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Factors Associated with Use of Maternal Health Services in Nepal: Analysis of the 2016 Nepal Demographic and Health Survey

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ABSTRACT

Background: Timely access and use of health services are critical for improving maternal health services. The objective of present study is to identify key factors related to antenatal care and institutional delivery services in Nepal.

Methods: Data from the Nepal Demographic Health Survey 2016 was analyzed. Women who have taken four or more antenatal checkup (ANC4+), and who delivered at a health Institution were considered outcome variables. Logistic regression analysis was used to compute odds ratio. Women (15-49) having most recent birth in 5 years preceding the survey were included in the study.

Results: 69.4% women had taken four or more ANC and 60.6 % had given delivery at a health institution. Age of mother at birth of child, birth order, residence, and ethnicity were significantly associated with use of maternal health service. Educated were 3.79(CI2.83-5.08) times likely to take ANC4+ and 2.71 (CI 2.05-3.57) times likely to give birth at health institution. Richest women were 2.25(CI2.83-5.08) times likely to utilize the ANC4+ service and 9.48(CI6.46-13.91) times likely to give birth at health institution. Women in Province 7 were 3.16(CI2.14-4.67) times likely to utilize ANC4+ service and 2.71(CI 1.83-4.05) times likely to give delivery in health institution compared to women in Province 6.

Conclusions: Higher educated and richest women were using antenatal care and institutional delivery compared to less educated. The finding reinforces importance of empowering women with education and improving economic situation.

Keywords: Antenatal care; demographic and health survey; institutional delivery; maternal health; Nepal.

INTRODUCTION

Preventing maternal mortality has been challenge and focused area of public health services. Each day 830 women die due to difficulty associated with pregnancy related causes such as lack of antenatal-care and institutional delivery.¹ WHO recommended minimum of four antenatal checkups before delivery.

ANC focuses on prevention and management of pregnancy related complications.² Globally, at time of pregnancy only 64% of women receive four or more antenatal-care and ³ this figure is less in Sub-Sahara Africa and South Asia which accounts 52% and 46% respectively.⁴ Worldwide, 75% of the delivery takes place in health facility.⁵

The trend of ANC 4+ visits in Nepal shows that it increased from 14.3% in 2001 to 69.4% in 2016. Institutional delivery increased from 9.0 % in 2001 to 57.4% in 2016.⁶ Timely access and use of health services are critical for

improving maternal health services. Few studies have been conducted to explore different factors related four or more ANC and institutional delivery among women (15-29) in Nepal. This study aims at exploring key factors related to antenatal care and institutional delivery services in Nepal.

METHODS

Data of the Nepal Demographic Health Survey 2016 (NDHS 2016) was downloaded from DHS Program. Permission regarding the use of data was taken in advance. Due to the publicly availability of data it was exempted from ethical review. Initially 11473 households were selected for the survey, 11040 were successfully interviewed. In these household 12862 women age (15-49) were interviewed for the survey.

Women (15-49) having the most recent birth in 5 years preceding the survey were included in our study. This

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totalled to 3998 cases.

Dependent variables were four or more ANC checkup and institutional delivery. Independent variables were age of the women at birth of last child, birth order, region, province, women's education, wealth quintile and ethnicity. Data were analyzed using SPSS version 16.0 software. Descriptive and inferential statistics was measured. Weighted samples were used for the analysis purpose. Techniques such as bivariate and multivariate analysis were used to compute OR and confidence interval of the data.

RESULTS

Interview was conducted among 1286 women age (15-49) of them 3998 had most recent live birth in the 5 years preceding the survey. Majority of the women (38.0%) were found to be in age group 20-24 years followed by 25-29 years. The mean age of women was 24.8±5.3. Regarding the number of children 45.9% had 2 to 3 children, 37.5% had one child. In terms of residence 55.6% lived in urban area. 24% of the respondents resided in province 2, followed by 18% in province 5, 17.3% and 17.1% in province 3 and 1, least number respondents were found to be in province 6, 4 and 7 respectively. Majority of them 31.4% had no education, 25.3% of them had secondary education, 23.9% had education of SLC or higher. 41.5% of the women were in upper two quintile of poor category, 21.6 % were in middle and remaining were in rich and richest. Janajati including Newar were found to be in majority number i.e. 32.6%, Brahmin and Chhetri 29% followed by other 24.8% and Dalit 13.6% respectively (Table 1).

