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Risk Factors and Birth Outcomes Associated with Adolescent Pregnancy in Tertiary Level Hospital of Chitwan

Sumitra Parajuli [1], Jiwan Kumar Poudyal [2], Madhu Maya Poudel [1], Kamala Regmi [1], Pratima Adhikari

[1]Department of Nursing, Bharatpur Hospital Nursing College, Bharatpur, Chitwan, Nepal, [2] Shree College of Technology, Bharatpur, Chitwan, Nepal.

ABSTRACT

Background

Adolescent pregnancy is a global public health concern and a leading determinant of adverse birth outcomes. This study was conducted to assess the risk factors and immediate birth outcomes associated with adolescent pregnancy in a tertiary hospital in Chitwan.

Methods

An analytical cross-sectional study was conducted among 210 post-partum mothers at the Maternity ward of Bharatpur Hospital. Mothers aged 20-35 years were designated as the reference group for comparison. A face-to-face interview was conducted to collect socio-demographic and risk factors related data and data on maternal and neonatal outcomes collected from record files. The collected data were entered and analyzed in SPSS 20 version.

Results

Adolescent pregnancy was significantly associated with Janajati/Chepang ethnicity (75.2% vs. 57.1%; $p<0.001$), household work (96.2% vs. 72.4%; $p<0.001$), Joint family (84.8% vs. 72.4%; $p<0.001$), basic education (45.7% vs. 21.0%; $p<0.001$), insufficient family income (34.3% vs. 11.3%; $p<0.001$), unplanned pregnancies (53.3% vs. 25.7%; $p<0.001$), low exposure to Family planning information (49.5% vs. 85.7%), and unable to complete eight ANC visit (60% vs. 38.1%) compared to adult mothers. Additionally, Birth outcomes of newborns with low birth weight ($p<0.003$), Apgar score below 7 at 1 minute ($p<0.04$), and maternal anemia ($p<0.001$) were significantly associated with adolescent mothers.

Conclusions

Multiple factors contribute to adolescent pregnancy. Therefore, adolescent sexual and reproductive health services must target early adolescent groups to prevent adolescent pregnancies and adverse outcomes.

Keywords: Risk Factors, Birth outcomes, Adolescent pregnancy, Adult mothers.

Correspondence: Mrs. Sumitra Parajuli, Department of Nursing, Bharatpur Hospital Nursing College, Bharatpur Chitwan, Nepal., Nepal. Email: sumi061@gmail.com, Phone: +977-9846014137. **Article received**: 2024-12-28. **Article accepted**: 2025-02-19. **Article published**: 2025-03-25.

INTRODUCTION

Adolescent pregnancy is indeed a global issue but more prevalent in poor and marginalized communities of developing countries. Adolescent pregnancy is when a female between 10-19 years gets pregnant and is used synonymously with teenage pregnancy. Maternal age is a leading determinant of maternal and child morbidity and mortality.[1] Despite the decreasing trend of adolescent pregnancy globally, there are huge differences in levels between and within countries.[2] Globally, every year more than twelve million girls marry before the age of 18 years and the leading cause of their death is complications in pregnancy and childbirth.[3] In 2021, more than one-tenth of total adolescent girls gave birth before the age of 18 years globally, which derails healthy development into adulthood and has negative impacts on their education, livelihoods, health, and social issues.[4] In many countries, societal and traditional norms, measures of maturity and means of societal respect, lower education level, poor economic status, and unprotected sex are found to be the major contributing factors for adolescent pregnancy,[5,6] and most pregnant adolescents in South African youth do not know the risk during that period.[7] Teenage pregnancy is also associated with socioeconomic disadvantage, depression, and substance use during pregnancy as compared with adults in Canada.[8] A scoping review of Nigeria found that individual, interpersonal, organizational, and community levels were the major factors for adolescent pregnancy in African countries.[9] Insecurity about infertility, wrong perceptions about hormonal contraceptives, lower education, low wealth index, and place of residence are the key reasons for adolescent pregnancy in Bangladeshi women [10,11], economic hardships, early marriage, social norms, low education and lack of knowledge on contraceptives in India.[12,13] In the Nepalese context, teenage pregnancy accounts for 13.2% of prevalence,[14] no or low education status, unaware of contraceptive methods, disadvantageous ethnic groups specifically Dalit and Janajati[15], and lower economic status play significant derive for adolescent pregnancy.[16,17]

