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# Factors affecting health facility delivery in rural Nawalparasi district of Nepal

<sup>1</sup>Preeti K Mahato<sup>1</sup>, Edwin van Teijlingen<sup>2</sup>, Padam Simkhada<sup>3</sup>, Catherine Angell<sup>4</sup>, Zoe A. Sheppard<sup>5</sup>, Ram Chandra Silwal<sup>6</sup>, Padmadharini Fanning<sup>7</sup>

1. Centre for Midwifery, Maternal & Perinatal Health, Faculty of Health & Social Sciences, Bournemouth House, 19 Christchurch Road, Bournemouth University, Bournemouth BH1 3LH, England, UK, Email: [pmahato@bournemouth.ac.uk](mailto:pmahato@bournemouth.ac.uk)
2. Bournemouth University, Bournemouth, UK & Manmohan Memorial Institute of Health Sciences, Tribhuvan University, Nepal, [evteijlingen@bournemouth.ac.uk](mailto:evteijlingen@bournemouth.ac.uk)
3. Liverpool John Moores University, Liverpool, UK & Manmohan Memorial Institute of Health Sciences, Tribhuvan University, Nepal, [P.P.Simkhada@ljmu.ac.uk](mailto:P.P.Simkhada@ljmu.ac.uk)
4. Bournemouth University, Bournemouth, UK, [cangell@bournemouth.ac.uk](mailto:cangell@bournemouth.ac.uk)
5. Bournemouth University, Bournemouth, UK, [zsheppard@bournemouth.ac.uk](mailto:zsheppard@bournemouth.ac.uk)
6. Green Tara Nepal, Kathmandu, Nepal, [ramsilwal99@gmail.com](mailto:ramsilwal99@gmail.com)
7. Green Tara Trust, London, UK, [gttpadmadharini@gmail.com](mailto:gttpadmadharini@gmail.com)

## Abstract

**Objective:** In Nepal, both percentage of women giving birth at health facility and proportion of birth assisted by skilled birth attendant is very low. The purpose of this research was to identify predictors for choice of place of birth: either at home, primary health care facility (including birthing centres) or at tertiary health care facilities (hospitals and clinics).

**Methods:** A cross-sectional household survey was conducted in seven villages of a district lying in plain area of Nepal: Nawalparasi. A structured interview questionnaire was developed and administered face-to-face. Descriptive analysis along with chi-square test and multinomial logistic regression was used to identify the predictors of giving birth at a health care facility.

**Results:** Women were significantly more likely to give birth at health care facilities compared to home if the distance was less than one hour, belonged to advantaged caste, had radio, television

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<sup>1</sup> Corresponding Author

and motorbike/scooter, decision maker for place of delivery was husband, reported their frequency of antenatal (ANC) visits at 4 or more and belonged to age group 15-19.

**Conclusion:** The analysis indicates that husbands of women giving birth influence the choice of place of birth. The findings highlight importance of having four or more ANC visits to the health institutions and that it should be located within one-hour walking distance. Inequity in utilisation of delivery services at health institutions exists as showed by low utilisation of such services by disadvantaged caste.

### **Highlights**

- Percentage of women giving birth at health facility is very low in Nepal
- Determinants of health facility delivery was investigated at two levels of care: primary and tertiary
- Women have less control over making decisions related to their choice for place of birth
- It is important to have four or more antenatal visits to health institutions
- Inequity in utilisation of delivery services at health institutions exists
- Health facilities should be located within one-hour walking distance

