

## Factors influencing the utilization of institutional delivery services by Chepang women in Chitwan district of Nepal

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### ABSTRACT

**Background:** Nepal has not yet achieved less than 70 maternal deaths per 100,000 live births of the SDG. To reduce the maternal death rates, a safe motherhood program has been implemented across Nepal to provide pregnant women with free delivery care in a healthcare facility, as well as transportation incentives promoting institutional delivery. Being a marginalized group of people residing in hilly slope areas, the Chepang population is deprived of significance usage of healthcare services.

**Objective:** This study aimed to assess the incidence of delivery complications, and to investigate the factors associated with the utilization of institutional delivery of the Chepang women in the Chitwan district.

**Methods:** A cross-sectional study was conducted in Rapti, Kalika and Ichchhakamana municipalities with a proportional random sample of 557 mothers. A face-to-face interview using a structured questionnaire was performed to collect the data. Using stepwise logistic regression analysis, the data were analyzed.

**Results:** The results show that the incidence of delivery complications among those who utilized an institutional delivery was lower than the non-institutional delivery respondents. The literate parents were strongly associated with the increased usage of an institutional delivery (OR=12.08, 95%CI=6.32-23.06), and (OR=5.45, 95%CI=2.82-10.51) for literate mothers and literate spouses, respectively. Other significant factors were older ages at delivery of mothers as compared to younger ages mothers (OR= 3.28, 95%CI=1.83-5.90 for ages 20-29 year.; OR=3.75, 95%CI=1.80-7.83 for ages  $\geq$ 30 year.), and engagement in business and services occupation of mothers (OR=2.01, 95%CI=1.01-4.01). The associations were observed for vehicle transportation to the delivery facility (OR =1.99, 95% CI =1.28-3.11) and travel time  $\leq$ 30 minutes to the delivery facility (OR=2.80, 95%CI=1.58-4.96).

**Conclusions:** The results revealed a lower incidence of delivery complications among those who utilized the institutional delivery. The analysis also demonstrated that age, education, income, and convenient access to an institutional delivery facility for mothers were associated with the utilization of institutional delivery of Chepang women. The findings could benefit health professionals in developing a health intervention to increase institutional delivery services for marginalized Chepang women.

**Keywords:** Institutional delivery, Multilevel analysis, Chepang Women, Chitwan District, Nepal

## 1. Introduction

Reducing high maternal death was the fifth Millennium Development Goals (MDG) with a goal to cut maternal deaths by three quarters in between the year 1990 and 2015 [1] and now it has been the third of the seventeen Sustainable Development Goals (SDG) with a goal to decrease the maternal death ratio to fewer than 70 per 100000 live births globally [2]. Between 1990 and 2015, the worldwide maternal death ratio reduced from 385 to 216 deaths per 100000 live births (44 percent decrease). However, there were large geographic inequalities regarding maternal mortality with sub-Saharan Africa having 546 maternal deaths per 100000 live births and only 12 maternal deaths per 100000 live births in developed countries [3].

Institutional delivery service utilization is one of the key and proven interventions to reduce maternal death. It ensures safe birth, reduces both actual and potential complications and maternal death, and increases the survival of most mothers and newborns [4]. Given that active management of the third stage of labor minimizes obstetric morbidity and mortality in low-resource settings, increasing the rate of births that take place in a medical facility is a key approach to reducing maternal mortality [3]. WHO also reported that approximately

99% of total maternal mortality happened in developing nations such as Nepal which made maternal mortality statistics with greatest gap between developing and developed countries [4].

In contrary to the global situation, the maternal mortality rate in Nepal fluctuated over time. The rate was decreased from 281 mothers per 100,000 live births in 2006 to 170 per 100,000 live births in 2011; however, it was increased to 239 per 100,000 live births in 2016 [5]. Evidently, Nepal has not yet reached the SDG of having maternal death ratio to fewer than 70 per 100000 live births although efforts have been made to increase utilization of institutional delivery service in Nepal. The rising maternal death rates in the country suggest that they have not been successful. Importantly, adverse effects of home delivery on the health of the mother have been documented in the literature [6].

