



Assessment of maternal healthcare services among the women of reproductive age in the rural municipality of Nepal: a cross-sectional study

Mukesh Adhikari ¹, Manish Rajbanshi ¹, Anita Karki,¹ Richa Aryal,² Bishnu Prasad Choulagai¹

To cite: Adhikari M, Rajbanshi M, Karki A, *et al*. Assessment of maternal healthcare services among the women of reproductive age in the rural municipality of Nepal: a cross-sectional study. *BMJ Public Health* 2025;**3**:e000916. doi:10.1136/bmjph-2024-000916

► Additional supplemental material is published online only. To view, please visit the journal online (<https://doi.org/10.1136/bmjph-2024-000916>).

Received 12 January 2024
Accepted 29 January 2025



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¹Central Department of Public Health, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal

²Department of Psychology, Padma Kanya Multiple Campus, Tribhuvan University, Kathmandu, Nepal

Correspondence to
Manish Rajbanshi;
manishrajbanshi717@gmail.com

ABSTRACT

Background Maternal Mortality Ratio is one of the crucial indicators of the Sustainable Development Goal-3, which is to be achieved below 70 per 100 000 live births by 2030. It is essential to assess the current status of antenatal care (ANC), uptake of skilled birth attendants (SBAs), and postnatal care (PNC) to improve the health of a mother and child in developing countries like Nepal. This study assesses the utilisation and factors associated with maternal healthcare services among reproductive-aged women in the Shubhakalika Rural municipality of Nepal. **Methods** A cross-sectional study using proportionate simple random sampling was performed to select 180 participants. A Nepali-translated tool based on Andersen's Behaviour Model of healthcare service utilisation was used to collect the data. ANC services, SBAs, PNC services and continuum of care were dependent variables while independent variables were categorised into predisposing, enabling and need factors. Bivariate and multivariable regression analysis was performed using the Statistical Package of Social Sciences V.20 to determine the association between dependent and independent variables. All the tests were set at a CI of 95%.

Results This study included 180 participants with a mean (\pm SD) age of 24.3 \pm 4.9 years. Women whose husbands completed formal schooling were more likely to have four ANC visits (adjusted OR (AOR)=3.2, CI=1.0–10.3). Women with a planned pregnancy were significantly associated with the use of four ANC visits (AOR=10.3, CI=3.5–30.3), institutional delivery (AOR=3.2, CI=1.1–9.3) and continuum of care (AOR=7.4, CI=1.4–37.8). Ethnicity (AOR=2.4, CI=1.1–5.4), education of women (AOR=2.7, CI=1.0–7.7), having problems in receiving maternal healthcare services (AOR=4.5, CI=1.5–15.2) and distance to the nearest health facilities of less than 30 minutes (AOR=2.4, CI=1.0–5.7) were significantly associated with the use of institutional delivery. Similarly, women who were 18 years or above at the time of marriage were more likely to attend at least one PNC (AOR=3.2, CI=1.5–6.5) than women who were under 18. Meanwhile, women with health insurance were less likely to attend at least one PNC visit (AOR=0.3, CI=0.1–0.6) compared with those without health insurance.

Conclusion Women with planned pregnancies, higher education and husbands who completed formal schooling

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Women's survival, health and well-being are essential to eradicating extreme poverty, promoting development and resilience and achieving the Sustainable Development Goals.

WHAT THIS STUDY ADDS

⇒ This study added evidence of how the predisposing, need and enabling factors influence the utilisation of maternal healthcare services.
⇒ This study showed lower utilisation of maternal healthcare services among women who were from disadvantaged ethnicities, illiterate/lower education and did not have access to the nearest health facilities within less than 30 minutes of walking distance.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study highlights that the government of Nepal should focus on extending healthcare institutions and birthing facilities for the community's people who are deprived of healthcare services.

were more likely to access comprehensive maternal healthcare services, including ANC, institutional delivery and PNC. This study demonstrated proximity to health facilities, and lower ethnic groups were deprived of maternal healthcare services. These results emphasise the need to address socio-demographic disparities and improve healthcare accessibility. Since, health insurance programmes facilitate the utilisation of maternal healthcare services, efforts should focus on expanding coverage to reach the target population effectively, such as newly married couples.

INTRODUCTION

Women's survival, health and well-being are essential to eradicating extreme poverty, promoting development and resilience and achieving the Sustainable Development Goals (SDGs).¹ The United Nations launched a

Safe Motherhood Initiative (SMI) in 1987 to ensure that women go through safe pregnancy and childbirth and give birth to healthy children.²

The concept of the Continuum of Care (CoC), composed of service delivery during pre-pregnancy, pregnancy, delivery, post-partum, childhood and motherhood, has been advocated as a cost-effective element of SMI.^{3,4} The CoC is explained by two dimensions: space and time. In practice, the time dimension of CoC emphasises care for both mothers and newborns, from antenatal care (ANC) to postnatal care (PNC), and the space dimension denotes optimal caretaking at households, communities and health facilities.^{4,5}