### **Introduction**

The new Sustainable Development Goals (SDGs) 2030 have a target specific to maternal health set under goal 3.1 which states the reduction of global MMR to 70 per 100,000 live births (1). The estimated global maternal deaths in 2013 were 289,000 of which South Asia shared second most number of deaths (69,000) (2). The World Health Organization (WHO) estimated the MMR of Nepal to be 190 per 100,000 live births (2). Safe birth is often related to giving birth in the presence of skilled birth attendants (SBA) at health facilities where basic obstetric care is available preferably with midwives as the main providers; and emergency obstetric care is available for women with complications and are treated at hospitals with doctors as the main providers (3, 4). In Nepal, although the percentage of births taking place in health facilities doubled from 18% in 2006 to 35% in 2011, the proportions of births assisted by a SBA was only 36% in 2011 (5). Recent data shows only 56% of women were attended by SBA at birth in 2014, and the inequalities between the poorest (25.5%) and wealthiest (93.3%) quintiles was very wide (6). With such high MMR, Nepal still lacks professional midwives (7). However, current statistics shows there are around 7000 auxiliary nurse midwives, nurses and doctors trained to be SBAs through an in-service education curriculum introduced in 2007 (8). Midwifery is associated with more efficient use of resources and improved outcomes when provided by midwives who are educated, trained, licenced and regulated. Midwives when integrated in the health system and working in interdisciplinary teams provide positive effect on maternal and perinatal outcome (9).

Health facilities in Nepal are provided in various levels: starting with sub-health posts (SHP) which are initial contact points for basic health services; health posts (HP) which offer the same services as SHPs and additionally a birthing centre; primary health care centres (PHCC); on to district, zonal, sub-regional, regional and finally to tertiary level hospitals (10). Such hierarchy of health facilities has been designed to provide continuum of care whereby people can access appropriate care at a place near them at an affordable price.

Although studies have previously determined factors affecting birth at health facilities in Nepal (11, 12), this study aims to go a step further to investigate the factors associated with different places of birth including home, primary healthcare and tertiary healthcare including hospitals and clinics. This study used a baseline household survey in seven village development committees (VDCs) of Nawalparasi district.

## **Methods**

### *Study design and sampling*

The study conducted as a baseline assessment survey consisted of a cross-sectional household survey conducted from June to August 2012. The inclusion criteria were women of reproductive age (15-49 years) having at least one child below 24 months of age at the time of survey (13). As this was a household survey, all the eligible participants from each household in the seven VDCs who agreed to take part were approached and a structured questionnaire was completed.

### *Study setting*

The study was conducted in Nawalparasi district lying in the plain areas of Nepal. The total population of Nawalparasi district was 643,508 according to the 2011 National Census (14). For the baseline assessment survey, seven VDCs were identified which had highest number of vulnerable and disadvantaged group of people (including women and children, the poor, underprivileged and marginalised) based on the Disadvantage Group (DAG) mapping conducted by the Nawalparasi District Development Committee. The baseline survey aimed to establish the socio-demographic, socio-economic, maternal related and other factors affecting health facility birth especially at the birthing centres and primary care facilities.

### *Data collection*

A structured interview questionnaire was developed and administered face-to-face to collect information related to delivery at health facilities and the associated factors. The questionnaire was adapted from the Nepal Demographic and Health Survey (NDHS) and Water and Sanitation Survey. The questionnaire which was originally developed in English was translated to Nepali. A similar version was used elsewhere in Nepal (13) and this adaptation was piloted (15) in a sample population of selected seven VDCs in Nawalparasi. Three enumerators were trained and mobilised

for data collection and entry. These enumerators had at least a Bachelor level qualification in a health subject.

### *Measures*

The outcome variable for the study was place of delivery categorised as either (a) home/on way (on way referred to while traveling to the health facility), or (b) at primary care facility including birthing centres, and (c) hospitals/clinics. The explanatory variables were based on previous literature on the determinants of institutional delivery and grouped under three main categories - individual, household, and obstetric/maternal characteristics. The individual characteristics included age of the women, caste, religion, literacy, occupation, husband's education and husband's occupation.

