

# BMJ Open Need factors for utilisation of institutional delivery services in Nepal: an analysis from Nepal Demographic and Health Survey, 2011

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## ABSTRACT

**Objective:** This study aims to assess the role of need factors with respect to the utilisation of institutional delivery services in Nepal.

**Design:** An analytic study was conducted using a subset of 4079 ever married women from the 2011 Nepal Demographic and Health Survey, which utilised two-stage cluster sampling. Logistic regression with complex sample analysis was performed to evaluate the effects of antenatal care visits and birth preparedness activities on facility delivery.

**Outcome measures:** Facility delivery.

**Results:** Overall facility delivery rate was low at 36.9% (95% CI 33.5% to 40.2%, SE 1.69). Only half (50.1%) of the women made four or more antenatal care visits while 62.9% (95% CI 59.9% to 65.8%, SE 1.51) did not indicate any of the four birth preparation activities. After adjusting for external, predisposing and enabling factors, women who made more than four antenatal care visits were five times more likely to deliver at a health facility when compared to those who paid no visit (adjusted OR 4.94, 95% CI 3.14 to 7.76). Similarly, the likelihood for facility delivery increased by 3.4-fold among women who prepared for at least two of the four activities compared to their counterparts who made no preparation (adjusted OR 3.41, 95% CI 2.01 to 5.58).

**Conclusions:** The perceived need, as expressed by the frequency of antenatal care visits and birth preparedness activities, plays an important role in institutional delivery service utilisation for Nepali women. These findings have implications for behavioural interventions to change their intention to deliver at a health facility.

## INTRODUCTION

Globally, nearly all (99%) maternal deaths occur in low-income countries, mainly caused by non-utilisation of available delivery services or delays in accessing such services.<sup>1 2</sup> Indeed, about half of all births in South Asia still occur at home.<sup>3</sup> A number of interventions have been implemented to increase the

## Strengths and limitations of this study

- This study used the nationally representative large sample of married women from the 2011 Nepal Demographic and Health Survey with a high response rate.
- Information was not available on some known determinants of facility delivery utilisation, particularly quality of providers, and distance and transportation to facility.
- Perceived need of facility delivery was assessed by antenatal visits and birth preparedness activities, which were positively associated with facility delivery utilisation.

rate of facility delivery and access to emergency obstetric care, including the establishment of birth centres and maternity waiting homes, reduction of user fees, provision of incentives and birth preparedness packages.<sup>4 5</sup> The 'safer mother programme' in Nepal provides free delivery services with incentives to women who deliver in a designated health facility.<sup>6</sup>

In Nepal, despite a substantial reduction in maternal mortality from 539 deaths/100 000 live-births in 1996 to 281 deaths/100 000 in 2006, there has been no proportionate increase in utilisation of institutional delivery service.<sup>7</sup> The 2011 national survey reported that 65% of women still delivered at home and only 36% of births occurred in the presence of a skilled birth attendant,<sup>8</sup> whereas the national target is to achieve 60% of births via skilled birth attendants by 2015, in order to meet the Millennium Development Goal 5 target of 134/100 000 live-births.<sup>9</sup> Therefore, utilisation of institutional delivery service is a major concern in Nepal.

According to the behavioural model proposed by Andersen,<sup>10</sup> need factors are fundamental to healthcare seeking behaviour, that is, one should perceive a condition as susceptible

and severe enough before seeking care to gain benefits. For institutional delivery service utilisation, this means that the pregnant woman and her family must recognise pregnancy and childbirth as abnormal events, where life-threatening situations may arise without any prediction.<sup>11</sup> In many low-income countries including Nepal, pregnancy and childbirth are often perceived as normal life events without justification to seek professional help.<sup>12 13</sup> In fact, need factors can be driven by pregnancy-related factors such as awareness, health knowledge of pregnancy and risk, importance given to pregnancy, community customs, previous facility use, parity and pregnancy complications.<sup>14</sup> Those women who perceive the need for professional help and recognise the risk of pregnancy and delivery, are expected to make antenatal visits and prepare and arrange for childbirth.<sup>15</sup> Besides the immediate need, utilisation of institutional delivery service can be affected by predisposing and enabling factors as well as external environment factors. Figure 1 depicts the conceptual framework, which is adapted from Andersen's<sup>10</sup> behavioural model for the utilisation of health services.