The WHO (World Health Organisation) estimated that almost 800 women died every day from preventable causes related to pregnancy and childbirth in 2020.⁶ Despite a 67% reduction in maternal mortality ratio (MMR) between 2000 and 2020, Southern Asia still accounts for 16% (about 287 000) of maternal deaths globally.⁶ The first month of life is the most vulnerable period for child survival, with 2.4 million newborns dying in 2020.⁷ The immediate postnatal period, corresponding to the first 24 hours after birth, is associated with the greatest concentration of fatal risks to the newborn including birth asphyxia, trauma, breathing issues related to preterm birth and sepsis. The early postnatal period, that is, 2–7 weeks when sepsis, malaria and other infectious disease risks are prominent.^{8–10} The late postnatal period extends from day 2 through 42 weeks of delivery when risks of childhood infections that are concentrated in week 1 remain as dominant causes of death.¹¹

Nepal is a signatory to the SDG and has committed to one of the important targets to reduce the MMR to <70 per 100 000 live births and reduce the newborn mortality rate to <12 per 1000 live births by 2030.⁸ Following the recommendations of the 1998 Safe Motherhood Policy and the 2018 Safe Motherhood and Reproductive Health Act, the Government of Nepal (GoN) protocol includes at least four ANC check-ups, obstetric care by a competent health worker or birth attendant, and three postnatal checks, the first at 24 hours after birth, then at three and 7 days after birth across the CoC.^{8,12} The coverage of at least four ANCs has increased from 69% in 2016⁹ to 81% in 2022.¹³ However, the quality has been relatively weak with a declining proportion of women on the fourth visit as compared with the first visit.^{12,14} Skilled Birth Assistance (SBA) during delivery has increased from 65% to 80%, and the proportion of women with a postnatal check within 2 days after delivery has increased from 57% to 70% in 2022.¹³ SMIs such as free delivery care, transportation incentives and subsidies to health facilities have been effective in increasing the coverage of services across maternal CoC at the national level; however, there exists local variation in the utilisation of these services.^{3,13,14}

As part of the CoC, ANC, childbirth and PNC are recognised as critical to improving the survival of women and newborns and to ending preventable

deaths.^{7,12} Importantly, early maternal healthcare services help to identify complications, promote healthy behaviours, ensure the establishment of successful breastfeeding and link the mother to family planning services and the baby to child healthcare ultimately improving the health and survival of the newborn and the mother.¹⁴

Previous studies in Nepal have revealed significant socio-economic disparities in the utilisation of ANC and PNC services. Women from wealthier households, with higher levels of education, and belonging to socially advantaged ethnic groups were found to have significantly greater access to and likelihood of receiving maternal health services.¹⁵ Moreover, the time required to travel to the nearest health facility emerged as a significant obstacle to accessing maternal health services.

In Nepal, although the utilisation of ANC, institutional delivery and PNC—collectively referred to as ‘maternal health services’—has improved over the past two decades, these rates still fall significantly below the global average.¹⁶ Nepal exhibits significant regional disparities in the utilisation of maternal health services, with access being notably lower in rural and remote areas of the country.¹⁷ These disparities can be attributed to factors such as limited availability of healthcare services, low levels of parental education, cultural beliefs and challenging geographic terrain.¹⁸ Therefore, this study aimed to assess the utilisation of maternal healthcare services and its associated factors among women of reproductive-aged group in Shubhakalika Rural Municipality (SRM) of Kalikot district, Nepal.

MATERIALS AND METHODS

Study design and setting

A cross-sectional study was conducted at SRM of Kalikot District. It is a rural area with a poor socioeconomic status of people and a Human Development Index of 0.374.¹⁹ This municipality consisted of a total population of 15 244 that was distributed into eight wards.¹⁹ Among the total population, 4167 belonged to the women of reproductive age group (15–49) years.¹⁹

Although SRM consisted of three health posts, three birthing centres, five basic health services centres and two Community Health Units, there was poor maternal healthcare services utilisation, that is, ANC (74%), institutional delivery (59%) and PNC (65%) as per protocol. Besides, this municipality has been facing poor facilities of transportation, electricity and reliable network connection.

Study population

This study included women of reproductive age (15–49 years) who had a child between 6 and 18 months of age. Women from selected wards only were recruited.

Women who were not permanent residents of SRM, that is, temporary residents for 6 months during the data collection period, were not enrolled in this study. Women who were having hearing problems, communication

problems, and a mental disorder were excluded from this study. Women who were not available during the data collection period were also excluded from this study.

Sample size and sampling

This study followed a proportionate simple random sampling technique to select the participants. At first, four wards were selected randomly via lottery method from the eight wards of SRM. Detailed information including location, household number and phone number of women of reproductive age group were obtained from the Health Posts of each selected wards. Then, the sample size of each ward was determined using a population proportionate sampling method. The sampling frame for each ward was designed with the help of the Female Community Healthcare Volunteers (FCHVs). Random selection of participants was done using household numbers that fulfilled the inclusion criteria for this study.

The total number of women of the reproductive age group having a child between 6 and 18 months was found to be $n=316$.

The sample size was calculated using the formula by Cochran for finite single population proportion formula $n_0 \left[\frac{z^2 p(1-p)}{d^2} \right]$, and $n = \left[\frac{n_0}{1 + \left[\frac{(n_0-1)}{N} \right]} \right]$ where 'z' is the standard normal distribution, 'N' is the total number of reproductive age (15-49) women having a child between 6 and

18 months, 'p' is the assumed proportion of maternal healthcare service utilisation (50%), 'd' is the margin of error at 5%, 'n₀' is the required sample size and 'n' is the sample size after adjusting for finite population.²⁰ This formula provided that the sample size (n)=164. Adding a non-response rate of 10%, the final sample size was 180.