The age of women was categorised into four groups (15-19, 20-24, 25-29, 30+ years). The Health Management and Information System (HMIS) of the Government of Nepal use a classification system with six groups for caste - Dalits, disadvantaged Janajatis (indigenous), disadvantaged non-Dalit Terai caste groups, religious minorities, relatively advantaged Janajatis and upper caste group (16). This study included two groups - disadvantaged including Dalit, disadvantaged Janjati, religious minority and Terai caste; and advantaged including Brahmin, Chhetri and advantaged Janajati. Education was categorised as illiterate, primary, and secondary and above. The women were first asked about their literacy status, the grade they attended, and finally were categorised into three groups as mentioned above. In contrast, husbands' education was based on that reported by the women. Women's occupation was grouped differently for women and their husbands based on their gender roles in society. Women's occupation was grouped as housewife and others (including student, farmer, service, business) whereas husband's occupation was grouped as farmer, skilled labour (including teacher) and unskilled labour.

Various individual variables were used to assess socio-economic status (SES) rather than using a wealth index as used by some studies (11, 12), as wealth indices are useful when controlling for SES but individual variables are needed to examine different dimensions of SES (17). Another main aim of this paper was to assess inequality in utilising delivery service which can be measured by individual socio-economic variables rather than a wealth index because a wealth index could potentially be a good proxy for wealth but provide poor measurement of inequality (18). Individual variables used for determining SES in this study included maternal literacy, having electricity at home or not, possession of radio/television (19), type of toilet facility, main roof material (20), ownership of motorcycle/scooter and land ownership (21).

Health service characteristics included time taken to reach the health facility, decision maker for the place of delivery and person assisting delivery. Time to reach the health facility was categorised as less than one hour, one hour and above, and don't know/ no response. The decision maker for place of delivery was recoded into three categories as participants, husbands, and family

members and others. Finally, the grouping for the person assisting delivery was skilled health professionals and others with the latter group including both unskilled and others.

Obstetric and maternal characteristics included total pregnancy, timing of first pregnancy check-up, planning for the most recent pregnancy and frequency of antenatal check-up (ANC) visits.

### *Analysis*

Data collected through the questionnaire were entered into SPSS 16 (IBM SPSS Inc., USA) based on the codes provided to the questions and the analysis carried out using this software. Before performing analysis, recoding of the variables into appropriate categories was conducted (as detailed above). At the initial stage, descriptive analyses were carried out. Chi square tests were conducted to identify associations between explanatory variables and the outcome of interest (the three different places of delivery). Multinomial logistic regression was then used to compare the delivery at primary health centre and hospitals/clinics with delivery at home/on way as the reference category after adjusting for age of respondents, time to reach health facility, caste, husband's education, husband's occupation, literacy of respondents, radio at home, television at home, having a motorcycle or scooter at home, decision maker of pregnancy, timing for first antenatal check-up and frequency of ANC visit. Only these factors were adjusted for since they showed a significant association with place of delivery using the chi-square test. However, three factors which showed significant association (women's education, person assisting birth and financial assistance received) were removed from the model after checking for collinearity. For each covariate the last group was kept as a reference group. Delivery at home or on way is kept as reference since the objective of this paper was to measure institutional delivery.

### *Ethical approval*

Ethical approval to conduct maternal and neonatal health related studies in the rural areas of Nawalparasi district was obtained from the Nepal Health Research Council in 2012. The purpose of the research was explained and verbal consent was taken (as not all were literate) from the participants before enrolling them in the study. The participants were free to leave the study at any time of the research.

## **Results**

A total of 631 women were approached, the data enumerators intended to include all eligible however 3 didn't took part in the survey (non-response rate is less than one percent) and 2 were taken out after data cleaning leaving 626 in total. Table 1 presents the socio-demographic and socio-economic characteristics of the study sample. The majority of women in the study belonged to age group 20-24 years (n= 248, 39.7%), disadvantaged caste (n= 567, 90.6%), and Hindu religion (n= 521, 83.2%) and were married between 15 and 19 years (n= 324, 51.9%). A

higher proportion of women (n= 386, 63.4%) were illiterate in contrast to their reporting of their husband's education (n= 172, 27.9%). Almost all respondents were housewives (n= 608, 97.3%) whereas just over half (n=333, 53.4%) reported that their husbands were farmers.