Adolescent pregnancy is a significant public health and social issue with various implications for the well-being of both young mothers and their children. Many studies found low birth Wight, lower Apgar scores[8], preterm deliveries [17], stillbirth, and neonatal death,[2,18] pre-eclampsia, preterm premature rupture of the membrane, maternal anemia, sexually transmitted diseases, post-partum depression, maternal death,[19] unsafe abortion, prolong labor [17] and obstructed labor [14] are the major outcomes of adolescent pregnancies. Adolescent mothers come from different socio-economic and geographical backgrounds and have received maternity services from Bharatpur Hospital Chitwan.

Therefore, this study aimed to assess the risk factors and immediate birth outcomes associated with adolescent pregnancy in a Tertiary hospital in Chitwan.

METHODS

An analytical cross-sectional study was conducted among 210 post-partum mothers from 15 August to 14 October 2024 at the Maternity Ward in Bharatpur Hospital. It is situated in the southern region of Bagmati province in central Nepal, this tertiary-level hospital serves over 35 lakh people from more than eight districts. It is a referral hospital outside of Kathmandu Valley.[20]

The study employed a consecutive sampling technique to recruit participants. The sample consisted of 105 adolescent mothers aged ≤19 years available during the data collection period and an equal number of adult mothers 20 to 35 years, who were admitted during a similar time. Inclusion criteria considered both prime and multiparous mothers, while those who were unmarried, absconded, and unwilling to provide consent were excluded from the study. Mothers aged 20-35 years were designated as the reference group, facilitating comparisons between adolescents and adult participants.

A semi-structured questionnaire was developed based on an extensive review of relevant literature and was reviewed by subject experts to ensure its validity. The questionnaire was designed in English and converted

into Nepali. The tool was pretested, and necessary modifications were made before finalization to enhance its reliability and clarity for the participants. The voluntary participation of the participants was ensured, and confidentiality and privacy were maintained. The socio-demographic and risk factors-related data were collected through face-to-face interviews with post-partum mothers in the Nepali language, and additional birth outcome-related data were collected from the recorded file. The study was conducted following approval from the Institutional Review Committee of Bharatpur Hospital, ensuring ethical compliance (Ref: 081/82-06).

The study obtained both maternal and neonatal outcome data. The study variables related to neonatal outcome were Preterm delivery (<37 weeks of gestation), very preterm delivery, (< 32 weeks of gestation), LBW (< 2500g), very LBW (<1500g), Apgar score less than 7 at 1 minute and 5 minutes. Similarly, maternal health-related outcome variables were the mode of delivery, antepartum hemorrhage, postpartum hemorrhage, premature rupture of membrane (rupture amniotic sac before labor begins), Eclampsia, obstructed labor, maternal anemia (hemoglobin level less than 11 g/dl), and sexually transmitted diseases. Data were entered and analyzed using SPSS version 20 and presented in frequencies and percentages for descriptive purposes. Pearson's chi-square test was applied to determine the relationship between age group and independent variables. The result assumes statistically significant associations of variables at $p<0.05$ with the chi-square analysis.