The sample size of the respective ward was calculated by using the following formula $n_h = ((N_h/N) \times n)$, where n_h =sample size for h_{th} ward, N_h =population size for h_{th} ward, n =size of entire population, n =size of entire sample.

Study tool

A study tool was adopted from the previous relevant studies by Li Y *et al*, 2023; Kabir MR *et al*, 2021 and Tolera H *et al*, 2020.^{1 21 22} All these studies followed Andersen's Behavioural Model to identify the factors influencing the utilisation of maternal healthcare services. The tool was translated into the Nepali language and pretested in a municipality near SRM among 10% ($n=18$) of the sample size to check the consistency, reliability and validity of the tool. After obtaining a Cronbach coefficient of 0.8, it was then adopted for the data collection in this study.

The questionnaire was divided into four sections. The first section was composed of predisposing, enabling and need factors that can influence maternal healthcare utilisation (figure 1). The second section consisted of questions related to ANC: time for first ANC visit, number of ANC visits, place for ANC visit, iron tablets consumption,

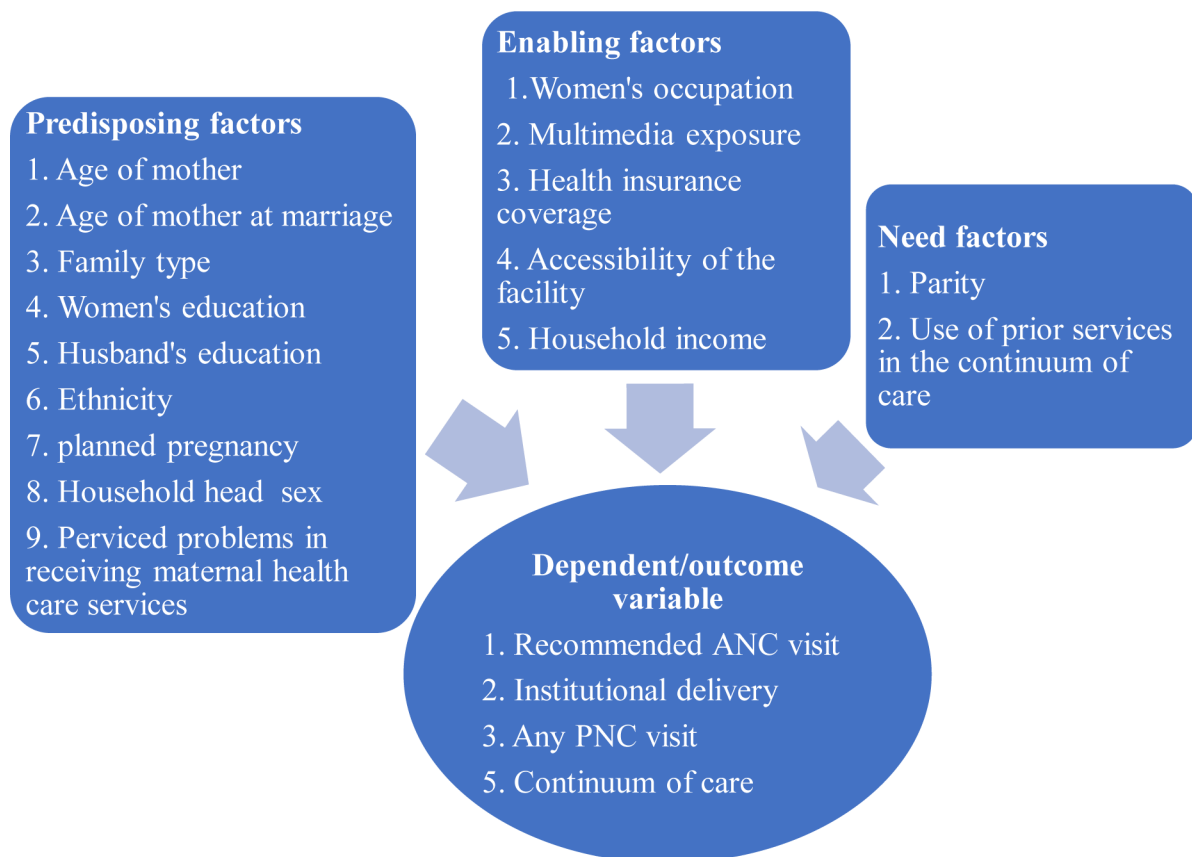


Figure 1 Andersen's behaviour model in the utilisation of maternal healthcare services.²¹ ANC, antenatal care; PNC, postnatal care.

tetanus-diphtheria (TD) immunisation and intake of deworming tablets.

The third section consisted of questions related to delivery: type of delivery during the last child, place of delivery, SBA during delivery, instruments used to cut the umbilical cord and problems encountered during delivery.

The last section comprises questions related to PNC: utilisation of PNC, initiation time of PNC, number of PNC visits, intake of Vitamin-A, initiation of breastfeeding and family planning choices during the postpartum period.

Variables and measures

Andersen's behavioural model was adopted for its comprehensive approach, which integrates individual, societal and healthcare system factors to explain healthcare utilisation, making it ideal for analysing maternal healthcare service use.²¹ This model classifies the influencing factors into predisposing, enabling and need factors²¹ (figure 1).