Table 1: Socio-demographic and socio-economic characteristics of participants

<b>Characteristics</b>	<b>Frequency (n)</b>	<b>Percentage</b>
<b>Age of women during study (years)</b>	625	
15-19	73	11.7
20-24	248	39.7
25-29	215	34.4
30 and above	89	14.2
<b>Caste of women</b>	626	
Disadvantaged	567	90.6
Advantaged	59	9.4
<b>Religion of women</b>	626	
Hindu	521	83.2
Muslim and others	105	16.8
<b>Age at marriage (years) (n=624)</b>		
Below 15	161	25.8
15-19	324	51.9
20 and above	139	22.3
<b>Education of women</b>	609	
Illiterate	386	63.4
Primary	182	29.9
Secondary and above	41	6.7

<b>Main occupation of women</b>	625	
Housewife	608	97.3
Others	17	2.7
<b>Husband's education</b>	617	
Illiterate	172	27.9
Primary	342	55.4
Secondary and above	103	16.7
<b>Husband's occupation</b>	624	
Farmer	333	53.4
Skilled labour and teacher	164	26.2
Unskilled labour and other	127	20.4
<b>Women's literacy</b>	622	
Literate	239	38.4
Illiterate	383	61.6
<b>Electricity at home</b>	628	
Yes	524	83.4
No	104	16.6
<b>Radio at home</b>	627	
Yes	81	12.9
No	546	87.1
<b>Television at home</b>	628	
Yes	334	53.2
No	294	46.8
<b>Roof material of the house</b>	626	

Cemented	219	34.9
Tinned	45	7.2
Tiled	208	33.1
Hay	152	24.2
Other	2	0.6
<b>Ownership of Motorcycle or scooter</b>	627	
Yes	104	16.6
No	523	83.4
<b>Land owned in Katha*</b>	628	
Less than 10	294	46.8
10 and above	334	53.2

\*1 katha is equivalent to 338.57 m<sup>2</sup>

Table 2 presents the health services, obstetric and maternal characteristics of the study sample. For most of the women (n= 416, 66.2%), the nearest health centre was less than one hour in distance. When asked about the decision maker for the place of delivery, the majority reported the husband (n= 273, 43.7%), followed by family members and others (n= 249, 39.8%) including mother in law, father in law, maternal parents, grandmother or health workers and only few (n= 103, 16.5%) said they decided by themselves. The majority of deliveries were assisted by skilled professionals (n= 341, 55.0%) which included doctors, nurses, health assistants, community medicine assistants, maternal and child health workers and other health professionals. More than 90 per cent of the respondents reported their last pregnancy to be planned (n= 562, 90.4%) and when asked about their frequency of ANC check-up, almost 60% had four or more (376).

Table 2: Health services, Obstetric and Maternal characteristics of respondents

<b>Characteristics</b>	<b>Frequency (n)</b>	<b>Percentage</b>
<b>Time to reach health centre</b>	628	
Less than one hour	416	66.2
One hour and above	156	24.9

Don't know/ didn't disclose	56	8.9
<b>Decision maker for place of delivery</b>	625	
Woman	103	16.5
Husband	273	43.7
Family members/others	249	39.8
<b>Person assisting delivery</b>	620	
Skilled health professionals	341	55.0
Unskilled people and others	279	45.0
<b>Received financial assistance for delivery</b>	617	
<b>Yes</b>	216	35.0
<b>No</b>	401	65.0
<b>Age at first pregnancy (years)</b>	619	
Below 15	24	3.9
15-19	278	44.9
20 and above	317	51.2
<b>Total number of pregnancies (gravida)</b>	627	
1-3	519	82.8
4 and above	108	17.2
<b>Timing of first pregnancy check up</b>	627	
First trimester	268	42.7
Second and third trimester	294	46.9

