Factors Associated with Teenage Pregnancy: A Hospital-Based Case-Control Study

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ABSTRACT

Background: Teenage pregnancy is a major public health problem and is considered to be high risk for maternal health, pregnancy outcomes, and long-term effects. This study aims to determine the factors associated with teenage pregnancy among pregnant teenagers and non-teenagers in a tertiary hospital of Nepal.

Methods: A hospital-based case-control study was conducted using 1:2 case-control ratio among 109 pregnant teenagers and 218 non-teenage pregnant women attending antenatal service at a tertiary hospital of Rupandehi, Nepal, from October 2020 to February 2021. Two controls were selected on the same day when a case was identified. Variables found significance (p<0.05) in bivariate analysis were entered into multivariable logistic regression to identify final associated factors.

Results: The mean age of cases was 17.81± 1.01 years, while controls were 25.35 ± 2.46 years. Women from Dalit caste (AOR=3.04, CI=1.02-9.07), engaged in business work (AOR= 0.23, CI= 0.10-0.57), food sufficiency for more than 12 months per year (AOR =2.83, CI= 1.09-7.31), family planning (AOR=2.38, CI=1.33-4.25) and anemia (AOR= 2.58, CI: 1.56-4.27) were positively associated with teenage pregnancy. Conversely, primary (AOR= 0.18, CI= 0.06-0.57), secondary (AOR= 0.13, CI= 0.06-0.26) and SLC and above education (AOR= 0.36, CI= 0.15-0.85) were found to be negatively associated.

Conclusions: Ethnicity, education, occupation, food sufficiency, family planning use and hemoglobin were found to be independently associated factors of teenage pregnancy. Thus, policy makers and administrators should focus on informal educational intervention, intervention for utilization skills of family planning, and nutrition promotion during pregnancy especially for disadvantages people.

Keywords: Teenage pregnancy, Adolescent, Case control, Antenatal services

INTRODUCTION

Teenage pregnancy is defined as pregnancy at the age of 10–19 years [1]. It is estimated that in developing countries, approximately 21 million girls aged 15–19 years' experience pregnancy, with approximately 12 million of them eventually giving birth [2]. Approximately half of these pregnancies are unwanted, and more than half of them result in unsafe abortion [3]. In developing countries, a minimum of 777,000 births occur among teenagers younger than 15 years of age [2]. South Asia has the highest prevalence of child marriages compared to other regions, with nearly half of all child marriages worldwide occurring in this region [4]. In Nepal, teenage pregnancy accounts for 17%, with 13% of teenagers having already given birth and 4% currently being pregnant with their first child [5]. Teenage pregnancy and its consequences are a significant concern from both public health and human rights perspectives, especially in low and middle-income countries, including those in South Asia [6]. Adolescent pregnancies have many life-threatening effects in terms of physical, mental, sexual, economic, social, as well as reproductive health [7]. Globally, complications during pregnancy and childbirth are the leading cause of death among teenagers aged 15–19-years [8]. Hence, teenage pregnancy should be a priority issues in every healthcare system [7].

Evidence suggests that younger pregnant adolescents face an elevated increased risk of maternal outcomes, including nutritional anemia, preterm delivery, postpartum hemorrhage, preeclampsia, unsafe abortion, puerperal endometritis, and systemic infections, compared to adult women aged 20-24 years [1, 9]. Similarly, babies had born to adolescent mothers face higher risks of having low birth weight, fetal growth retardation, severe neonatal conditions, and infant mortality [9]. The teenage pregnancy is associated with a higher risk of prolonged labor and an increased likelihood of requiring a cesarean delivery, as their pelvis is immature, which can contribute to difficulties in labor progression and descent of the fetus [10].

Pregnancy and delivery during the period of adolescence not only effect on maternal and pregnancy-related outcomes but are also connected to age-appropriate education [19], increased health care costs and an increased risk of poverty [11]. Several studies conducted in different parts of world found that factors such as education, family history of teenage pregnancy, peer group influence, family instability, early age of marriage, lack of knowledge of sexuality, lack of knowledge and/or ineffective use of contraceptives are the influencing factors of teenage pregnancy [12].

Despite Nepal's legislative efforts to prevent teenage marriage below the age of 20 years [13], teenage pregnancy remains prevalent in Nepal, particularly in Terai region [14]. Existing studies lack comprehensive investigation into the associated risk factors [15]. Hence, this study aims to determine different factors associated with teenage pregnancy among pregnant teen and pregnant non-teen in a tertiary hospital in Nepal.