RESULTS

Out of 205 postpartum mothers, half (105) were adolescent (≤19 years) mothers available during the data collection period, and a similar number of adult mothers (20-34 years) were included. The mean age of respondents was 21.96±4.7 years (adolescents; 18.08±1.2 years and adults; 25.84±3.6 years). Similarly, the mean age of respondents' husbands was 25.99±5.5years. The mean age at marriage among adolescents was 16.66 ±1.2 years and 20.84±3.3 years among adults. The study found that three fourth of adolescents belonged to Janajati/Chepang ethnicity (75.2% vs. 57.1%; $p <0.001$), most of the adolescents were involved in household work (96.2% vs. 72.4%; $p <0.001$), and belongs to the joint family (84.8% vs. 72.4%; $p <0.05$). Furthermore, 52.4% of adolescents had secondary-level education, and a significant proportion of adolescent mothers had a basic level of education (45.7% vs. 21.0%; $p < 0.001$), and insufficient family income (34.3% vs. 11.3%; $p < 0.001$) compared to the adult mothers. However, no significant differences were found in residential areas, Table 1.

Comparison of maternal health-related risk factors between two age groups found more than half proportion of adolescent mothers (53.3% vs. 25.7%; $p <0.001$) have unplanned pregnancies, 40.0% of adolescents were less likely to meet the recommended eight ANC visits, and exhibit lower exposure (49.5% vs. 85.7%) to family planning messages, where one-fourth adolescents were underweight (25.7% vs. 18.1%; $p <0.05$) as related to adult mothers according to weight measured at first ANC visit. In contrast, adult mothers (22.9%) reported a higher abortion history than adolescents (13.3%) however, it was statistically not significant, and adult mothers were more likely to have used family planning methods (18.1% vs. 7.6%; $p<0.05$) compared to adolescent mothers, Table 2.

More than half (55.2%) of adolescent mothers gave birth to female children compared to 46.7% of adult mothers. The proportion of newborns with low birth weight was significantly higher ($p<0.05$) among adolescent mothers (17.1%) compared to adult mothers (3.8%). Similarly, the percentage of newborns with an Apgar score below 7 at 1 minute was significantly higher ($p<0.04$) among adolescent mothers (26.7%) than adult mothers (15.2%). Additionally, 4.8% of neonates born to adolescent mothers were admitted to the NICU due to Apgar scores <7 after 5 minutes, Table 3.

DISCUSSION

Table 1. Characteristics of respondents by age group (n=210)

Variables	Total n(%)	Adolescent mothers (n=105) n(%)	Adult mothers (n=105) n(%)	*p*-value
Religion of respondents				
Hindu	170(81.0)	79(75.2)	91(86.7)	0.035*
Other religions	40(19.0)	26(24.8)	14(13.3)	
Ethnicity				
Brahman/Chettri	44(21.0)	10(9.5)	34(32.4)	<0.001**
Janajati/Chepang	139(66.2)	79(75.2)	60(57.1)	
Dalit/Muslim	27(12.9)	16(15.2)	11(10.5)	
Educational status of respondents				<0.001**#
Illiterate	5(2.4)	2(1.9)	3(2.9)	
Basic Level	70(33.3)	48(45.7)	22(21.0)	
Secondary level	112(53.3)	55(52.4)	57(54.3)	
Bachelor and above	23(11.0)	0(0)	23(21.9)	
Educational status of respondents' husbands				<0.001**#
Illiterate	5(2.4)	1(1.0)	4(3.8)	
Basic Level (1-8 class)	70(33.3)	50(47.6)	20(19.0)	
Secondary level and above	135(64.3)	54(51.4)	81(77.1)	
Occupation of respondents				<0.001**#
Household work	177(84.3)	101(96.2)	76(72.4)	
Farming/Business/Job	33(15.7)	4(3.8)	29(27.6)	
Husbands' Occupation				<0.001**
Job/Business	82(39)	34(32.4)	48(45.7)	
Farming/Daily wage/Driver	73(34.8)	52(49.5)	21(20.0)	
Foreign employment	55(26.2)	19(18.1)	36(34.3)	
Family Types				0.029*
Single	45(21.4)	16(15.2)	29(27.6)	
Joint	165(78.6)	89(84.8)	76(72.4)	
Family income				<0.001**
Sufficient	162(77.1)	69(65.7)	93(88.6)	
Insufficient	48(22.9)	36(34.3)	12(11.4)	
Residential Area				0.776
Urban	80(38.1)	39(37.1)	41(39.0)	
Rural	130(61.9)	66(62.9)	64(61.0)	