The Chepang population is a marginalized group of people residing on hilly slope areas spreading in many districts of Nepal, of which, the Chitwan district has the largest number of the Chepang population. And a previous study done by Ghimire and Maharjan showed a substantial difference in the usage of healthcare services amongst Chepang and Non-Chepang pregnant woman [7]. It is, therefore, important

to understand the factors influencing the delivery practices and their consequences among the Chepang pregnant women in Chitwan District. The results of this study will provide valuable information to concerned authorities in Nepal in policy development and program planning to improve the usage of institutional delivery facilities among Chepang. Though the previous study showed the percentage of Chepang women utilizing the institutional services, there was no study aimed at finding out the real reasons behind the low use of the institutional services among the Chepang community [5].

Therefore, the objective of this study was to assess the incidence of delivery complication of Chepang women who used and did not use the institutional delivery services and to investigate the factors associated with utilization of institutional delivery of the Chepang women in Chitwan district.

The conceptual framework of the study (fig 1) is based on the documentation of various factors that showed association with utilization of institutional delivery in the different literatures.

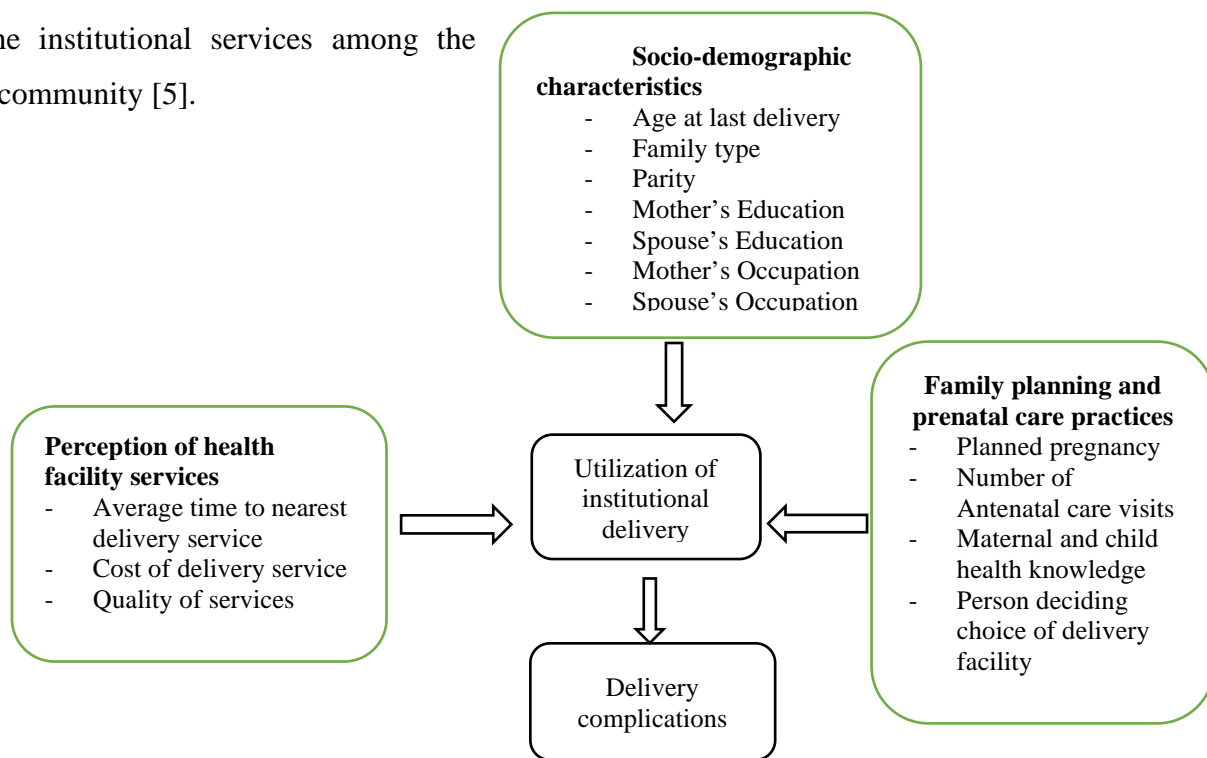


Figure 1: Theoretical conceptual framework demonstrating factors related to utilization of healthcare facility

## 2. Methods

### 2.1 Study design

A cross-sectional study was conducted to assess the incidence of delivery complications

of the reproductive age Chepang women who gave live birth in the past two years and examine the factors associated with their utilization of institutional delivery services.