Despite the important role of need factors, their effect on utilisation of institutional delivery service has seldom been investigated in the context of safe motherhood programmes. The aim of the present study was to assess the contribution of need factors with respect to the utilisation of institutional delivery service in Nepal, using data from the national Nepal Demographic Health Survey (NDHS). Need factors were assessed by antenatal care visits and birth preparedness activities.

## METHODS

### Study setting

Nepal, with a population of 27.5 million, is divided into five developmental regions, each extending from north

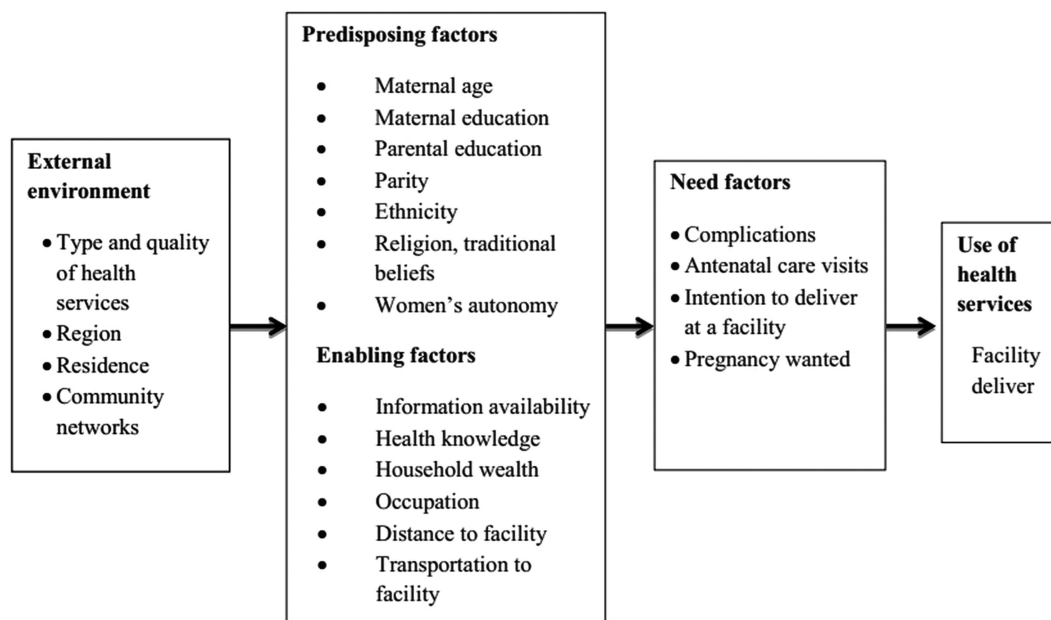
to south. The country has also three ecological zones across east to west: Terai, hill and mountain. These 15 subecological regions are further divided into smaller districts. Typically, each district has Village Development Committees (VDC) in rural areas and municipalities in urban areas. Each VDC or municipality in turn consists of small administrative units known as wards.

### Data and sampling

The data for this study were obtained from the 2011 NDHS conducted by the Ministry of Health and Population.<sup>16</sup> Details of the sampling methodology had been described elsewhere.<sup>8</sup> Briefly, the survey utilised a two-stage cluster sampling design with wards (enumeration areas) being the primary sampling units. The wards were stratified by subecological domains and by rural–urban residency. In total, 11 085 households were selected as listing units from these 289 wards. Among them, 12 961 women aged 15–49 years were identified as eligible but individual interviews were only completed for 12 699 women, giving a response rate of 98%. This study focused on the subset of 4079 ever married women who had given birth within the past 5 years preceding the survey and who provided information on antenatal visits and preparation activities.