Study variables and their measurement

All the variables and their measures used in this study are shown in online supplemental file 1.

Outcome variables

- ▶ Recommended ANC visit: woman who have at least four ANC visits during their last pregnancy.
- ▶ Institutional delivery: woman whose last pregnancy was delivered in a health facility.
- ▶ PNC: at least one PNC visit following 42 days of delivery.
- ▶ CoC: complete: it refers to those women who completed at least four ANC visits during their pregnancy, have SBA attendance at their delivery, and any PNC check-up while discontinued refers to those who do not meet the criteria for a complete CoC.

Data collection

Data collection was conducted between December 2022 and January 2023. A structured questionnaire was used to collect the data from the participants. The principal investigator himself conducted face-to-face interviews with the participants. During the data collection, the investigator was assisted by FCHVs. The interviews took around 30 minutes to complete.

Data management and analysis

Collected data were compiled, edited, cross-checked, coded and then entered into Epi-data V.3.1 software. Data were then exported to the Statistical Package for the Social Sciences V.20 (IBM) for analysis. Descriptive statistics (frequency, percentage, mean and SD) were calculated to study the characteristics of the participants. The χ^2 test was used for bivariate analysis to assess the association between the independent variables and the outcome variables. The variables with p-value <0.15 in the bivariate analysis were selected as candidate variables for multivariable logistic regression. In the multivariable

logistic regression, variables with p-values <0.05 were considered to be statistically significant. Multicollinearity among covariates was examined using Variance Inflation factors (VIF). No multicollinearity was observed among the independent variables (VIF <2). The goodness of fit of the regression model was tested by the application of the Hosmer and Lemeshow test; the model was found to be a good fit (p>0.05).

Research registry

This study is research registered (reference: researchregistry9911).

RESULTS

Predisposing factors, enabling factors and need factors of the study participants

The mean±SD age of 180 participants was 24.3±4.9 years. More than one-third (39.4%) were married before 18 years of age. The majority of the participants, that is, 62.8% and 53.3%, belonged to advantaged ethnicity (Brahmin/Chhetri/Thakuri) and nuclear family, respectively. Most of them (34.4%) had completed primary-level schooling, while 31.1% of the husbands had completed higher-level schooling. The majority of the households had a male as household head, that is, 91.1%. Only a few (9.4%) reported having problems receiving maternal healthcare services. Around three-fourths, that is, 72.8% women, were engaged in agricultural work and three-fifths, that is, 59.4%, had <NRs.10000 as their monthly household income. Only 35% of the participants had access to the nearest health facility in <30 minutes (table 1).

Utilisation of maternal healthcare services (n=180)

ANC-related characteristics

All the participants had at least one ANC check-up, and nearly 70% had completed at least four ANC check-ups. Likewise, two-thirds, that is, 65.6%, of the participants had their first ANC in the first trimester during pregnancy. Only 46% had completed the course of iron consumption. Mostly, that is, 93.3% and 98.3% were TD immunised and had taken deworming tablets, respectively (table 2).

Delivery-related characteristics

Most participants had their last child delivered at a health facility (68.9%), followed by home (19.4%). Among them, around 95% had a normal delivery, and nearly 64% of the deliveries were attended by SBA. The most used instruments to cut the umbilical cord at the time of delivery were scissors (76.7%) and knife/sickle (11.7%). Only a few (10.6%) of the women encountered problems during the last delivery in this study (table 2).

PNC-related characteristics

This study found only half of the participants (52.2%) had used at least one PNC check-up within 42 days. Among

Table 1 Distribution of predisposing, enabling and need factors among the study participants (n=180)

Characteristics	Frequency (n)	Percentage (%)
Predisposing factors		
Age (in years), (mean±SD)	(24.3±4.9)	
<20	45	25.0
20–29	105	58.3
30–39	30	16.7
Age at marriage (in years)		
Before 18	71	39.4
18 or after	109	60.6
Religion		
Hindu	180	100
Ethnicity		
Brahmin/Chhetri/Thakuri	113	62.8
Dalit	67	37.2
Family type		
Nuclear	96	53.3
Joint/extended	84	46.7
Woman's education		
Illiterate	29	16.2
Below primary	22	12.2
Primary	62	34.4
Secondary	35	19.4
Higher and above	32	17.8
Husband's education		
Illiterate	10	5.6
Below primary	27	15.0
Primary	51	28.3
Secondary	36	20.0
High and above	56	31.1
Sex of household head		
Male	164	91.1
Female	16	8.9
Perceived problems in receiving maternal healthcare services		
Yes	17	9.4
No	163	90.6
Planned pregnancy		
Yes	154	85.6
No	26	14.4
Enabling factors		
Woman's occupation		
Agriculture	131	72.8
Homemaker	16	8.9
Employed	15	5.6
Business	10	8.3
Student	8	4.4

Continued

Table 1 Continued

Characteristics	Frequency (n)	Percentage (%)
Monthly household income (mean±SD)	10323.8±6149.5	
<NRs. 10 000	107	59.4
NRs. 10 000 and more	73	40.6
Multimedia as a source of maternal healthcare information		
Yes	134	74.4
No	46	25.6
Health insurance coverage		
Yes	80	44.4
No	100	55.6
Time to reach the nearest health facility		
<30 min	63	35.0
30–60 min	71	39.4
>60 min	46	25.6
Need factor		
Parity		
1	74	41.2
2–3	80	44.4
4 or more	26	14.4

them, only 26.6% visited for the first PNC check-up. The maximum number of the participants, that is, 91.1%, had taken vitamin-A supplementation. Likewise, 84% had initiated breastfeeding within 1 hour. Around one-third of women had used postpartum family planning services within 6 weeks of delivery. Among them, Depo-Provera (60.7%) and pills (32.1%) were the most followed family planning methods (table 2).