## **2.2 Study area**

Due to geographical challenges (like people living in remote areas and hilly sloppy areas which do not have easy access to the road or vehicles), the study areas were purposively selected based on the number of Chepang population living in the areas. The top 3 municipalities (Rapti, Kalika and Ichchhakamana) having the largest Chepang population were selected. Next, the top 3 wards having the largest Chepang population in the selected municipalities were selected as the study areas.

## **2.3 Study population**

The study included all women who had given birth during the past two-year period between March 1, 2019 to March 1 2021 (i.e., one week prior to the start of data collection, which allowed FCHVs (Female Community Health Volunteer) one week to record the birth).

## **2.4 Inclusion and exclusion criteria**

The study included only the eligible study population who delivered at least one live birth at the age of 15-49 years in the past two years and was able to communicate in the Nepali language. They were excluded from the study if they had mental and physical disabilities that might hinder communication, including those

aged 15-17 years having guardians who cannot communicate in the Nepali language.

## **2.5 Sample size and sampling technique**

The required sample size was estimated using Epi Info software using the information on the institutional delivery usage by maternal education levels, ANC visits, birth order, and experience of complications from a previous study [8]. Due to limited resources, the sample size of 557 was determined for the study, allowing for detecting a significant OR as low as 1.7 with 80% power and 95% confidence interval.

A proportionate random sampling technique was used to select a sample of 557 participants from the total of 835 eligible study population from the 9 study wards.

## **2.6 Data collection**

A face-to-face interview was used to gather the data after obtaining an informed consent from the respondents. The researcher and nine well-trained FCHVs undertook the interviews in a private setting which requires about 30 minutes to complete an interview. The data on dependent variable and independent variables collected from the interview

## **2.7 Data collection tools**

The interview was undertaken using a structured questionnaire adapted from the questionnaire used in the previous survey [9]. The original questionnaire was in English and was translated to the Nepali language and back-translated to English to ensure the correct translation. The content validity of the questions in the questionnaire was evaluated by three experts with a CVI of 0.975. The questions were modified in responding to the feedback received from the experts. To ensure the clarity of the questions, a pre-test of the questionnaire was done on a group of 20 mothers living in the rural area of the Gorkha district. The questionnaire was adjusted depending on the feedback obtained from the pre-test.

## **2.8 Data collection procedure**

After obtaining an ethical approval from the ethical committee of Thammasat University, the researcher sought an ethical clearance from the NHRC (Nepal Health Research Council), and asked the permissions from the respected municipalities office to collect the data. Subsequently, the researcher contacted nine Female Community Health Volunteers (FCHVs) from each health post wards to obtain the list of the potential respondents of

respective wards and then trained them for data collection. For each municipality, one FCHV undertook the interview after receiving consent from the respondents. If the respondent had an age below 16, the respondent's guardian was asked to give consent.

## **2.9 Data analysis**

The incidence of delivery complications was calculated to assess the occurrence of delivery complications among the respondents utilizing and not utilizing an institutional delivery. A chi-square test was used to compare the variations of the respondents' characteristics of the two groups of the respondents (i.e., their sociodemographic characteristics, family planning and prenatal care practices, and perception of health facility services. In the test, the age at delivery was classified as  $\leq 19$  years, 20-29 years, and 30 years and above. The knowledge of maternal and child health assessed using a scoring system adapted from a previous study [10], was classified as "poor knowledge" for a score of 25% or below, as "fair knowledge" for a score of 26-75%, and as "good knowledge" for a score greater than 75%. All other characteristics variables were nominal measured. A logistic regression model was used to assess the associations between the individual factors and the utilization of institutional delivery of the respondents. A

crude odds ratio and an adjusted odds ratio with its corresponding 95% confidence intervals were calculated for the associations. There was no multi collinearity of the factors in the analyses. All data analyses were performed using SPSS statistical package version 16.

**2.10 Ethical Clearance:**

The present study was approved by the human research committee of Thammasat University (Reference No. COA No.005/2564) and Nepal Health Research Council (Ref. No. 708). In addition, the informed consent was taken from each of the respondents to protect their autonomy.