METHODS

Study Design and Population

A hospital-based case-control study was conducted at Universal College of Medical Science and Teaching Hospital (UCMS-TH), Bhairahawa Rupandehi Nepal, from October 2020 to February 2021. The study focused on pregnant women aged ≤ 29 years attending antenatal services of UCMS-TH. Cases included pregnant teenagers (15-19 years) who attended UCMH-TH from 20th October 2020 to 19th February 2021, while controls comprised non-teenage pregnant women (20-29 years) as in the previous studies [16-18] from the same hospital and time frame. Cases and controls were matched based on pregnancy status (only primigravida) and place of Antenatal Care (ANC) visit.

Inclusion and Exclusion criteria: Pregnant women who met the criteria for both the cases and controls, and were experiencing their first pregnancy while visiting the same ANC outpatient department, were included. Pregnant

women in both the case and control groups who had previously given birth or had severe mental health issues were excluded from the study.

Sample Size and Sampling Techniques

The sample size 327 was calculated by using Open Epi Version 3.01 statistical software for unmatched case control study. The basic parameters assumed for calculating sample size were 95% confidence level, power of study 80%, a control-to-case ratio of 2: 1, minimum detectable odds ratio of two and a proportion of control exposed at 30% [19]. The calculated sample size was 104 cases and 207 controls. An additional 5% of the sample was taken to account for non-response rate adjustment, resulting in a final sample size of 109 cases and 218 controls. Purposive sampling technique was used to select the cases. Two controls were selected on the same day when a case was identified, and controls were randomly chosen in case of more than two eligible controls found on the same day.

Data Collection Procedures and Validity

A set of semi-structured questionnaire was prepared after reviewing similar studies. The questionnaire was initially formulated in English language and then translated into Nepali. The Nepali version of the questionnaire was then retranslated into English to ensure the consistency of the questionnaire as per the previous study [20]. Pretesting of the questionnaire was conducted among 10% of sample in private clinics of Bhairahawa, Rupandehi, Nepal. The Cronbach's alpha was calculated, yielding a value of 0.764, which indicates good reliability of the instruments. A two days training was provided to bachelor in public health student from UCMS for data collection procedure. Selected pregnant women underwent face-to-face interviews, and certain obstetric information was collected by reviewing participants' hospital records.

Data Processing and Analysis

The collected data were manually checked, compiled, edited and entered into Microsoft Excel, and subsequently, SPSS software version 22 was used to analyze the data. Simple frequency tables, cross tabulation, mean and standard deviation were used to present data. The association between dependent and independent variables was assessed using chi-square test with significance noted at $p<0.05$. Binary logistic regression was used to compute the crude odds ratio (COR) and confidence interval. Significant variables with $p<0.05$ in binary logistic regression were entered into multivariable logistic regression model to find the adjusted odds ratio (AOR) and confidence interval for the final factors of teenage pregnancy. The adequacy of the multivariate logistic regression model's fit was assessed using Nagelkerke's R Square and the -2 likelihood ratio. Similarly, multicollinearity was examined using the variation inflation factor (VIF) like that of the previous studies [21,22]. The value of Nagelkerke R square was 0.317 and -2 likelihood ratio was 331.410, indicating an adequate goodness of fit. Similarly, VIF of all independent variables were less than 10, with the highest value being 1.363, indicating the absence of multicollinearity among independent variables. After checking all the confounders, AORs were assessed, and their corresponding value at a 95% confidence interval were calculated using the multivariate logistic regression model to determine the net effect of independent variables in cases and control.

Ethical consideration and informed consent

This study obtained ethical approval from Institutional Review Committee of Universal College of Medical Science and Teaching Hospital Bhairahawa, Rupandehi, Nepal (UCMS/IRC/073/20). All the respondents involved in the study were fully informed about the objectives of study, privacy and confidentiality of the collected data. After explaining about the study, written informed consent with a signature was taken from the literate respondents and thumb print was taken for illiterate respondents. For the respondents having age lesser than 18

years, assent of respondents along with their husband's or parent's written informed consent was taken.