### Statistical analysis

The outcome variable was 'place of delivery': home versus facility (private or public). This binary variable was chosen instead of 'assisted deliveries' to emphasise the use of institutional delivery services and to avoid the potential problem of inaccurate reporting of birth attendant skills. Perceived need factors investigated were (1) frequency of antenatal care visits and (2) birth preparedness. The latter referred to four preparation



**Figure 1** Conceptual framework of factors associated with the utilisation of institutional delivery services.

activities, namely, planning for a birth attendant, saving money, arrangement for transportation and identification of potential blood donor.<sup>17</sup> Although the 2011 NDHS collected information on planning activities related to preparation of clothes, delivery kit and food, these activities did not necessarily imply the need for facility delivery; consequently, they were not considered as need factors of institutional delivery service use.

Table 1 gives the classification of variables used in this study. These variables were chosen in view of the conceptual framework of factors associated with the utilisation of institutional delivery services (figure 1). NDHS applied principal component analysis of a range of

household assets to generate wealth quintiles. Ethnicity was categorised by three groups: upper caste (Hill Brahmin, Hill Cheetri, Terai Brahmin, Terai Cheetri), lower caste (Hill Dalit, Terai Dalit) and other (all other recorded ethnicities). Education was classified as none, primary (1–5 grade), secondary (6–10 grade) and higher (after 10th grade).

In the 2011 NDHS, enumeration areas were not allocated proportional to their population size, thus requiring adjustment by sampling weights prior to analysis. Such sampling weights were provided by the survey to account for cluster level variables and strata (domain) level variables. Based on these sampling weights, a

**Table 1** Classification of variables used in the analysis (n=4079)

Variables	Categories	Weighted percentage	Unweighted count
Place of delivery	Home	63.1	2397
	Facility	36.9	1682
Antenatal care visits	0	15.2	611
	1	6.1	234
	2	12.2	426
	3	16.4	657
	4	19.7	901
	≥5	30.4	1250
Birth preparedness*	0	62.9	2476
	1	33.3	1440
	≥2	3.8	163
Women's age (years)	15–19	7.1	306
	20–24	33.4	1273
	25–29	32.2	1335
	30–49	27.3	1165
Women's education	None	47.3	1765
	Primary	20.0	817
	Secondary	27.2	1225
	Higher	5.5	272
Partner's education	None	23.2	745
	Primary	24.5	989
	Secondary	42.1	1815
	Higher	10.2	514
Parity	1	24.2	1248
	2	30.6	1157
	3	19.3	690
	4	10.8	440
	≥5	15.1	544
	1	25.8	1160
Wealth quintiles	2	21.9	832
	3	21.0	739
	4	17.4	677
	5	13.9	671
	Other	52.1	1813
Ethnicity	Upper caste	30.1	1552
	Lower caste	17.8	703
	Mountain	7.9	742
Region	Hill	39.5	1656
	Terai	52.6	1681
	Rural	90.7	3182
Residential location	Urban	9.3	897

\*Birth preparedness consists of four preparation activities (planning for a birth attendant, saving money, arrangement for transportation and identification of potential blood donor).