**3. Results**

**3.1 Incidence of delivery complications in mothers**

As shown in table 1, 260 out of 557 mothers (46.7%) used an institutional delivery service in their latest delivery, while the remaining opted to use a non-institutional delivery service. The incidence of complications was lower among the institutional delivery mothers (9.6%) than the non-institutional delivery services (14.1%). The results also reveal a lower incidence of complications occurring within 24-hr after giving birth (13.5%) among the institutional delivery mothers than the non-institutional mothers (16.5%).

Table 1: Incidence of delivery complications of mothers during delivery and within 24 hours after giving birth

Complications	Institutional Delivery (n=260)		Non-Institutional Delivery (n=297)		Total (n=557)	
	Frequ ency	Percentage	Frequ ency	Percentag e	Frequ ency	Percent age
<b>Faced by mother during last delivery</b>						
Yes	25	9.6	42	14.1	67	12.0
No	235	90.4	255	85.9	490	88.0
<b>Faced by mother within 24 hours after delivery</b>						
Yes	35	13.5	49	16.5	84	15.1
No	225	86.5	248	83.5	473	84.9

Table 2 shows a considerably comparable incidence of the complications occurring during the delivery period faced by the 25 institutional delivery mothers and the 42 non-institutional delivery mothers. About 50% of each group of these mothers experienced

prolonged labor, followed by one-third of them experiencing vaginal hemorrhage. There were slight differences in the complications occurring within 24-hr after giving birth between the 35 institutional delivery mothers and the 49 non-institutional delivery mothers.

Excessive vaginal discharge was the most prevalent complication (34.3%) among the institutional delivery mothers, followed by constipation (25.7%) and postpartum infection (22.9%); meanwhile, most of the non-institutional mothers experienced infections during postpartum (26.5%) and bladder

dysfunction (26.5%), followed by excessive vaginal discharge (22.4%). The findings indicate potential risk if they are not received appropriate medical care from a health professional at the time of delivery. This problem is of more concern for non-institutional delivery mothers.

Table 2: Type of complications faced by mothers in their latest delivery

Complications	Institutional Delivery (n=25)		Non-Institutional Delivery (n=42)		Total (n=67)	
	Frequency*	Percent age	Frequen cy*	Percent age	Frequen cy*	Percent age
<b>*Faced by mothers during last delivery (n=67)</b>						
Prolong labor	11	44.0	20	47.6	31	46.2
Vaginal Hemorrhage	8	32.0	13	30.9	21	31.3
Fetopelvic disproportion	1	4.0	3	7.1	4	6.0
Prolapsed umbilical cord	4	16.0	4	9.5	8	11.9
Nuchal cord	2	8.0	3	7.1	5	7.5
Retained placenta	4	16.0	8	19.0	12	17.9
Shoulder dystocia	3	12.0	3	7.5	6	8.9
<b>* Faced by mother within 24 hours after delivery (n=84)</b>						
		(n=35)		(n=49)		(n=84)
Postpartum Infection	8	22.9	13	26.5	21	25.0
Vaginal Hemorrhage	1	2.9	3	6.1	4	4.8
Perineal pain	7	20.0	7	14.3	14	16.6
Bladder dysfunction	7	20.0	13	26.5	20	23.8
Excessive vaginal discharge	12	34.3	11	22.4	23	27.4
Breast discomfort	7	20.0	6	12.2	13	15.5
Constipation	9	25.7	5	10.2	14	16.7

\*The total number of complications is more than the total number of mothers experienced complications because an individual mother might have multiple complications

### 3.2 Characteristics of the participants

Table 3 presents the characteristics of the institutional delivery mothers and the non-institutional delivery mothers, which included socio-demographic factors (i.e., age at the last

delivery, family type, mother’s and spouse’s education, and mother’s and spouse’s occupation), factors involving family planning and prenatal care practices (i.e., planned pregnancy, antenatal care, the person deciding the choice of delivery service facility, and



mother’s knowledge on maternal and child health), and factors involving the perception of health facility services (i.e., access to the health facility, cost of delivery, transportation means to the nearest health facility, time spent to the delivery service, and perceived quality of health service.