Note. Pearson Chi-square test used where significant difference shows by p-value* <0.05, **<0.001, # used Fisher's Exact testFisher's Exact test

The study results provide insights into the disparities between adolescent and adult postpartum mothers in the tertiary-level hospital in Chitwan. Adolescent mothers had insufficient family income and were primarily involved in household work, husbands were daily wage workers, living in joint families, living with parents, and they depended on parental income compared to adult mothers. Maternal health-related risk factors, such as unplanned and unwanted pregnancy, being uninformed about family planning messages, pre-pregnancy underweight, and inability to meet the recommended ANC visits are more prevalent among adolescent mothers than adult mothers. Adolescent mothers (16.66 ± 1.2) marry considerably earlier than adult mothers, according to the socio-demographic data of the respondents. Early marriage

Table 2. Risk factors related to maternal health among respondents (n=210)

Variables	Total n(%)	Adolescent mothers (n=105) n(%)	Adult mothers (n=105) n(%)	*p*-value
BMI				0.006*
Underweight	46(21.9)	27(25.7)	19(18.1)	
Normal weight	137(65.2)	72(68.6)	65(61.9)	
Overweight/Obese	27(12.9)	6(5.7)	21(20.0)	
Alcohol consumed	6(2.9)	3(2.9)	3(2.9)	
Experienced Violence during pregnancy	3(1.4)	2(1.9)	1(1.0)	
Exposed to Family planning				0.000**
Yes	142(67.6)	52(49.5)	90(85.7)	
No	68(32.4)	53(50.5)	15(14.3)	
Ever used Family Planning methods				0.023*
Yes	27(12.9)	8(7.6)	19(18.1)	
No	183(87.1)	97(92.4)	86(81.9)	
Current pregnancy status				0.000**
Planned	172(60.5)	49(46.7)	78(74.3)	
Unplanned	83(39.5)	56(53.3)	27(25.7)	
Frequency of ANC visit				**0.001****
8 Visit	107(51.0)	42(40.0)	65(61.9)	
<8 Visit	103(49.0)	63(60.0)	40(38.1)	
Taken Iron and Calcium				**0.174**
Yes	205(97.6)	101(96.2)	104(99.0)	
No	5(2.4)	4(3.8)	1(1.0)	
Abortion History				**0.073**
Yes	38(18.1)	14(13.3)	24(22.9)	
No	172(81.9)	91(86.7)	81(77.1)	
Parity				**0.000****
Primi para	160(76.2)	99(94.3)	61(58.1)	
Multi Para	50(23.8)	6(5.7)	44(41.9)	
Number of living children				**0.000****
One child	162(77.1)	101(96.2)	61(58.1)	
Two and three children	48(22.9)	4(3.8)	44(41.9)	

Note. Pearson Chi-square test used to compare differences between age groups, with a p-value significance at *<0.05, and **<0.001, @ have a history of NND

trends among adolescents likely contribute to early childbearing, exposing them to increased health risks during pregnancy and childbirth.[21] This result contradicts national statistics, which show that women marry at an average age of 21.8 years. [22] This variation might be due to the higher proportion of respondents were Janajati like as Chaudhary, Tharu, Mahato, Kumal, Tamang, Gurung, Magar, Bote, Chepang/ Praja and the socio-economically disadvantageous population. Early marriage and teenage pregnancy are more prevalent among marginalized and economically hardship communities in Nepal.[21] This study found that a higher proportion (75.2%) of adolescent mothers belonged to the Janajati/Chepang ethnic group. Most socioeconomically disadvantaged women accessed health care services at Bharatpur

Table 3. Neonatal outcomes among respondents (n=210)