**Table 2** Crude and adjusted ORs of facility delivery from logistic regression with complex sampling analysis (n=4079)

	Crude OR (95% CI)	Adjusted OR (95% CI)	p Value*
<i>Need factors</i>			
Antenatal care visits			<0.001
0	1	1	
1	1.79 (1.03 to 3.10)	1.30 (0.72 to 2.34)	
2	2.58 (1.62 to 4.10)	1.75 (1.07 to 2.93)	
3	4.18 (2.69 to 6.50)	2.21 (1.39 to 3.43)	
4	8.71 (5.40 to 14.05)	4.13 (2.51 to 6.44)	
≥5	17.89 (11.23 to 28.51)	4.94 (3.14 to 7.76)	
Birth preparedness†			<0.001
0	1	1	
1	2.68 (2.18 to 3.30)	1.52 (1.19 to 1.88)	
≥2	9.31 (5.71 to 15.17)	3.41 (2.01 to 5.58)	
<i>Confounding factors</i>			
Women's age (years)			0.083
15–19	1	1	
20–24	0.65 (0.49 to 0.86)	0.65 (0.44 to 0.97)	
25–29	0.56 (0.42 to 0.75)	0.69 (0.48 to 1.00)	
30–49	0.36 (0.26 to 0.49)	0.80 (0.49 to 1.32)	
Women's education			0.216
None	1	1	
Primary	1.91 (1.46 to 2.51)	1.08 (0.82 to 1.42)	
Secondary	5.35 (4.25 to 6.72)	1.29 (0.97 to 1.71)	
Higher	20.28 (12.22 to 33.65)	1.67 (0.89 to 3.12)	
Partner's education			0.467
None	1	1	
Primary	1.61 (1.17 to 2.21)	0.94 (0.67 to 1.30)	
Secondary	3.62 (2.63 to 4.98)	0.95 (0.67 to 1.33)	
Higher	11.19 (7.34 to 17.04)	1.28 (0.78 to 2.09)	
Parity			<0.001
1	1	1	
2	0.44 (0.35 to 0.54)	0.44 (0.34 to 0.58)	
3	0.21 (0.16 to 0.28)	0.39 (0.28 to 0.54)	
4	0.18 (0.13 to 0.25)	0.42 (0.28 to 0.63)	
≥5	0.08 (0.06 to 0.12)	0.30 (0.19 to 0.49)	
Wealth quintiles			<0.001
1	1	1	
2	2.14 (1.68 to 2.73)	1.58 (1.19 to 2.11)	
3	3.73 (2.80 to 4.96)	2.03 (1.44 to 2.86)	
4	7.25 (5.33 to 9.88)	2.73 (1.90 to 3.94)	
5	24.17 (17.51 to 33.35)	6.17 (3.94 to 9.67)	
Ethnicity			0.607
Other	1	1	
Upper caste	1.56 (1.22 to 2.01)	1.08 (0.81 to 1.42)	
Lower caste	0.72 (0.57 to 0.92)	1.16 (0.85 to 1.59)	
Region			0.244
Mountain	1	1	
Hill	1.94 (1.28 to 2.95)	1.28 (0.86 to 1.92)	
Terai	2.78 (1.86 to 4.14)	1.43 (0.94 to 2.19)	
Residential location			<0.001
Rural	1	1	
Urban	5.19 (3.99 to 6.75)	2.42 (1.83 to 3.19)	

\*From multivariable logistic regression model.

†Birth preparedness consists of four preparation activities (planning for a birth attendant, saving money, arrangement for transportation and identification of potential blood donor).

complex sampling plan file was then prepared to perform logistic regression modelling, with need factors and other confounding factors listed in [table 1](#). All statistical analyses were conducted in the SPSS package V.21.

## RESULTS

[Table 1](#) shows the characteristics of the 4079 eligible women. About half of the participants had no education (47.3%) and came from the Terai region (52.6%).

Almost two-third of them were between 20 and 29 years of age. Although half (50.1%) of the eligible women made four or more antenatal care visits, 15.2% never visited a health facility before giving birth. The majority of mothers (62.9%) did not indicate any of the four birth preparation activities, while no woman prepared for all four activities.

The overall facility delivery rate was found to be 36.9% (95% CI 33.5% to 40.2%, SE 1.69). Table 2 presents the results of logistic regression analysis. The confounding factors used were woman's age, woman's education, partner's education, parity, wealth quintiles, ethnicity, region and residential location from the NDHS 2011 data set. Both need factors were positively associated with the facility delivery status. Even after simultaneously adjusting the effects of predisposing, enabling and external environment factors, the two need factors remained statistically significant ( $p < 0.001$ ). In particular, women who made five or more antenatal care visits were almost five times more likely to deliver at a health facility when compared to those who paid no visit prior to delivery (adjusted OR 4.94, 95% CI 3.14 to 7.76). Similarly, the likelihood for facility delivery increased by 3.4-fold among women who prepared for at least two of the four activities, relative to their counterparts who chose to make no preparation (adjusted OR 3.41, 95% CI 2.01 to 5.58). The multivariable logistic regression analysis also confirmed that wealth quintiles, residential location and higher parity were significantly associated with place of delivery.