As shown in Table 3, a few socio-demographic factors of both groups of mothers were relatively different ( $p < 0.05$ ), except for family type and spouse’s occupation. More than half of the mothers of both groups were aged 20-29 years; however, there were 2.5 folds’ fewer mothers aged  $\leq 19$  years in the institutional delivery mothers than in the non-institutional delivery mothers. Moreover, the institutional delivery mothers were more likely to be multiparous, literate, and likely to engage in business and services occupations than the non-institutional delivery mothers, as well as more

likely to have literate spouses. The mothers of both groups were not much different regarding the factors involving family planning and prenatal care, i.e., most of them had no planned pregnancy and no antenatal visit, and had poor knowledge of maternal and child health. However, the non-institutional delivery mothers had their parents deciding on the choice of the delivery facility about three folds more than the institutional delivery mothers. For the factors involving the perception of health facility services, most of them in both groups perceived that they had no access to health facilities, cost of institutional delivery services, and poor or satisfactory quality of health services. However, they were significantly different concerning the means to the nearest delivery service and the average time reaching delivery services ( $p < 0.05$ ).

**Table 3: Characteristics of the mothers and utilization of delivery service facilities of their last delivery**

Characteristics	Institutional Delivery (n=260)		Non-Institutional Delivery (n=297)		P-value*
	n	Percentage	n	Percentage	
<b>Age at last delivery</b>					
≤ 19 years	24	9.2	75	25.3	<0.001
20-29 years	188	72.3	173	58.2	
≥ 30 years	48	18.5	49	16.5	
<b>Family Type</b>					
Nuclear	87	33.5	116	39.1	0.171
Joint and Extended	173	66.5	181	60.9	
<b>Parity</b>					
Primi	43	16.5	87	29.3	<0.001
Multi	217	83.5	210	70.7	



Characteristics	Institutional Delivery (n=260)		Non-Institutional Delivery (n=297)		P-value*
	n	Percentage	n	Percentage	
<b>Mother's Education</b>					
Illiterate	13	5.0	135	45.5	<0.001
Literate	247	95.0	162	54.5	
<b>Spouse's Education</b>					
Illiterate	15	5.8	99	33.3	<0.001
Literate	245	94.2	198	66.7	
<b>Mother's Occupation</b>					
Housewife	86	33.0	92	31.0	<0.001
Agriculture	93	35.8	152	51.2	
Wage Labour	33	12.7	26	8.8	
Business and Services	48	18.5	27	9.0	
<b>Spouse's Occupation</b>					
Agriculture	139	53.5	166	55.9	0.214
Wage Labour	92	35.4	90	30.3	
Business and Services	21	8.1	22	7.4	
Foreign Employee	8	3.0	19	6.4	
<b>Person deciding choice of delivery facility</b>					
Wife	43	16.5	52	17.5	0.039
Husband	68	26.2	63	21.2	
Parents or Husband's parent	9	3.5	27	9.1	
Both of spouses	140	53.8	155	52.2	
<b>Planned pregnancy</b>					
Yes	92	35.4	105	35.4	0.994
No	168	64.6	192	64.6	
<b>ANC visit</b>					
None	156	60.0	167	56.2	0.368
< 4 times	72	27.7	100	33.7	
≥ 4 times	32	12.3	30	10.1	
<b>Maternal and child health knowledge</b>					
Poor	108	41.6	120	40.4	0.142
Fair	121	46.5	155	52.2	
Good	31	11.9	22	7.4	
<b>Easy access to health facilities</b>					

Characteristics	Institutional Delivery (n=260)		Non-Institutional Delivery (n=297)		P-value*
	n	Percentage	n	Percentage	
Yes	82	31.5	78	26.3	0.170
No	178	68.5	219	73.7	
<b>Cost of delivery service</b>					
Less than NRs 1000	8	3.1	19	6.4	0.238
1000 NRs and higher	252	96.9	278	93.6	
<b>Transportation to the nearest delivery service</b>					
On foot	160	61.5	210	70.7	0.022
By vehicles	100	38.5	87	29.3	
<b>Average time to nearest delivery service</b>					
Within 30 minutes	63	24.2	50	16.8	0.014
30-60 minutes	68	26.2	64	21.5	
More than 60 minutes	129	49.6	183	61.7	
<b>Quality of health services</b>					
Poor	116	44.6	124	41.8	0.131
Satisfactory	112	43.1	118	39.7	
Good	32	12.3	55	18.5	