Sources of information regarding maternal healthcare information

This study found that most of the participants accessed information related to maternal healthcare from health posts (92.8%), followed by radio (71.1%), FCHVs (65%) and mother's group (30.6%) (figure 2).

Factors associated with recommended ANC visits

This study showed that women whose husbands had attended formal schooling had higher odds of fulfilling recommended ANC visits compared with women whose husbands did not have formal schooling (AOR=3.2, 95% CI 1.0 to 10.3). Women who had a planned pregnancy were 10.3 times more likely to have fulfilled recommended ANC visits than those who did not have a planned pregnancy (AOR=10.3, 95% CI 3.5 to 30.3) (table 3).

Factors associated with the utilisation of institutional delivery

This study showed that women who belonged to an advantaged ethnicity were 2.4 times more likely to have institutional delivery (AOR=2.4, 95% CI 1.1 to 5.4) than women who belonged to a disadvantaged ethnicity. Women with formal schooling had higher odds of institutional delivery

Table 2 Maternal healthcare services utilisation (n=180)

Characteristics	Frequency (n)	Percentage (%)
ANC-related characteristics		
At least one ANC check-up	180	100.0
Four ANC check-ups	125	69.4
Initiation of the first ANC		
First trimester	118	65.6
Second trimester	60	33.3
Third trimester	2	1.1
Intake of complete iron consumption (180 tablets)	74	46.7
TD immunisation	168	93.3
Intake of deworming tablet	177	98.3
Delivery-related characteristics		
Place of delivery		
Health facility	124	68.9
At home	35	19.4
On the way to the hospital	21	11.7
Type of delivery		
Normal	170	94.4
Caesarean	5	2.8
Vacuum/forceps	5	2.8
SBA attendance	115	63.9
Instrument that used to cut the umbilical cord at the time of delivery		
Scissors	138	76.7
Knife/sickle	21	11.7
New blade	19	10.6
Old blade	2	1.1
Problem encountered during the last delivery		
Yes	19	10.6
No	161	89.4
PNC-related characteristics		
PNC within 42 days	94	52.2
Time of first PNC visit, n=94		
Within 24 hours	25	26.6
Within 3 days	23	24.5
Within 7 days	28	29.8
Within 42 days	18	19.1
Vitamin-A supplementation	164	91.1
Initiation of breastfeeding within 1 hour	151	83.9
Postpartum family planning services	56	31.1
Methods of family planning, (n=56)		
Depo-Provera	34	60.7
Pills	18	32.1
Others	4	7.1

ANC, antenatal care; PNC, postnatal care.

(AOR=2.79, 95% CI 1.0 to 7.7) than women who had no schooling. Similarly, institutional delivery was more likely to be found among women who did not perceive

a problem in accessing maternal healthcare services previously compared with their counterparts (AOR=4.6, 95% CI 1.5 to 15.2). Women with planned pregnancies were three times more likely to use institutional delivery compared with women who did not have planned pregnancies (AOR=3.2, 95% CI 1.1 to 9.3). Likewise, the likelihood utilisation of institutional delivery was twice more among the women who had access to the nearest health facility in <30 minutes than their counterparts (AOR=2.4, 95% CI 1.0 to 5.7) (online supplemental file 2).

Factors associated with at least one PNC check-up within 42 days after delivery

Women who were married at the age of 18 or more were 3.2 times (AOR=3.2, 95% CI 1.5 to 6.5) more likely to have at least one PNC within 42 days after delivery than women before 18. Likewise, women with health insurance coverage were less likely to have at least one PNC check-up (AOR=0.3, 95% CI 0.1–0.6) in this study (online supplemental file 3).

Factors associated with the CoC

This study showed that women who had a planned pregnancy had higher odds of receiving three services (AOR=7.4, 95% CI 1.4 to 37.8) in the CoC compared with those who did not have a planned pregnancy (online supplemental file 4).

DISCUSSION

Maternal and Child Health programme is one of the priority programmes of the GoN and is responsible for reducing the burden of mortality and morbidity related to mother and child. This study revealed that almost all the participants visited health institutions (HIs) for at least one ANC check-up. Among them, the majority proportion of women (69.4%) visited HIs for at least four ANC check-ups. This finding is lower than the national survey conducted in Nepal in 2022 (81%) and a similar study in Indonesia (93.44%).^{14 23} In contrast, this finding is higher than a similar study conducted in Papua New Guinea (52.3%) and Nepal in 2014 (33.9%).^{1 14}

This study found that the education of women and their husbands significantly influenced the utilisation of maternal healthcare services. Women having a husband with an education level of at least formal schooling were 3.2 times more likely to have at least four ANC visits than those who did not have formal schooling. A similar pattern was reported by the previous survey conducted in Nepal,²⁴ Ethiopia,²⁵ Bangladesh²⁶ and Uganda.²⁷