Didn't disclose	65	10.4
<b>Last pregnancy</b>	622	
Planned	562	90.4
Unplanned	60	9.6
<b>Frequency of antenatal check-up</b>	628	
Less than 4	197	31.4
4 and above	376	59.9
Don't prefer to disclose	55	8.8

Table 3 shows the multivariate analysis results for factors affecting place of delivery where delivery in primary health centres and hospitals/private clinics are being compared with those who delivered at home or on the way to the health facility. The estimates presented here for each variable are adjusted, controlling for all the other variables in the model (variables found significant in the chi-square tests (not shown) but excluding those variables with collinearity issues (women's education, person assisting birth and financial assistance received).

Generally, controlling for the other variables, the odds of delivering at both primary care centre and hospitals as compared to home/on way decreased with age, although significant results were observed only for those delivering at hospitals/clinics and for age range 15-19 years with 30 years and above as the reference category (Odds Ratio (OR) 2.87, p-value 0.018). Women who resided less than an hour away from a health facility were twice as likely to deliver in a primary health centre compared to home/on the way than those who resided an hour or more away (OR 2.18, p-value 0.027). Compared to their advantaged counterparts, women belonging to disadvantaged castes were less likely to deliver at primary health centres than at home/on the way (OR 0.33, p-value 0.01). In other words, the odds of advantaged caste attending primary health centres compared to giving birth at home/on way are  $1/0.33 = 3.03$  times more than for the disadvantaged caste.

Educational level of husbands also determined if the respondents delivered at health facilities. Women whose husbands were either illiterate (OR 0.37 p-value 0.009) or had only primary level education (OR 0.46, p-value 0.01) were significantly less likely compared to women with husbands with secondary level education to give birth at the hospitals/clinics compared to home/on way. In contrast, literacy of women showed no significant association with place of delivery. The odds of women (whose husbands were farmers) delivering at both the primary care

centre and at hospital compared to delivering at home/on way were respectively 0.39 (p-value 0.009) and 0.42 (p-value 0.003) times lower than women whose husbands' were unskilled.

Other significant socio-economic associations found were with the ownership of consumer durables. Respondents were more likely to deliver both at primary health centres (OR 2.61, p-value 0.015) and at hospitals/clinics (OR 2.36, p-value 0.014) than delivering at home/on the way if they owned a radio at home than those who did not owned radio. Similarly, those respondents who had a television at home also had significantly higher odds of giving birth at a primary health centre (OR 1.92, p-value 0.034) than at home/on the way compared to those who did not own a television.

Women whose husbands were the decision makers for place of delivery had increased odds of delivering at both primary health centres (OR 2.19, p-value 0.01) and at hospitals/clinics (OR 1.87, p-value 0.10) than delivering at home/on the way compared to women whose family members/others were the decision makers. However, the reverse was the case for respondents themselves, with women being less likely to deliver at both primary health centres and hospitals/clinics than at home/on the way if they were the decision maker for the place of delivery compared to family members/others. Finally, respondents who reported their frequency of the ANC visits as 1-3 compared to 4 or more had lower odds for giving birth at a primary health facility than giving birth at home/on way.

Table 3: Multinomial logistic regression of factors affecting place of delivery in Nawalparasi

Variables	Primary health centre vs home/on way	Hospitals/clinics vs home/on way
	OR (95% CI)	OR (95% CI)
<b>Age of respondent (years)</b>		
<b>(Ref 30 and above)</b>		
15-19	2.15 (0.73,6.29)	2.87* (1.19,6.89)
20-24	0.89 (0.38,2.10)	1.38 (0.70,2.73)
25-29	1.34 (0.57,3.13)	1.25 (0.62,2.51)
<b>Time to reach health facility</b>		
<b>(Ref one hour and above)</b>		
Less than one hour	2.18* (1.09,4.36)	0.92 (0.58,1.47)
<b>Caste of respondent</b>		