Table 1. Characteristics of women (15-49) with a most recent birth in 5 year preceding the survey.

Variables	N	%	Variable	N	%
Age group			Residence		
<20	637	15.9	Urban	2223	55.6
20-24	1519	38.0	Rural	1775	44.4
25-29	1123	28.1			
30-49	719	18.0	Education		
Birth order			No education	1257	31.4
1	1498	37.5	Primary	777	19.4
2-3	1833	45.9	Some secondary	1010	25.3

4+	667	16.7	SLC or Higher	955	23.9
Wealth quintile					
Ecological region			Lowest (Poorest)	822	20.5
Mountain & Hill	1878	47.0	Second	839	21.0
Terai	2120	53.0	Middle	863	21.6
			Fourth	830	20.8
Province			Highest (Richest)	643	16.1
Province 1	686	17.1			
Province 2	963	24.1	Ethnicity		
Province 3	691	17.3	Brahmin & Chhetri	1159	29.0
Province 4	337	8.4	Janajati (incNewar)	1303	32.6
Province 5	720	18.0	Dalit	545	13.6
Province 6	255	6.4	All other	990	24.8
Province 7	346	8.7			
Total	3998	100.0	Total	3998	100.0

Four or more ANC checkup service was utilized by 69.4% women where as 60.6 % had given delivery in health institution. Majority of the women who were below 20 years of age had 4+ ANC and Institutional delivery, 73.5% and 68% respectively. Women who were pregnant for first time or had their first birth were found to receive 4+ ANC and Institutional delivery which accounted to 82.6% and 79.8% these numbers were comparatively less in those women who had 4 or more children. In terms of residence women who resided in urban area were observed to utilize more ANC 4+ and institutional delivery.

Women residing in province 3 were found to receive ANC 4+ and institutional delivery in higher number compared to other province. Likewise province 7, 4, 1 and 5 also showed positive signs regarding the indicators. To the contrast women in province 6 and 2 had received service the least.

Higher educated women were found to take the service in higher number compared to the less educated counterparts. Similar results were seen in terms of wealth status where, women in the richest category were receiving services in higher number compared to the poorest where the difference was observed to be more than 30%. Significant difference was seen for ethnicity, where as those women of Brahmin and Chhetri background were utilizing the service in higher number,

Table 2. Distribution of women (15-49) by ANC 4+ visit for the most recent live birth in 5 year preceding the survey.

Variables	ANC 4+				ANC 4+				
	Yes		No		Yes		No		
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	
Province					Residence				
Province 1	527	76.9	158	23.1	Urban	1677	75.4	546	24.6
Province 2	514	53.4	449	46.6	Rural	1096	61.7	679	38.3
Province 3	542	78.4	149	21.6	Ethnicity				
Province 4	259	76.6	79	23.4	Brahmin & Chhetri	941	81.1	219	18.9
Province 5	531	73.8	189	26.2	Janajati(incNewar)	924	70.9	379	29.1
Province 6	133	52.2	122	47.8	Dalit	339	62.2	206	37.8
Province 7	267	77.2	79	22.8	All other	570	57.6	420	42.4
Wealth quintile					Education				
Lowest	466	56.7	356	43.4	No education	621	49.4	636	50.6
Second	549	65.4	291	34.6	Primary	498	64.1	279	35.9
Middle	576	66.7	287	33.3	Some secondary	790	78.3	219	21.7
Fourth	620	74.7	210	25.3	SLC or Higher	864	90.5	91	9.5
Highest	562	87.4	81	12.6	Birth Order				
Age Group					1	1237	82.6	261	17.4
<20	468	73.5	169	26.5	2-3	1239	67.6	594	32.4
20-24	1073	70.6	446	29.4	4+	297	44.5	370	55.5
25-29	785	69.8	339	30.2	Ecological region				
30-49	448	62.3	271	37.7	Mountain & Hill	1385	73.7	493	26.3
					Terai	1388	65.5	732	34.5
Total	N=2773	(69.4)	N=1225	(30.6)	Total	N=2773	(69.4)	N=1225	(30.6)

Table 3. Distribution of women (15-49) by place of delivery, for the most recent live birth in 5 year preceding the survey.