RESULTS

Cases had a mean age of 17.81 ± 1.01 years, while controls were older with a mean age of 25.35 ± 2.46 years. The average family size was 7.06 ± 3.29. Among participants, 32.7% of women were Madeshi, comprising 21.1% of cases and 38.5% of controls. Urban dwellers constituted 51.1%, with 59.6% as cases and 46.8% as controls. Hinduism was predominant among both cases (88.1%) and controls (85.3%). Arranged marriages were common among cases (74.3%) and controls (85.8%). Large families (>4 members) were prevalent in cases (75.2%) and controls (80.7%), with joint families more common in cases (65.1%) and controls (66.5%). Controls had higher education levels (17.4%) compared to cases

(14.7%). Housewife was the primary occupation for cases (26.6%) and controls (32.6%) while agriculture was another significant occupation among cases (22.0%) and controls (31.2%). Both cases (75.2%) and controls (83.0%) were categorized as cash earners. A significant portion of participants had a monthly income between 10,000 and 19,999 Nepalese Rupees (NRs), with 44.0% of cases and 30.7% of controls within this range. The median family income was NRs 17,395.83 in the case group, NRs 18,805.97 in the control group and NRs 18,217.39 in overall. The family monthly income ranged from a minimum of NRs 7,000 to a maximum of NRs 56,000. Most parents were married and cohabiting for both cases (93.6%) and controls (94.0%). The highest percentage of controls (36.2%) and cases (15.6%) reported having food sufficiency for more than 12 months **(Table 1)**.

Table 1: Background related characteristics among cases and control

Characteristics	Cases (n=109)		Control (n=218)		Total (n=327)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Caste/Ethnicity						
Brahmin/Chhetri	35	32.1	46	21.1	81	24.8
Madeshi	23	21.1	84	38.5	107	32.7
Dalits	9	8.3	25	11.5	34	10.4
Janjati	31	28.4	27	12.4	58	17.7
Muslim	11	10.1	36	16.5	47	14.4
Residential Status						
Urban	65	59.6	102	46.8	167	51.1
Rural	44	40.4	116	53.2	160	48.9
Religion						
Hindu	96	88.1	186	85.3	282	86.2
Other than Hindu	13	11.9	32	14.7	45	13.8
Types of Marriage						
Arranged	81	74.3	187	85.8	268	82.0
Loved	28	25.7	31	14.2	59	18.0
Size of Family						
≤ 4 members	27	24.8	42	19.3	69	21.1
> 4 members	82	75.2	176	80.7	258	78.9
Mean family size ±SD; 7.06±3.29						
Types of family						

Nuclear	27	24.8	46	21.1	73	22.3
Joint	71	65.1	145	66.5	216	66.1
Extended	11	10.1	27	12.4	38	11.6
Education of Respondents						
Illiterate and Informal class	23	21.1	118	54.1	141	43.1
Primary	11	10.1	12	5.5	23	7.0
Secondary	59	54.1	50	22.9	109	33.3
SLC/SEE and above	16	14.7	38	17.4	54	16.5
Occupation of Respondents						
Agriculture	24	22.0	68	31.2	92	28.1
Business	35	32.1	31	14.2	66	20.2
Service	6	5.5	16	7.3	22	6.7
Daily Wages	15	13.8	32	14.7	47	14.4
Homemaker	29	26.6	71	32.6	100	30.6
Earning Status						
Not Earning	27	24.8	37	17.0	64	19.6
Earning	82	75.2	181	83.0	263	80.4
Marital Status of Parents						
Married	102	93.6	205	94.0	307	93.9
Single, divorced or widow/widower	7	6.4	13	6.0	20	6.1
Family Monthly Income (NRs)						
Less than 10000	19	17.4	50	22.9	69	21.1
10000-19999	48	44.0	67	30.7	115	35.2
20000-30000	20	18.3	42	19.3	62	19.0
More than 30000	22	20.2	59	27.1	81	24.8
Median	*17395.83*		*18805.97*		*18217.39*	
Food Sufficiency						
< 3 months	21	19.3	26	11.9	47	14.4
Up to 6 months	29	26.6	33	15.1	62	19.0
Up to 12 months	42	38.5	80	36.7	122	37.3
> 12 months (sell remaining Food)	17	15.6	79	36.2	96	29.4