## DISCUSSION

The national survey data revealed the majority of Nepali mothers did not prepare any of the four activities and only half of the women made the recommended four or more antenatal care visits, despite birth preparedness being incorporated into the national safe motherhood programme since 2009.<sup>12</sup> Female community health volunteers and facility-based health workers use pictorial charts to educate women on obstetric danger signs. While preparedness level can be high in some districts,<sup>18</sup> overall birth preparedness is still low. The variations between districts may be attributed to differences in human development indexes including adult literacy, women empowerment and physical accessibility to health facilities.

Overall, the preparation and antenatal visit record suggested that women might have no intention or might not perceive the need of giving birth at a health facility. Such perception of need can also be influenced by distance and quality of maternity services.<sup>14–19</sup> Indeed, the facility delivery rate was found to be only 36.9%. In the traditional Nepalese society, childbirth continues to take place at home, while many women still hold the view that facility delivery is unnecessary. On the other hand, those women who were prepared and made antenatal visits tended to give birth at facilities. Our results confirmed the strong contribution by these need factors to

actual facility utilisation irrespective of predisposing, enabling and external environment factors. Apart from the need factors, parity, wealth status and residential location also play a significant role in the choice of delivery place.

Although the frequency of antenatal care visits was associated with subsequent facility delivery, the relationship appeared to be dose-dependent,<sup>14–18</sup> as in the case of the present study whereby making a single visit induced no significant impact; whereas previous studies undertaken in Tanzania observed high use of antenatal care but low use of facility delivery.<sup>20–21</sup> Making the recommended four or more antenatal care visits might reflect the woman's concern of her pregnancy, pregnancy complications and the need for professional help.<sup>14–22</sup> Consequently, informing women about danger signs and providing quality antenatal care with provision of iron tablets and blood check might encourage women to attend antenatal visits.

The link between birth preparedness activities and facility delivery was supported by recent literature. A prospective cohort study of 701 pregnant women in the Kaski district of Nepal found preparation activities could increase the facility delivery rate.<sup>18</sup> Similarly, a randomised trial in Tanzania demonstrated that skilled delivery care uptake was 16.8% higher among women who had been counselled on promotion of birth plan than others without such counselling.<sup>23</sup> Raising awareness and help for birth plan also led to increased facility utilisation in other intervention studies conducted in Burkina Faso, Bangladesh and Eritrea.<sup>24–26</sup> However, two prepost evaluation studies of birth preparedness in southern districts of Nepal reported that increased preparedness level was not significantly translated into increased facility delivery.<sup>27–28</sup>

The findings have important implications for safe motherhood programme in Nepal and other low-income countries. As the intention to deliver at a health facility can be largely influenced by need factors, women should be extensively counselled on and convinced of the benefits and safety of facility delivery. Any behavioural intervention such as birth preparedness package and complication readiness is unlikely to be successful unless it attains a high level capacity to change the women's attitude and intention. Counselling can be performed by health professionals, preferably female health workers at a health facility or by female community health volunteers at household visits. Further, local teachers and social workers can be involved in awareness raising campaigns. Community networks and mother clubs can also provide support in terms of money and transport management.

The strength of the present study was the use of a nationally representative large sample of married women with a high response rate. However, information was lacking on some known determinants of facility delivery utilisation, particularly quality of providers and distance and transportation to facility. These variables were unavailable from the NDHS 2011 database and

posed as the major limitation. Nevertheless, the external factors 'residential location' and 'region' have provided some proxy information to partially compensate the effect of distance and service availability. Institutional delivery services in Terai and urban areas are more physically accessible than in hilly or mountainous parts of the country. The regression model has accounted for region and location as well as other known predisposing and enabling factors.

## Conclusion

Utilisation of institutional delivery services remained low in Nepal. The majority of mothers were not prepared for childbirth and only half the women made the recommended four or more antenatal care visits, indicating their perceived lack of need for facility delivery. The national data confirmed the strong associations between such need factors and institutional delivery service utilisation. This has implications for behavioural interventions such as birth preparedness and complication readiness, which aim to change their intention to deliver at a health facility. Birth preparedness packages in Nepal should be continued and future interventions should target the need factors.

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**Patient consent** Obtained.

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**Data sharing statement** Data of 2011 Nepal Demographic and Health Survey can be obtained from MEASURE DHS ICF International, Calverton, Maryland, USA.

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