Neonatal outcomes	Total	Adolescent mothers n(%)	Adult mothers n(%)	p-Value
Sex of newborn child				
Female	107(51.0)	58(55.2)	49(46.7)	
Male	103(49.0)	47(44.8)	56(53.3)	
Post-dated (>41weeks)	13(6.3)	7(6.7)	6(5.7)	0.775
Preterm (<37weeks)	14(6.7)	9(8.6)	5(4.8)	0.268
Very Preterm (<32 weeks)	6(2.9)	3(2.9)	3(2.9)	0.659#
Low birth weight (<2500g)	22(10.5)	18(17.1)	4(3.8)	0.003*#
Very low birth weight (<1500g)	3(1.4)	2(1.9)	1(1.0)	0.500#
Apgar score <7 at 1 min	44(21.0)	28(26.7)	16(15.2)	0.042*#
Apgar score <7 at 5 min	6(2.9)	5(4.8)	1(1.0)	0.212#
NICU admitted	5(2.4)	5(4.8)	0	0.060#

Note. #Fisher's exact test used, *significance in p<0.05

Table 4. Maternal Outcomes among Respondents (n=210)

Variables	Total n(%)	Adolescent mothers n(%)	Adult mothers n(%)	*p*-value
Mode of delivery				
Normal	164(78.1)	77(73.3)	87(82.9)	
Caesarian section	39(18.6)	25(23.8)	14(13.3)	
Instrumental	7(3.3)	3(2.9)	4(3.8)	
Ante-Partum Hemorrhage (APH)	5(2.4)	2(1.9)	3(2.9)	1.000
Post-Partum Hemorrhage (PPH)	9(4.3)	6(5.7)	3(2.9)	0.498
Premature rupture of membrane	14(6.7)	8(7.6)	6(5.7)	0.783
Maternal anemia	31(14.8)	22(21.0)	9(8.6)	0.011*
STD	3(1.4)	2(1.9)	1(1.0)	1.000

Note. *p-Value <0.05 in Pearson Chi-square test, #Fisher's exact test used

Hospital through the Aama Surkshya Program, which also serves as a primary referral center for Chitwan and neighboring districts.[20] A total of 17 indigenous communities of Janajati were residing in Chitwan.[23] Most Janajati had traditional norms that easily accepted early marriage and childbearing. (21) A similarity was found in a previous study by Devkota et al. where 77% of adolescent pregnancies were from the Janajati group.[15] This similarity might be due to the similarity of the study population and similar geographical location. This study found that 62.9% of adolescent mothers came from rural areas. Meanwhile, the study found that 61.0% of adult mothers also reside in rural areas, therefore, no significant difference was found between the two groups. Most of the rural areas of Nepal had limited opportunities for education, information, and sexual and reproductive health facilities. This finding was supported by Islam et al, study[11] however, this finding contradicted previous studies, which found a higher proportion of adolescent pregnancy in urban settings. This difference is due to inclusion criteria whereas the study reviews urban setting medical college studies.[14,24] The disparity was also found in levels of education between the groups. A significantly higher proportion of adolescent mothers had only a basic level of education (45.7% vs 21.0%) than adult mothers. However, the study found 52.4% of adolescents with a secondary level education which opposes increasing education decline in teenage pregnancy according to NDHS 2022.[16] Educational status and socioeconomic factors limit adolescents' access to information, healthcare services, and opportunities for economic empowerment. These factors lead to their vulnerability to poor maternal and child health outcomes. A similarity found in previous studies reveals that adolescent pregnancy was higher among adolescents with primary education. [2] The study found