SLC- School Leaving Certificate

The study revealed that in the case group, 95.4% of pregnancies were desired, compared to 92.2% in the controls. The majority of cases (92.7%) and controls (93.1%) expressed satisfaction with their recent pregnancies. A higher percentage of cases (80.7%) than controls (66.1%) reported not using any family planning methods. Among those using family planning, irregular use of temporary

methods led to pregnancies for most women. Antenatal Care adherence was higher in controls (81.7%) than cases (69.7%). Similarly, complete immunization rates were higher among controls (90.4%) than cases (81.7%). Hemoglobin level in this study was categorized as ≥ 11gm/dl- No anemia and <11 gm/dl as anemia as per the National NDHS 2016 [6]. Anemia was more prevalent in cases (56.9%) than controls (38.1%). Underweight individuals were more common in cases (32.1%) than controls (22.9%). Pregnancy- Induced Hypertension occurred in 4.6% of cases and 11.9% of controls. Cases had less discussion on sexual and reproductive health (SRH) in families (82.6%) compared to controls (71.6%). Cases (37.6%) reported more instances of teenage pregnancy in the family than controls (51.8%). Peer influence for sexual intercourse was higher in cases (21.1%) than controls (11.9%). Satisfaction with pregnancy experience was high among both cases and controls **(Table 2)**.

Table 2: Pregnancy-related characteristics among cases and control

Characteristics	Cases (n=109)		Control (n=218)		Total (n=327)	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Pregnancy Status						
Wanted	104	95.4	201	92.2	305	93.3
Not wanted	5	4.6	17	7.8	22	6.7
Satisfaction towards recent pregnancy						
Satisfied	101	92.7	203	93.1	304	93.0
Not satisfied	8	7.3	15	6.9	23	7.0
Status of family planning use						
Not using	88	80.7	144	66.1	232	70.9
Using	21	19.3	74	33.9	95	29.1
ANC visit as per protocol						
Visited	76	69.7	178	81.7	254	77.7
Not visited	33	30.3	40	18.3	73	22.3
Immunization as per protocol						
Complete	89	81.7	197	90.4	286	87.5
Incomplete	20	18.3	21	9.6	41	12.5
Hemoglobin level						
No anemia (≥11gm/dl)	47	43.1	135	61.9	145	44.3
Anemia (<11gm/dl)	62	56.9	83	38.1	182	55.7
BMI Status						
Underweight	35	32.1	50	22.9	85	26.0
Healthy Weight	67	61.5	146	67.0	213	65.1
Overweight	7	6.4	22	10.1	29	8.9
Pregnancy Induced Hypertension (PIH)						
No PIH	104	95.4	192	88.1	296	90.5
PIH	5	4.6	26	11.9	31	9.5

Discussion on SRH in family						
No discussion	90	82.6	156	71.6	246	75.2
Discussion	19	17.4	62	28.4	81	24.8
History of Teenage pregnancy in family						
No	68	62.4	105	48.2	173	52.9
Yes	41	37.6	113	51.8	154	47.1
Peer Influence for sexual Intercourse						
Not Influenced	86	78.9	192	88.1	278	85.0
Influenced	23	21.1	26	11.9	49	15.0
Family Satisfaction on pregnancy						
Not Happy	8	7.3	10	4.6	18	5.5
Happy	101	92.7	208	95.4	309	94.5
Siblings Satisfaction on pregnancy						
Not Happy	7	6.4	12	5.5	19	5.8
Happy	102	93.6	206	94.5	308	94.2

Chi-square tests revealed significant associations (p < 0.05) between teenage pregnancy and ethnicity, residential status, marriage type, education, occupation, and household food sufficiency. Multivariable logistic regression analysis highlighted ethnicity, education, occupation, and food sufficiency as influential factors. Dalit caste women were 3.04 times more likely to experience teenage pregnancy than Brahmin or Chhetri (AOR=3.04, CI=1.02-9.07). Education correlated with decreased odds: primary (AOR= 0.18, CI= 0.06-0.57), secondary (AOR= 0.13, CI= 0.06-0.26), and SLC and above (AOR= 0.36, CI= 0.15-0.85) compared to illiterate. Cases showed higher illiteracy and informal education, while controls had higher education levels. Engagement in business, compared to agriculture, was 23% lower in cases (AOR= 0.23,

CI= 0.10-0.57). Food sufficiency for >12 months raised teenage pregnancy likelihood 2.83 times (AOR =2.83, CI= 1.09-7.31) **(Table 3)**.