<b>(Ref advantaged group)</b>		
Disadvantaged	0.33* (0.14,0.77)	0.54 (0.25,1.15)
<b>Husband's education</b>		
<b>(Ref Secondary and above)</b>		
Illiterate	0.74 (0.29,1.85)	0.37** (0.18,0.78)
Primary	0.66 (0.30,1.40)	0.46* (0.25,0.84)
<b>Husband's occupation</b>		
<b>(Ref Unskilled and others)</b>		
Farmer	0.39** (0.19,0.79)	0.42** (0.27,0.74)
Skilled	0.89 (0.45,1.99)	0.63 (0.34,1.18)
<b>Literacy of respondent</b>		
<b>(Ref Illiterate)</b>		
Literate	1.50 (0.82,2.72)	1.40 (0.87,2.24)
<b>Radio at home</b>		
<b>(Ref No)</b>		
Yes	2.61* (1.20,5.66)	2.36* (1.19,4.69)
<b>Television at home</b>		
<b>(Ref No)</b>		
Yes	1.92* (1.05,3.51)	1.05 (0.65,1.67)
<b>Have a motorcycle/scooter</b>		
<b>(Ref No)</b>		
Yes	1.03 (0.48, 2.19)	1.87* (1.05,3.35)
<b>Timing of 1<sup>st</sup> antenatal check</b>		
<b>(Ref Don't want to disclose)</b>		
	1.01(0.14,7.27)	

1 <sup>st</sup> trimester	1.04(0.14,7.46)	0.87 (0.17,4.43)
2 <sup>nd</sup> and 3 <sup>rd</sup> trimester		0.73 (0.14,3.68)
<b>Decision maker for place of delivery</b>		
<b>(Ref Family members/others)</b>		
Participant	0.14*** (0.05,0.39)	0.17***(0.08,0.35)
Husband	2.19** (1.20,4.00)	1.87** (1.16,3.01)
<b>Frequency of ANC visit</b>		
<b>(Ref 4 or more)</b>		
1-3	0.37** (0.19,0.71)	0.73 (0.46,1.16)
*p<0.05, **p<0.01, ***p<0.001		
OR – Odds Ratio		CI – Confidence Interval

## Discussion

This study was conducted to determine various factors related to place of birth mainly birth at primary health centres and at hospitals and clinics compared to at home/on the way. Giving birth at the health facilities is determined by the distance to these facilities which is demonstrated by the results. Results from this study also show that women belonging to disadvantaged castes were less likely to attend health institutions for childbirth compared to advantaged castes which was significant for primary health centres. Women whose husbands had primary level education or were illiterate were significantly less likely to give birth at health institutions. Women whose husbands were farmers were less likely to give birth at the health institutions compared to husbands in other occupations. Having a radio, television and motorcycle or scooter at home, were all associated with institutional delivery. The results showed women having a radio at home were more likely to attend both primary health facilities as well as hospitals/clinics. Those women who had motorcycle or scooter at home were significantly more likely to deliver at hospital/clinics. The results indicate number of ANC visits and decision making capacity of women determined their place of birth. This study showed women were significantly less likely to attend health facilities (both primary facilities and hospitals/clinics) for birth if they decided alone regarding the place for delivery. On the contrary, if the decision was taken by their husbands, they were more likely to attend health facilities for delivery.

The following discussion will help elaborate on the results from this study.

*Distance to health facility:* The results of this study were consistent with other similar studies conducted in rural Nepal (11-13) and Ethiopia (22, 23) where distance to health facility affected attending health facility. Women are more likely to give birth at primary health centres if they

are located within a one-hour distance. Health facilities especially birthing centres in the rural areas of Nepal should therefore be located within one-hour distance to increase utilisation.