It is justifiable that educated husbands may have better communication with their wives and willingness to discuss the use of maternal healthcare services. They may also provide more autonomy and support in decision-making power to their wives.^{28–30} Another reason could be an improvement in health literacy that might affect health-seeking behaviour, and foster new attitudes and values, leading to optimal utilisation of maternal healthcare services.²⁶ Besides, previous studies depicted that

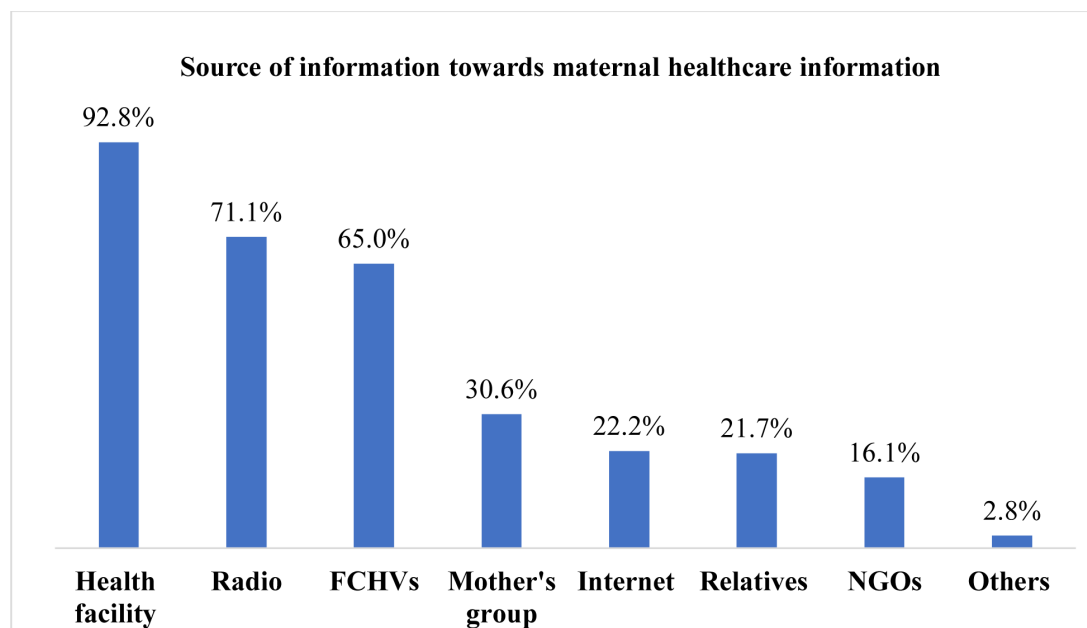


Figure 2 Source of information towards maternal healthcare information. FCHVs, Female Community Health Volunteers; NGOs, non-government organisations.

the mother's education is the strongest predictor of the husband's education which has a positive effect on the utilisation of ANC.^{28 30 31} It is due to educated women being more knowledgeable and aware of maternal healthcare services than men.^{30 32}

In this study, a significant association was observed between the recommended ANC visits and whether the pregnancy was planned or not. Women with a planned pregnancy had higher odds of having at least four ANC visits compared with those who did not plan. This finding is similar to other studies conducted in Sweden,³³ Northern Ethiopia²⁵ and Bangladesh.^{26 34} It is due to a planned pregnancy encouraging the mother, husband and family members to seek medical attention from time to time.³² They become aware of early pregnancy detection, counselling and other maternal healthcare services. This results in frequent visits to health facilities and an increase in the number of ANC visits. Furthermore, this finding suggests training should be provided to healthcare providers for the identification of unwanted pregnancies, while respecting their anonymity and culture, for support and care to women.

Women of disadvantaged ethnicities were less likely to have institutional delivery than their counterparts. This finding is consistent with the previous studies conducted in Nepal,^{24 35 36} Uganda,²⁷ Pakistan³⁷ and Ethiopia.²⁵ This may be explained by challenging issues such as social discrimination, disrespect and unacceptable behaviour against women belonging to disadvantaged ethnic groups by community people and healthcare service providers.³⁵ Unacceptable past experiences like disrespect and abuse during labour and childbirth are the barriers to accessing maternal healthcare services.^{38 39} Besides, women belonging to disadvantaged ethnicities were reported to be stripped of self-decision capacity,

supportive family members, education and employment opportunities.^{35 39 40}

In coherence with other studies, this study also highlighted that women's education is a significant factor in the higher utilisation of institutional delivery.^{26 30 36 38 41} Education is a powerful tool that strengthens women's self-decision capacity, attitude and rational choices towards healthcare service utilisation.^{30 41} Higher education among individuals enhances their health literacy and awareness, resulting in positive health-seeking behaviour on time.^{35 38}

Similar to other studies,^{27 42–44} this study revealed that institutional delivery was significantly higher among women who perceived to have no problems in accessing healthcare services during their last pregnancy compared with their counterparts. This finding can be justified as women might feel more confident in HIs for safe delivery when they have had positive prior experience in receiving maternal healthcare services. Another reason is that a healthcare provider might have provided counselling on the risk of home delivery, health complications and the importance of maternal healthcare services.⁴¹ Subsequently, this results in positive intention in health-seeking behaviour towards institutional delivery.