Variables including family planning use, ANC visit, immunization, hemoglobin levels, pregnancy induced hypertension (PIH), discussion on sexual and reproductive health (SRH) in family, family history of teenage pregnancy and peer influence for sexual intercourse were significantly associated with (p<0.05) in bivariate analysis. Multivariable analysis model identified the status of family planning use and hemoglobin status as associated factors. Cases were 2.38 times more likely to use family planning (AOR=2.38, CI=1.33-4.25) and 2.58 times more likely to have anemia (AOR= 2.58, CI: 1.56-4.27) compared to controls **(Table 4).**

Table 3: Background-related factors associated with Teenage Pregnancy in using bivariate and multivariable analysis

Characteristics	Cases (n=109)	Control (n=218)	p-value	COR (95% CI)	AOR 95% CI

	Frequency	Percentage	Frequency	Percentage			
Caste/Ethnicity							
Brahmin/Chhetri	35	32.1	46	21.1	<0.001 *	1	1
Madeshi	23	21.1	84	38.5		**2.78(1.47-5.26)**	1.81(0.83-3.94)
Dalits	9	8.3	25	11.5		2.11(0.88-5.09)	**3.04(1.02-9.07)**
Janjati	31	28.4	27	12.4		0.66(0.34-1.31)	0.58(0.24-1.39)
Muslim	11	10.1	36	16.5		**2.49(1.11-5.57)**	1.11(0.42-2.92)
Residential Status							
Urban	65	59.6	102	46.8	0.029*	1	1
Rural	44	40.4	116	53.2		**1.68(1.05-2.68)**	1.78(0.93-3.40)
Religion							
Hindu	96	88.1	186	85.3	0.496	1	ns
Other than Hindu	13	11.9	32	14.7		1.27(0.64-2.53)	
Types of Marriage							
Arranged	81	74.3	187	85.8	0.011*	1	1
Loved	28	25.7	31	14.2		**0.48(0.27-0.85)**	0.79(0.39-1.57)
Size of Family							
≤ 4 members	27	24.8	42	19.3	0.314	1	ns
> 4 members	82	75.2	176	80.7		1.38(0.80-2.39)	
Types of family							
Nuclear	27	24.8	46	21.1	0.674	1	ns
Joint	71	65.1	145	66.5		1.20(0.69-2.09)	
Extended	11	10.1	27	12.4		1.44(0.62-3.36)	
Education of Respondents							
Illiterate and Informal class	23	21.1	118	54.1	<0.001*	1	1
Primary	11	10.1	12	5.5		**0.21(0.08-0.54)**	**0.18(0.06-0.57)**
Secondary	59	54.1	50	22.9		**0.17(0.09-0.30)**	**0.13(0.06-0.26)**
SLC and above	16	14.7	38	17.4		**0.46(0.22-0.97)**	**0.36(0.15-0.85)**
Occupation of Respondents							
Agriculture	24	22.0	68	31.2	0.005*	1	1
Business	35	32.1	31	14.2		**0.31(0.16-0.61)**	**0.23(0.10-0.57)**
Service	6	5.5	16	7.3		0.94(0.33-2.68)	0.77(0.21-2.76)
Daily Wages	15	13.8	32	14.7		0.75(0.35-1.63)	0.91(0.35-2.35)
Homemaker	29	26.6	71	32.6		0.86(0.46-1.63)	0.86(0.38-1.95)
Earning Status							
Not Earning	27	24.8	37	17.0	0.094	1	ns
Earning	82	75.2	181	83.0		1.61(0.92-2.82)	

Marital Status of Parents							
Married	102	93.6	205	94.0	0.870	1	ns
Single, divorced or widow/widower	7	6.4	13	6.0		0.92(0.36-2.39)	
Family Monthly Income (NRs)							
Less than 10000	19	17.4	50	22.9	0.106	1	ns
10000-19999	48	44.0	67	30.7		0.53(0.28-1.01	
20000-30000	20	18.3	42	19.3		0.80(0.38-1.69)	
More than 30000	22	20.2	59	27.1		1.02(0.50-2.09)	
Food Sufficiency							
< 3 months	21	19.3	26	11.9	<0.001*	1	1
Up to 6 months	29	26.6	33	15.1		0.92(0.43-1.97)	0.72(0.28-1.86)
Up to 12 months	42	38.5	80	36.7		1.54(0.78-3.05)	1.44(0.60-3.41)
> 12 months	17	15.6	79	36.2		**3.75(1.72-8.17)**	**2.83(1.09-7.31)**