\* P-value from Chi-square test

Table 4 shows the results of crude and adjusted odds ratios for the factors associated with the utilization of institutional delivery services for the mothers in Chepang. The crude odds ratio results demonstrate the significantly increased odds of institutional utilization for older age at delivery, multiparity, literate mother and spouse, and mother with business and service occupations. The strongest associations were found for literate mother (OR= 15.83, 95% CI= 8.67-28.92) and literate spouse (OR= 8.17, 95% CI=4.60-14.5). For the family planning and prenatal care practices, decision on the choice of the delivery facility made by the spouses' parents was the only factor found negatively associated with the odds of the

utilization of institutional delivery services (OR=0.40, 95%CI= 0.17-0.95). For the perception of health facilities services, vehicle transportation to the delivery services and travel time of fewer than 60 minutes to reach the delivery service significantly increased the odds of the utilization of institutional delivery services.

After controlling for other factors in the multiple logistic regression model, the increased age at delivery remained significantly increased odds of the utilization of institutional delivery services (OR= 3.28, 95%CI=1.83-5.90 for ages 20-29; OR=3.75, 95%CI=1.80-7.83) for ages ≥30). Similar to the

crude ORs, literate mothers (OR=12.08, 95%CI=6.32-23.06) and literate spouses (OR=5.45, 95%CI=2.82-10.51) were strongly associated with the utilization of institutional delivery services, with a slight decrease in the ORs.

None of the factors involving family planning and prenatal care practices was associated with

the utilization of institutional delivery services. For the perception of health facilities, the associations were observed for vehicle transportation to the delivery facility (OR =1.99, 95% CI =1.28-3.11) and travel time ≤30 minutes to the delivery facility (OR=2.80, 95%CI=1.58-4.96).

Table 4: Factors associated with institutional delivery of Chepang women in Chitwan district

Characteristics	Crude OR (95% CI)	Adjusted OR (95% CI) *
<b>Age at last delivery</b>		
≤ 19 years	1	1
20-29 years	3.40 (2.05-5.62)	3.28 (1.83-5.90)
≥ 30 years	3.06 (1.67-5.62)	3.75 (1.80-7.83)
<b>Family Type</b>		
Nuclear	1	ns
Joint and Extended	1.27 (0.90-1.80)	
<b>Parity</b>		
Primi	1	ns
Multi	2.09 (1.39-3.16)	
<b>Mother's Education</b>		
Illiterate	1	1
Literate	15.83 (8.67-28.92)	12.08 (6.32-23.06)
<b>Spouse's Education</b>		
Illiterate	1	1
Literate	8.17 (4.60-14.51)	5.45 (2.82-10.51)
<b>Mother's Occupation</b>		
Housewife	1	1
Agriculture	0.66 (0.44-0.97)	0.66 (0.41-1.05)
Wage Labour	1.36 (0.75-2.46)	1.20 (0.57-2.50)
Business and Services	1.90 (1.09-3.32)	2.01 (1.01-4.01)
<b>Spouse's Occupation</b>		
Agriculture	1	ns
Wage Labour	1.22 (0.85-1.76)	
Business and Services	1.14 (0.60-2.16)	
Foreign Employee	0.50 (0.21-1.18)	