*Socio-economic and socio-demographic factors:* Belonging to certain caste affected the place of birth. The results are like other studies in rural Nepal where advantaged women were found to be more likely to give birth in health institutions than their counterparts who belonged to disadvantaged castes (11, 12). This indicates there is inequity in utilisation of birthing services at the health facilities which may be due to socio-economic and socio-demographic factors.

Those women who had a television at home were significantly more likely to give birth at the primary health facilities which was similar to results shown by research conducted in Bangladesh (24). Similar to this study, other studies (28) show household wealth to be significantly associated with institutional delivery.

*Literacy level:* Similarly, literacy level of women and their husbands affected place of birth. One study in Bangladesh showed significantly higher institutional birth rate for couples' education (24) although in this study literacy of women had no significant association with place of delivery contrary to other studies in Nepal (25) and Ethiopia (26, 27) where the educational level of women affected place of birth. This result was however similar to one of the studies in rural Nepal where education level of women showed no clear association with place of birth (11). This might be related to the low literacy level of farmers and thus low awareness regarding complications arising during childbirth and the advantages of giving birth at the health institutions.

*Number of ANC visits and decision regarding place of birth:* The results of this study show lower than four ANC visits resulted in decreased utilisation of institutional birth services especially at primary health facilities as shown by a study in Ethiopia (22) and another study in rural Nepal where women who attended antenatal services were four times more likely to attend institutional delivery (12). A study conducted in Nepal regarding uptake of ANC showed how women's decision of uptake of the ANC services is influenced by husbands and mother-in-laws and less influenced by the women themselves (29). Another study conducted in rural Nepal also established that the decision for uptake of the institutional birth services was influenced more by family members or family members and women and not by women alone (11). Similar studies where husbands' influence over decision making for place of delivery was also seen were in Tanzania (30) and in Bangladesh (31). This shows that women have less control over making decisions related to their choice of giving birth in health facilities especially in rural Nepal. Since husbands have greater decision making power, it is important to involve husbands in programs related to maternal health.

### *Strengths and Limitations*

The key strength of this cross-sectional household survey is that it offers a comprehensive picture of socio-demographic, socio-economic, maternal related and other factors affecting

institutional delivery. The non-response rate was very low (less than one percent). However, one of the main limitations of this cross-sectional study is that it only found the factors associated with health facility birth but was not able to establish the causes behind it. Furthermore, it is confined to only seven VDCs of Nawalparasi district which has a high number of disadvantaged people and thus affects generalisability of the study to the whole Nepalese population. Therefore, further qualitative work is needed to explore the reasons behind the findings as well as investigation in other districts of Nepal.

## **Conclusion**

This study conducted in rural Nawalparasi district regarding factors affecting health facility birth shows that distance to health facility, socio-economic, socio-demographic, literacy level, number of ANC visits and decision regarding place of birth play a significant role in determining the place of childbirth. Access to health institutions is a key factor in increasing the uptake of delivery services as shown by this study. Availability of health institutions within one hour of walking distance and focusing on education should be the prime focus of the government. There is inequity in utilisation of delivery services at health institutions as showed by low utilisation of such services by disadvantaged caste. Level of literacy also has a role in determining uptake of delivery services made available at health institutions.

One of the major finding emphasises the importance of having four or more ANC visits to the health institutions. Although the government of Nepal already has the policy of four ANC visits during pregnancy, this needs to be given more emphasis especially in rural areas through various public health campaigns perhaps through female community health volunteer (FCHV), radio and television. Another important finding of this study suggests that women have less control over making decisions related to their choice for place of birth compared to their family members. Such decisions are rather made by family members especially husbands and thus they need to be targeted for involving in programs related to promotion of maternal health.

This cross-sectional study identified factors responsible for determining place of childbirth but it fails to explain the reasons for inequity in utilisation of health services and how these could be addressed at the local and national level. Further exploration of causes and possible remedies is needed. Thus, more qualitative studies are required which can explore reasons for such inequity and possible solutions.

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## **Conflict of interest**

The authors declare no conflict of interest.

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