that almost all adolescents (96.2% vs 72.4%) were engaged in household work and husbands were daily wage workers and drivers (49.5% vs 20.0%) and insufficient family income (34.3% vs 11.3%), and living in a joint family as compared to the adult mothers group. This finding is supported by previous studies where adolescent pregnancy was highly prevalent among families with lower economic status.[5,13,14,21] Regarding risk factors, the study found one-fourth of adolescent mothers were underweight in the first trimester of pregnancy according to weight measured at 1st ANC visit. It is consistent with data from the NDHS 2022, which reports that 26% of Nepalese adolescent women were classified as thin based on BMI criteria.[16] A study from rural lowland Nepal supported the present study where early marriage and pregnancy are associated with nutritional status. Adolescent pregnancy is the primary determinant of poorer nutritional status.[25] Similarly, A study in Bangladesh in line with the present study found that the BMI of adolescent pregnancy is comparatively lower than adult pregnancy.[26] Meanwhile, the study found that overweight or obesity prevalence was higher among adult mothers (20.0%) than adolescent mothers (5.7%). However, in a Canadian study by Wong et al, 14.6% of adolescent mothers were underweight during pre-pregnancy.[8] The study revealed that a comparatively higher proportion of adolescent mothers (53.3% vs 25.7%) reported their pregnancy was unplanned than adult mothers. Meanwhile, 74.3% of adult mothers reported that pregnancy was planned. Similarly, a previous study in Nepal highlights the chance of unplanned pregnancy was higher among teenagers.[24] The result is also supported by Mchunu et al, study which reveals most adolescents (female and male youth) reported their pregnancies were unwanted.[7] The study found significant disparities in exposure to family planning messages, where half of adolescents were unaware of any family planning methods. Most adolescents (92.4%) were not using family planning methods, despite 49.5% of adolescent mothers having been exposed to family planning information. This finding is similar to the results of previous studies.[7,14] However, a study in Ghana found a higher prevalence of contraceptive users were adolescents than adults and no differences in contraceptive knowledge among them.[5] The study reveals that adolescent mothers (60.0%) less frequently attended the recommended eight ANC visits than adult mothers. Similar findings were obtained by Diabelkova et al, who found 75.9% of adolescents visit doctors less than eight times[2], and Neupane et al, reported that 60.2% of adolescents had ANC visits according to four visit guidelines.[24] Moreover, the study revealed that the proportion of newborns with low birth weight was significantly higher ($p<0.05$) among adolescent mothers (17.1%) compared to adult mothers (3.8%) which is consistent with previous studies.[2,24] Adolescent mothers (26.7%) were also associated with neonatal lower Apgar scores at one minute, a finding consistent with previous studies.[2,8] Additionally, 4.8% of neonates born to adolescent mothers were admitted to the NICU due to Apgar scores lower than 7 after 5 minutes. Post-dated, preterm, Very preterm, very low birth weight, and Apgar score below seven at 5 minutes were the neonatal adverse outcomes also found in this study. Regarding maternal health outcomes, the study revealed the requirement of caesarian section and instrumental delivery, antepartum hemorrhage, postpartum hemorrhage, premature rupture of membrane, maternal anemia, and sexually transmitted diseases. Whereas, the study found that vaginal delivery was more prevalent and 18.6% of adolescent mothers required caesarian section delivery and consistent with Shrestha et al., who found 21.5% of teenage pregnancies needed caesarian section.[14] Maternal anemia was significantly more prevalent among adolescent mothers (21.0% vs. 8.6%) when comparing outcomes between adolescent and adult mothers and previous studies supported it.[19]

CONCLUSIONS

Adolescent marriage behavior leads to early pregnancy. Adolescent pregnancy was associated with different socio-demographic and maternal health-related risk factors such as ethnicity, religion, low education level, unemployment, insufficient family income,

joint family, unplanned pregnancy, limited family planning information, and nonuse of family planning methods. There was a significant association between adolescent pregnancies and low birth weight, low Apgar score, and maternal anemia. It is recommended to ensure access to continued school education for all adolescents, and the need to promote economic empowerment activities for socioeconomically marginalized families. Additionally, it is essential to enhance adolescent sexual and reproductive health services targeting early adolescent groups to prevent adolescent pregnancies.

Limitations

The study was conducted in a single tertiary care center with a limited duration, restricted the available adolescent sample size, and made it difficult to compare outcome variables between groups. Additionally, the result may not be generalized in different socio-economic and healthcare settings, as pregnancy outcomes are also influenced by the quality of health services provided by healthcare centers.

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