Characteristics	Crude OR (95% CI)	Adjusted OR (95% CI) *
<b>Person deciding choice of delivery facility</b>		
Wife	1	ns
Husband	1.31 (0.77-2.21)	
Parents or Husband's parent	0.40 (0.17-0.95)	
Both of spouses	1.09 (0.69-1.74)	
<b>Planned pregnancy</b>		
Yes	1	ns
No	1.00 (0.71-1.42)	
<b>ANC visit</b>		
None	1	ns
< 4 times	1.17 (0.83-1.64)	
≥ 4 times		
<b>Maternal and child health knowledge</b>		
Good	1	
Fair	0.55 (0.31-1.01)	ns
Poor	0.64 (0.35-1.17)	
<b>Transportation to the nearest delivery facility</b>		
On foot	1	1
By vehicles	1.51 (1.06-2.15)	1.99 (1.28-3.11)
<b>Easy access to health facilities</b>		
Yes	1	ns
No	0.77 (0.54-1.12)	
<b>Cost for delivery service</b>		
Less than NRs 1000	1	ns
More than NRs 1000	2.12 (0.54-8.30)	
<b>Average time to reach nearest delivery facility</b>		
> 60 minutes	1	
Within 30 minutes	1.79 (1.16-2.76)	2.80 (1.58-4.96)
30-60 minutes	1.51 (1.00-2.27)	1.18 (0.72-1.92)
<b>Quality of health services</b>		
Poor	1	ns
Satisfactory	1.02 (0.71-1.46)	
Good	0.62 (0.38-1.03)	

\*Adjusted for other factors in the model, ns = non-significant at p <0.05

#### 4. Discussions

##### 4.1 Incidence of delivery complications

The present study revealed a less than fifty percent of the respondents utilized institutional delivery in their latest deliveries; similar to a

previous study which showed slightly more than half (53%) of institutional delivery among marginalized women [11]. However, a few studies reported a 57% of nationwide institutional delivery of women in 2016 [12, 13], which is slightly higher than that observed finding among the marginalized Chepang women in the Chitwan district. The observed differences could be partly due to the marginalized women in Chitwan district having less access to the information promoting utilization of institutional delivery services, for instance, the safer mother program in Chitwan district Nepal was mainly implemented in health facilities not community-wide.

This study also found that the institutional delivery mothers experienced a 9.6% incidence of delivery complications during their labor (with 14.1% in non-institutional delivery mothers) and a 13.5% within 24 hours after giving birth (16.5% in non-institutional delivery mothers). This observation was in agreement with the finding of a previous study in the Chitwan district [10]. However, a study in Akordet town, Eritrea found that delivery complications were not significantly related to the place of delivery [14]. The different health systems in Nepal and Eritrea may explain the different findings in the two countries.

## **4.2 Factors associated with institutional delivery**

### **4.2.1 Socio-demographic factors**

The analysis found that mothers of older age at delivery increased the odds of utilizing institutional delivery as compared with the younger age at delivery. The observed findings were in line with the results from a study conducted in Bangladesh [15]. In contrast, the Nepal Demographic and Health Survey in 2011 reported that the teenage mothers were more likely to deliver at a health facility in comparison to the non-teenage mothers [16], which is similar to the results from another study in the Morang district of Nepal [17]. This might indicate that better health literacy existed among younger women than their counterparts among in marginalized community [18].

Further, the analysis found a strong association between literate mother and father with institutional delivery of Chepang women, which was consistent with several studies [19]. In concordance with the present study, a study conducted in rural communities of the minority Afar ethnic group in Eritrea found that mothers whose husbands had no formal education were less likely to deliver in a health facility [20].

Among various mothers' occupations, only business and services occupations were significantly associated with institutional

delivery services as compared to the housewife mothers. This finding was in line with other studies conducted in Morang of Nepal [17], and Ethiopia [21]. In addition, previous studies conducted in Ethiopia [22] and Southwest Ethiopia [23] also found that employed women were more likely to utilize institutional delivery as compared with housewife women. This consistent evidence suggested that mothers involved in business and services might be able to earn more revenue than other occupations, and hence be able to pay for health services costs [24].

However, this analysis did not find a significant association of other socio-demographic factors with the institutional delivery of the Chepang women, including family types, parity, and spouse's occupation. This evidence was similar to the results reported in other studies [19, 20].

The significant results of the socio-demographic factors observed in this study suggest that the literacy of mothers and spouses, and business and service occupations of mothers may be able to generate higher income and have more access to health information than their counterparts. As a result, they have more opportunities to utilize institutional delivery services.