This study demonstrated that planned pregnancy as a significant positive factor, influences the optimum utilisation of institutional delivery. The likelihood of institutional delivery was three times higher for women with planned pregnancies than those who did not have planned pregnancies. Similar findings were also reported in the study conducted in Ethiopia,^{41 45} Bangladesh²⁶ and Uganda.²⁷ This is because planning pregnancy makes women aware of the potential health complications for both mother and child during delivery.⁴⁶ To avoid such

Table 3 Factors associated with recommended ANC visits (n=180)

Characteristics	Four ANC visits		Multivariate logistic regression	
	Yes	No	COR (95% CI)	AOR (95% CI)
	n (%)	n (%)		
Age				
15–29	111 (74.0)	39 (26.0)	3.2 (1.4 to 7.2) *	1.6 (0.5 to 4.8)
30–49	14 (46.7)	16 (53.3)	1	1
Age at marriage				
18 or after	82 (75.2)	27 (24.8)	1.9 (1.0 to 3.7)*	1.0 (0.4 to 2.4)
Before 18	43 (60.6)	28 (39.4)	1	1
Ethnicity				
Advantaged	85 (75.2)	28 (24.8)	2.0 (1.0 to 3.9)*	1.4 (0.6 to 3.1)
Disadvantaged	40 (59.7)	27 (40.3)	1	1
Family type				
Nuclear	75 (78.1)	21 (21.9)	2.4 (1.2 to 4.6)*	1.9 (0.9 to 4.3)
Joint/extended	50 (59.5)	34 (40.5)	1	1
Woman's education				
Formal schooling	98 (76.0)	31 (24.0)	2.8 (1.4 to 5.5)*	1.1 (0.4 to 3.1)
No schooling	27 (52.9)	24 (47.1)	1	1
Husband's education				
Formal schooling	107 (74.8)	36 (25.2)	3.1 (1.4 to 6.6)*	3.2 (1.0 to 10.3)*
No schooling	18 (48.6)	19 (51.4)	1	1
Time to reach the nearest health facility				
<30 min	48 (76.2)	15 (23.8)	1.6 (0.8 to 3.3)	1.9 (0.8 to 4.2)
30 min or more	77 (65.8)	4 (34.2)	1	1
Planned pregnancy				
Yes	118 (76.6)	36 (23.4)	8.9 (3.4 to 22.8)*	10.3 (3.5 to 30.3)*
No	7 (26.9)	19 (73.1)	1	1
Sex of household				
Female	14 (87.5)	2 (12.5)	3.3 (0.7 to 15.2)	1.7 (0.1 to 9.2)
Male	111 (67.7)	53 (32.3)	1	1

1= Reference category
 *p value <0.05.
 AOR, adjusted OR; COR, crude OR.

complications, couples prefer to have safe delivery at HIs with the help of SBAs or skilled health professionals.^{46 47}

Institutional factors can have a significant impact on the delivery of healthcare services. Similarly, this study showed that the odds of institutional delivery were higher among women who had access to delivery institutions in their area. Women with access to birthing facilities within a 30-minute walking distance were more likely to deliver at health facilities than their counterparts. This finding is justified by the previous studies conducted in Ethiopia^{41 48} and developing countries like Nepal^{49 50} and Kenya.⁵¹ This finding is reasonable with other previous studies where there is active communication and interaction between community people and healthcare providers.⁴⁸ This interaction opportunity promotes two parties to

share health-related information including maternal healthcare services. Besides, health education and counselling services are easily accessible to the community people through nearby health facilities, which results in optimal utilisation of ANC and PNC services.⁴² Furthermore, women who have access to nearby health facilities do not have to face the problem of transportation to attend the institutional delivery service and can manage any pregnancy-related problems early.^{26 41 52}

In this study, half of the participants (52.2%) had used at least one PNC check-up within 42 days of delivery. Among them, only 13.8% used PNC services within 24 hours after delivery. The reason behind the low-reported prevalence of PNC compared with the national average may be attributed to the study site. This study was

conducted in one of the rural municipalities of Karnali Province in Nepal. This province reports low utilisation of maternal healthcare services compared with other provinces in Nepal. A study that employed spatial maps to identify clusters of low service utilisation highlighted that Karnali Province dominated the low utilisation of ANC and PNC services during the period 1996–2016.⁵³ The challenging geography of the province characterised by mountainous terrain, higher travel time to health facilities and high multidimensional poverty index poses a significant barrier to the utilisation of PNC services for the women in this province.⁵³

Women who were married at the age of 18 or after were 3.2 times more likely to utilise at least one PNC check-up compared with those women who were married before 18 years. This finding is supported by the study conducted by Sekine *et al* in which child marriage decreased the likelihood of attending PNC.⁵⁴ Moreover, a systematic review conducted to identify consistent factors associated with and resulting from child marriage in South Asia has reported a low level of utilisation of maternal health services.⁵⁵

Nepal has the second-highest prevalence of child marriage among South Asian countries.⁵⁶ As per the latest Nepal Demographic and Health Survey 2022, one in five (21%) women aged 15–19 are currently married.⁵⁷ Child marriage is associated with unintentional adolescent pregnancies which leads to heightened risks of adverse maternal outcomes, including morbidity, mortality and neonatal health issues.⁵⁸ Consequently, the insufficient utilisation of PNC among this demographic raises public health concerns. Given their increased vulnerability to adverse outcomes, first there is a need to eliminate the practice of child marriage by intervening effective programmes, second, preventing pregnancies among child brides and third, encouraging proper maternal health utilisation, especially PNC in case of pregnancy becomes crucial, as it holds the potential to prevent such outcomes and increased PNC coverage.