Variables	Institutional Delivery (%)				Institutional Delivery (%)				
	Yes		No		Yes		No		
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	
Province					Residence				
Province 1	447	65.2	239	34.8	Urban	1585	71.3	638	28.7
Province 2	444	46.1	519	53.9	Rural	838	47.2	937	52.8
Province 3	504	72.8	188	27.2	Ethnicity				
Province 4	234	69.2	104	30.8	Brahmin & Chhetri	843	72.7	317	27.3
Province 5	453	62.9	267	37.1	Janajati(incNewar)	804	61.7	500	38.3
Province 6	103	40.4	152	59.6	Dalit	268	49.1	278	50.9
Province 7	238	68.8	108	31.2	All other	509	51.4	481	48.6
Wealth quintile					Education				
Lowest	300	36.5	521	63.5	No education	484	38.5	773	61.5
Second	411	49.0	428	51.0	Primary	395	50.9	381	49.1
Middle	530	61.3	334	38.7	Some secondary	718	71.1	292	28.9
Fourth	591	71.2	239	28.8	SLC or Higher	825	86.5	129	13.5
Highest	590	91.8	53	8.2	Birth Order				

Age Group					1	1196	79.8	302	20.2
<20	433	68.0	204	32.0	2-3	1015	55.4	818	44.6
20-24	953	62.7	566	37.3	4+	212	31.8	455	68.2
25-29	659	58.7	464	41.3	Ecological region				
30-49	377	52.4	342	47.6	Mountain & Hill	1149	61.2	729	38.8
					Terai	1274	60.1	846	39.9
Total	N=2423	(60.6)	N=1577	(39.4)	Total	N=2423	(60.6)	N=1577	(39.4)

Table 4. Multivariate or Results of logistic regression analysis.

Variables	ANC 4+		Institutional Delivery		Variables	ANC 4+		Institutional Delivery	
	OR	CI	OR	CI		OR	CI	OR	CI
Province					Residence				
Province 1	2.63***	1.83-3.80	1.47*	1.01-2.13	Urban	1.00		1.00	
Province 2	1.39	0.93-2.06	0.74	0.49-1.12	Rural	1.24**	1.06-1.45	1.69***	1.44-1.98
Province 3	2.26***	1.57-3.26	1.71**	1.16-2.50	Ethnicity				
Province 4	2.08***	1.39-3.13	1.73**	1.14-2.62	Brahmin & Chhetri	1.36*	1.03-1.79	1.43**	1.09-1.89
Province 5	2.33***	1.61-3.37	1.18	0.80-1.72	Janajati (incNewar)	0.78*	0.61-1.00	0.85	0.66-1.09
Province 6	1.00		1.00		Dalit	1.00		1.00	
Province 7	3.16***	2.14-4.67	2.71***	1.83-4.05	All other	0.85	0.66-1.10	0.89	0.68-1.16
Wealth quintile					Education				
Lowest	1.00		1.00		No education	1.00		1.00	
Second	1.39**	1.09-1.76	1.52***	1.20-1.93	Primary	1.46***	1.19-1.78	1.30*	1.06-1.60
Middle	1.92***	1.48-2.50	3.55***	2.73-4.63	Some secondary	2.06***	1.64-2.58	1.81***	1.45-2.27
Fourth	2.09***	1.59-2.74	4.08***	3.11-5.36	SLC or Higher	3.79***	2.83-5.08	2.71***	2.05-3.57
Highest	2.25***	1.59-3.19	9.48***	6.46-13.91	Birth Order				
Age Group					1	3.42***	2.55-4.60	5.07***	3.75-6.87
<20	0.95	0.75-1.21	0.97	0.76-1.23	2-3	1.82***	1.45-2.29	1.65***	1.30-2.10
20-24	1.00		1.00		4+	1.00		1.00	
25-29	1.35**	1.10-1.65	1.13	0.92-1.38	Ecological region				
30-49	1.48**	1.14-1.91	1.48**	1.14-1.92	Mountain&Hill	1.00		1.00	
					Terai	0.81	0.64-1.04	1.24	0.98-1.58