#### **4.2.2 Family planning and prenatal care practices**

The analysis found that the decision on the choice of the delivery facility made by the spouses' parents significantly decreased the odds of the utilization of institutional delivery services, while the decisions made by the mother and/or spouse were insignificant. However, another study in Eritrea reported that institutional delivery is more likely if the mother and husband jointly took the decision for delivery places [20]. The insignificant associations were also found for planned pregnancy and antenatal care visits. However, a study conducted on marginalized Dalit mothers in the Mahottari district of Nepal found that the mothers who planned for their last pregnancy and received more ANC services were more likely to have their delivery at a health institution [19]. Also, a study conducted among marginalized women in Karnataka, India found that women receiving more ANC service were more likely to have institutional delivery [25].

The present study did not find a significant association of knowledge regarding maternal and child health with institutional delivery, but other studies found that the women having knowledge about danger signs during delivery

were more likely to have institutional delivery than the insufficient knowledge mother [26]

. This divergence might be due to the different methodologies, adopted by different studies. The studies done by Pathak et al. (2018) and Demilew et al. (2016) were the population survey covering a large sample size [17, 26].

#### **4.2.3 Perception of health facility services**

The analysis found that access to vehicle transportation significantly increased the odds of utilizing institutional delivery, which was in accordance with a study in rural communities of minority afar ethnic groups in Eritrea [20], and a study in rural communities of India [27]. Another study in Uttar Pradesh also reported that those who have access to health facilities and transport were seven times more likely to undergo delivery in a health facility than those mothers who have to walk on their feet in India [28].

Travel time to the nearest institutional delivery facility can be an important factor in accessing the institutional delivery. This analysis found that the less travel time to reach the facility significantly increased the odds of institutional delivery. These findings were consistent with several previous studies, such as a study in remote mountain Mugu district and Kaski district of Nepal [29, 30], and a study in a rural

village of Kavrepalanchowk district of Nepal [8].

It was reported that the institutional delivery was high among those who were satisfied with the quality of delivery care in the study conducted among rural and minority ethnic groups of Eritrea [20]. However, this analysis did not find such evidence, which is consistent with a study conducted among marginalized (disadvantaged) Dalit mothers in the Mahottari district of Nepal [19].

In light of the information discussed above, the findings of this study demonstrated that age at delivery, literacy of mothers and spouses, ability to generate income for mothers, and convenient access to the delivery facility are significant factors associated with the utilization of institutional delivery of Chepang women in Chitwan district.

This study may have a few limitations that might affect the validity of the results. The cross-sectional study design of this study limits the opportunity to assess the temporal association of the findings. Besides, information bias is possible as the respondents had to recall the information on delivery services, delivery complications, and the independent variables in the two past years. However, delivery is a significant event and



unlikely to be forgotten by a mother where the last delivery in the past two years was undertaken.

As a result, the information bias of this outcome is minimized. A considerable strength of this study is that it was conducted in a specific marginalized (disadvantaged) community of Chepang, in which the information about the utilization of institutional delivery services is scarce.

### **5. Conclusions**

The study revealed a low proportion of the Chepang women utilized institutional delivery in their latest deliveries and a lower incidence of delivery complications among those who utilized the institutional delivery than those not using the institutional delivery. The analysis also demonstrated that mothers with older age, literacy and income-generating potential, having literate spouse, and convenient access to an institutional delivery facility were associated with the increased utilization of institutional delivery. The results obtained could be beneficial information for health professionals in developing health programs to increase the coverage of utilization of institutional delivery services of the vulnerable marginalized Chepang women. They also provide insights for identifying vulnerable Chepang women, who tend to lack opportunities for institutional delivery services

usage, to be targeted in the implementation of the health program.

A collaborative effort from responsible governmental and non-governmental organizations is needed to promote the utilization of institutional delivery among marginalized Chepang women, especially among the vulnerable group. i.e., adolescents and low socio-economic status women residing in remote areas where transportation to an institutional delivery facility is inconvenient. Community-wide implementation of health programs for raising awareness of reproductive health and utilization of institutional delivery is suggested in the marginalized Chepang communities of Chitwan District, especially among the vulnerable population. In addition, expanding birthing centers in these disadvantaged areas should be addressed in the national health system development. Similarly, it is recommended that large-scale studies have to be conducted among Chepang communities exploring qualitative methods to explore the perception and in-depth information regarding the institutional delivery among marginalized Chepang women.

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### Conflict of interests

The authors declare that they have no competing interests.

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