This study reported that less than one-third (31.6%) of participants had completed a CoC for maternal healthcare services, which is much lower than the national average. A nationwide Multiple Indicator Cluster Survey of Nepal in 2019 reported that only 41% had completed the CoC pathway.⁵⁹ Similarly, a study conducted in two rural districts of Nepal, that is, Dhading and Nawalparasi, reported that the CoC completion rates were 41% and 28%, respectively.⁵ The discrepancy in the reported CoC rates can be attributed to the provincial, residential (urban/rural) and socio-economic disparities concerning access and utilisation of maternal healthcare services. The GoN has prioritised the National Safe Motherhood programme and has provision incentives for four ANC visits and institutional delivery as a universal approach to increase the coverage of maternal health services which has so far shown tremendous results.⁶⁰ However, the persistent inequity in the utilisation of maternal healthcare services by women with socio-economic

disadvantages and those living in hard-to-reach areas such as this study site calls for a targeted intervention in addition to a universal approach.

Women with a planned pregnancy were 7.4 times more likely to complete the CoC than those who did not have a planned pregnancy. This finding is supported by studies conducted in Egypt,⁶¹ Malawi,⁶² Sub-Saharan Africa⁶³ and Bangladesh.⁶⁴ Similarly, a study by Khatri *et al* in Nepal reported that women who had an unwanted previous birth had a higher risk of discontinuing maternal care visits.⁶⁵ Those women with unplanned pregnancies are not likely to have access to family planning services and maternal health services. This might result in unawareness of pregnancy status among women. Since the planning of pregnancy is associated with maternal health service utilisation, this advocates that focusing on increasing coverage and quality of family planning services ultimately results in improved utilisation of maternal healthcare services as well.

This study found that a significant proportion of deliveries still occur outside of institutional settings, without access to SBAs, leading to increased risks of infection during cord cutting. This finding is consistent with the previous studies conducted in Nepal.^{24 35} It is due to limited health literacy among women and families that reduces understanding of the importance of institutional delivery and SBA services.²⁴ This result is driven by the insufficient availability of nearby birthing facilities and qualified healthcare professionals, which further deters institutional delivery.³⁵

Strengths and limitations

A limited number of studies in Nepal have investigated the factors associated with CoC, that is, ANC to PNC visits for maternal healthcare services. This study provided additional evidence to limited studies that could help design a community-based intervention package in the safe motherhood programme of Nepal. This study was conducted in a rural area of Nepal situated in Karnali Province, known for the lowest utilisation of maternal healthcare services among all provinces. This study provides a better representation of the maternal health status of women belonging to rural communities that can be generalised among women in Nepal.

Nevertheless, our study is subjected to some limitations. Considering the cross-sectional nature of the study, the temporal relationship could not be established. There might be a chance of recall bias among the participants. The study findings were focused on the coverage of maternal healthcare services. Therefore, the quality of maternal healthcare services should be investigated from the perspectives of the service users and providers in the future.

CONCLUSION

This study highlights significant factors influencing maternal healthcare utilisation in Nepal, emphasising disparities based on education, ethnicity, geographic

access and planned pregnancy. Women's and their husbands' education levels, planned pregnancies and proximity to healthcare facilities were positively associated with increased utilisation of ANC, institutional delivery and PNC services. However, socio-economic and geographic barriers persist, particularly in disadvantaged ethnic groups and remote regions.

Low PNC utilisation, particularly within 24 hours post-delivery, and an incomplete CoC underscore the need for targeted interventions. Addressing child marriage, enhancing family planning services and improving healthcare access in underserved areas are critical to promoting equitable maternal health service utilisation. Tailored strategies, alongside universal programmes, can bridge gaps in maternal health outcomes and ensure comprehensive care for all women in Nepal.

Acknowledgements We thank the Central Department of Public Health, Institute of Medicine, Tribhuvan University, Nepal, for their guidance and support in this study. We also acknowledge all the study participants for their time and effort.

Contributors MA: conceptualisation, data curation, formal analysis, investigation, methodology, project administration, resources and writing original preparation. MR: data curation, formal analysis, methodology, writing reviewing and editing, guarantor. AK: formal analysis, methodology, writing reviewing and editing. RA: investigation, writing reviewing and editing. BPC: Conceptualisation, methodology, supervision and validation.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, conduct, reporting or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants, and ethical approval was obtained from the Institutional Review Committee of the Institute of Medicine, Tribhuvan University, Nepal (ref. no. 369 (6-11) E2/079/080). Written permission was taken from the rural municipality before conducting the data collection. Both verbal and written consents were taken from the participants after explaining the study objectives. Assent forms were obtained from the participants under 18 years. For those participants who were unable to provide written consent, fingerprints were obtained. A written parental consent form was obtained for the participants below 18 years of age. All the information of the participants was kept confidential, the right to revoke participation without prior justification was maintained and access was denied if the participants were not interested in providing consent. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information. See the supplementary dataset (online supplemental file 3).

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ORCID iDs

Mukesh Adhikari <http://orcid.org/0009-0000-0925-4005>

Manish Rajbanshi <http://orcid.org/0000-0001-9671-3846>

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