* Significant at p< 0.05, 1=reference category, COR = crude odds ratio, AOR = adjusted odds ratio, ns =not significant in bivariate analysis

Table 4: Pregnancy related factors associated with Teenage Pregnancy in using bivariate and multivariable analysis

Characteristics	Cases (n=109)		Control (n=218)		p value	COR (95% CI)	AOR 95% CI
	Frequency	**Percentage**	**Frequency**	**Percentage**			
Pregnancy Status							
Wanted	104	95.4	201	92.2	0.275	1	ns
Not wanted	5	4.6	17	7.8		1.76(0.63-4.90)	
Satisfaction towards recent pregnancy							
Satisfied	101	92.7	203	93.1	0.878	1	ns
Not satisfied	8	7.3	15	6.9		0.93(0.38-2.27)	
Status of family planning use							
Not using	88	80.7	144	66.1	0.006*	**1**	1
Using	21	19.3	74	33.9		**2.15(1.24-3.74)**	**2.38(1.33-4.25)**
ANC visit as per protocol							
Visited	76	69.7	178	81.7	0.015*	**1**	1
Not visited	33	30.3	40	18.3		**1.93(1.33-3.29)**	0.77(0.39-1.51)
Immunization as per protocol							
Complete	89	81.7	197	90.4	0.025	1	1

						COR	AOR
Incomplete	20	18.3	21	9.6		**0.47(0.25-0.92)**	0.63(0.29-1.39)
Hemoglobin level							
No anemia	47	43.1	135	61.9	0.001*	1	1
Anemia	62	56.9	83	38.1		**3.49(2.16-5.66)**	**2.58(1.56-4.27)**
BMI Status							
Underweight	35	32.1	50	22.9	0.150	1	ns
Healthy Weight	67	61.5	146	67.0		1.53(0.91-2.57)	
Overweight	7	6.4	22	10.1		2.20(0.85-5.71)	
PIH							
No PIH	104	95.4	192	88.1	0.033*	1	1
PIH	5	4.6	26	11.9		**2.81(1.05-7.55)**	2.79(0.99-7.87)
Discussion on SRH in family							
No discussion	90	82.6	156	71.6	0.030*	**1**	1
Discussion	19	17.4	62	28.4		**0.53(0.30-0.95)**	1.79(0.96-3.31)
History of Teenage pregnancy in family							
No	68	62.4	105	48.2	0.015*	**1**	1
Yes	41	37.6	113	51.8		**1.79(1.12-2.86)**	1.47(0.89-2.43)
Peer Influence for sexual Intercourse							
Not Influenced	86	78.9	192	88.1	0.028	**1**	1
Influenced	23	21.1	26	11.9		**1.98(1.07-3.66)**	1.54(0.77-3.08)
Family Satisfaction on pregnancy							
Not Happy	8	7.3	10	4.6	0.304	1	ns
Happy	101	92.7	208	95.4		1.65(0.63-4.30)	
Siblings Satisfaction on pregnancy							
Not Happy	7	6.4	12	5.5	0.738	1	ns
Happy	102	93.6	206	94.5		1.18(0.45-3.08)	

* Significant at p< 0.05, 1=reference category, COR = crude odds ratio, AOR = adjusted odds ratio, ns =not significant in bivariate analysis

DISCUSSION

Women who were from Dalit caste were three times more likely to be pregnant at the age of

teenage than those who were from Brahmin or Chhetri. This finding is consistent with pooled analysis of Nepal Demographic and Health Surveys (2006, 2011 and 2016) [23] and another hospital based case-control study conducted in Pokhara Nepal where teenage pregnancy was higher among Dalit and disadvantaged ethnicity [16]. In concordance to this study several other studies conducted in Nepal [15, 24] and Ethiopia [25] found lower ethnic background were significantly more likely to have teenage pregnancy. Dalit women had a greater rate of teenage pregnancy; the observed situation could be attributed to the fact that Dalit belongs to a lower caste, while Nepalese culture is predominately controlled by upper castes [26]. Women having formal education were less likely to have teenage pregnancy compared to those who were illiterate. This finding is in line with several other studies conducted in Nepal [16, 23] and Ethiopia [27]. This could be attributed to the fact that education promotes autonomy, decision-making ability, and economic liberation, leading to the postponement of the marriage [28]. In the present study, women involved in business work were less likely to experience teenage pregnancy compared to those who involved in agriculture work. This finding is consistent with study conducted in Nepal [16], Uganda [29]. A possible explanation for this is that women engaged in business tend to have more exposure to people and various social determinants of health. As a result, they may find it challenging to allocate sufficient time for their families and raising children [29, 30]. Teenage pregnancies were nearly three times more likely among respondents who had food sufficiency for more than 12 month per year compared to those with food sufficiency for less than 3 months in a year. This finding is concordance with the finding of previous study conducted in rural Honduras where teenage pregnancy was significantly associated with food security [31]. This could be because women with sufficient food availability do not have to worry as much about raising, feeding, and providing for the education of their

