is significantly related to premature birth (p -value = 0.015). Mothers with a previous history of abortion had a higher proportion of premature births compared to mothers with no such history. Women with a history of abortion have an almost twofold risk of premature birth compared (Rejina Gurung, Mats Malqvist, Zhou Hong, Pragya Gautam Poudel, Avinash K. Sunny & Sangeeta Mishra, 2020). Research by (Zhang et al., 2020) stated that a history of abortion increases the risk of obstetric complications in subsequent pregnancies, including cervical insufficiency and premature rupture of membranes, which contribute to prematurity. Abortion is associated with repeated curettage procedures or cervical trauma, genetic abnormalities, intrauterine infections, endocrine disorders, chronic

inflammation, as well as placental vascularization disorders that can trigger early contractions and premature birth (Maheshwari et al., 2022; Yu et al., 2023).

4.3 Multivariate Interpretation

Based on the results of the multivariate analysis, there are three variables significantly related to premature birth: maternal age at pregnancy, frequency of antenatal care, and history of abortion. The nutritional status of the mother during pregnancy was not statistically significant, but clinically, mothers with Chronic Energy Deficiency still showed a greater tendency for risk of giving birth to a premature baby. Maternal age at pregnancy was the most dominant factor with the highest odds ratio, which means that pregnancies at a very young age (14-15 years) carry the greatest risk of premature birth.

Pregnancies at age < 16 years increase the risk of premature birth 6-8 times due to the immaturity of the reproductive organs and a lack of optimal psychological readiness. The mother's very young age can trigger hormonal disorders, limited uterine capacity, and a high risk of cervical incompetence, which directly shortens the gestational age, causing mothers to give birth prematurely (Wulandari et al., 2023). Maternal age during pregnancy is the most dominant variable influencing premature birth because this factor reflects the mother's biological, physiological, and psychosocial readiness to undergo pregnancy. At a very young age (14-15 years), the reproductive organs are not fully mature. This immaturity impacts the smaller size of the uterine cavity, suboptimal endometrial thickness, and inadequate placental vascularization, thereby reducing the capacity to sustain the pregnancy to full term (DeMarco et al., 2021; World Health Organization, 2020b).

Teenage pregnancy has negative impacts on physical, psychological, and social well-being, such as hormonal disorders and malnutrition. Psychosocial issues include marital breakdown, a risk of divorce, domestic violence, stress, and even depression. These factors interact in a complex manner, triggering premature labor (Kusuma, 2023b) (Kusuma et al., 2019) (Maheshwari et al., 2022; Teshale et al., 2025).

5. Conclusion

It is concluded that teenage pregnancies and premature births at Putri Ayu Community Health Centre in Jambi City are quite high, which are related to teenage pregnancy, incomplete antenatal care frequency, a history of abortion, and the mother's nutritional status during pregnancy. Therefore, a primary preventive approach is needed through reproductive health education in schools, programs to delay the age of marriage, and the empowerment of adolescent girls. An intensive support strategy for young pregnant mothers should be implemented to minimize the risk of complications. Regular monitoring and home visits are necessary to detect early signs of prematurity. This approach should be integrated with psychosocial support through teenage pregnancy groups, family counseling, and the involvement of community leaders. The community health centre needs to establish formal partnerships with schools, village officials, and the health department to build a rapid referral system.

Acknowledgment

Special thanks are extended to the Rector and Head of the Institute for Research and Community Service of Baiturrahim University, the leadership of the Putri Ayu Community Health Center in Jambi City, the Coordinating Midwife for the Maternal and Child Health (MCH) Program, the Coordinating Midwife for the Adolescent Health Program, the students, and the several teenage mothers who were willing to be contacted by phone for data verification.

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