children. However, they might not be fully conscious of health impact and consequences of early-age pregnancy.

In the present study family planning users were at higher risk of experiencing teenage pregnancy compared to those who did not used family planning. This result contrasts with the finding of another study conducted in Ethiopia [25], which found that contraceptives non users were more likely to be pregnant. This might indicate that despite a higher proportion of family planning users in developing countries, there is still higher contraceptives failure, irregular use of temporary methods, inadequate counseling on family planning, low awareness, and low utilization skills, resulting in unplanned and unwanted pregnancies [32]. However, this finding is consistent with the previous case control study conducted in Ethiopia, where bivariate analysis showed that current users of contraceptives were nearly 5 times more likely to be pregnant 33]. In this study, women having teenage pregnancy had a significantly higher risk of anemia. This finding is in line with several other studies, conducted in West Bengal, India [9] and Uganda [26]. This association may be attributed to both the physiological and social factors. During adolescence, a rapid growth and the onset of menstruation deplete the body's iron reserves. Additionally, pregnant teenagers may be less likely to engage in professional job due to their lower educational status, lack of sufficient experiences [60], and their younger age [34]. Consequently, we hypothesize that these women may have limited access to nutritious foods or lack understanding of nutrition.

Implications of the study: Nepal's government has implemented laws and strategies for prohibiting adolescent marriage and improves teen well-being, aiming to reduce teenage pregnancy rates. However, teenage pregnancy remains a significant public health and social concern in Nepal, hindering progress towards Sustainable Development Goal 3, in reducing maternal mortality rate to at least 70 per 100,000

live births and neonatal mortality rate to at least 12 per 1000 live births. Analytical data on factors contributing to teenage pregnancies in Nepal are scare. Thus, this study's findings will be valuable insights for healthcare professionals and policymakers to develop targeted strategies for reducing teenage pregnancy in Nepal. Additionally, this study will serve as a baseline data for further research and policy formulation.

Limitations of the study: This study was conducted in a single tertiary hospital, underscoring the need for broader community-based research. Previous studies often used pregnant teenagers (15-19 years) as cases and non-pregnant peers as controls. However, this study diverged by selecting pregnant individuals aged 15-19 as cases and non-teens as controls, aiming to explore pregnancy-related factors alongside socio-demographic and socio-economic elements. Further research with larger sample sizes and matched age groups are recommended to mitigate potential selection biases arising from educational opportunities influenced by age differences among respondents.

CONCLUSIONS

Ethnicity, women's education, occupation, food sufficiency, family planning use and hemoglobin level was found to be independent associated factors of teenage pregnancy. Teenage pregnancy was significantly high among Dalit women, those who have food sufficiency for more than 12 months per year, using family planning methods and anemic women. Similarly, it was significantly low among formally educated and business women. Thus policy makers and local administrators should focus on increasing awareness related program regarding reproductive health, programs to promote communication between teenagers and their parents, should emphasize on providing employment, and develop intervention for providing counseling on utilization skills of family planning, and promotion of nutritional diet during pregnancy especially for disadvantages people, such as Dalits.

List of abbreviations: ANC: Antenatal care; AOR: Adjusted odds ratio; BMI: Body mass index; CI: Confidence interval; COR: Crude odds ratio; IRC: Institutional review committee; NRs: Nepalese rupees; OPD: Outpatient department; OR: Odds ratio; PIH: Pregnancy induced hypertension; SD: Standard deviation; SLC: School leaving certificate; SPSS: Statistical package for the social sciences; SRH: Sexual and reproductive health; UCMS-TH: Universal College of Medical Sciences and Teaching Hospital; VIF: Variation inflation factor

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