OR- Odds Ratio, CI- Confidence Interval, * P<0.05, **P<0.01, ***P<0.001

in contrast the number were less for women from dalit and other background (Table 2 and Table 3).

Variables which showed significant association in the bivariate analysis were included in multivariate analysis model. P value, Adjusted Odds Ratio (AOR) and confidence interval at 95% were used to interpret the data (Table 3).

Compared to the 20-24 age group women, those women who were in 30-49 and 25-29 years were 1.48 (CI 1.14-1.91, p<0.01) and 1.35 (CI 1.10-1.65, p<0.01) times likely to utilize ANC 4+ service respectively. However no significant association was observed for women aged <20. Similar trend was observed for institutional delivery

women in 30-49 age group were 1.48 (CI, 1.14-1.92, p<0.01) times likely to give birth in institutional facility compared to the 20-24 age women. For other group no statistical significant association was observed.

Women having first child were 3.42 (CI 2.55-4.60) times more likely to utilize ANC4+ service and those having 2-3 children were 1.82 (CI 1.45-2.29) times likely compared with women who had 4 or more children. Women having first child were 5 (CI 3.75- 6.87) times more likely to give birth in health institution and those having 2-3 child were 1.65 (CI 1.30-2.10) times likely.

In terms of four or more ANC visit and Institutional delivery women in urban area were 1.24 (CI1.06-1.45,

$p < 0.01$) times and 1.69 (CI 1.44-1.98, $p < 0.001$) times more likely to utilize the service compared to those who were residing in rural area. Though women in terai were 1.24 times likely to give birth in health institution, no significant association was observed.

Women in Province 7 were 3.16 (CI 2.14-4.67, $p < 0.001$) times likely to utilize ANC 4 or more service compared to women in province 6. Other province which had significant association and were more likely to have ANC 4+ visit were, province 1 (CI 1.83-3.80, $p < 0.001$), province 3 (CI 1.57-3.26, $p < 0.001$), province 5 (CI 1.61-3.37, $p < 0.001$) and province 4 (CI 1.39-3.13, $p < 0.001$). Women in province 2 were 1.39 (0.93-2.06) times likely to have utilize the service but no significant association was observed. Comparing with province 6, women in province 7 were 2.71 (CI 1.83-4.05, $p < 0.001$) times likely to give delivery in a health institution. Province 4 and 3 also showed similar result where women were 1.73 (1.14-2.62, $p < 0.01$) and 1.71 (1.16-2.50, $p < 0.01$) times likely to give birth in health institution. Whereas, for province 2 and 5 no significant relationship was observed, AOR 1.18 (CI 0.80-1.72) and 0.74 (0.49-1.12) respectively.

Education was highly associated with ANC4+ utilization. Significant association observed at $p < 0.001$. Women who were educated were observed to have institutional delivery. Wealth also had highly significant relationship with ANC4+ service utilization. Compared to women who were poorest, richest women were 2.25 (CI 2.83-5.08, $p < 0.001$) times likely to utilize service. Institutional delivery had high significant relationship with wealth of women; the richest women were 9.48 (CI 6.46-13.91) times likely to give birth in health institution, figure compared with those women who were poorest.

Compared to Dalit, women from Brahmin/ Chhetri were 1.36 (CI 1.03-1.79, $p < 0.05$) times more likely to utilize ANC4+ service whereas Janajati (incNewar) were less likely 0.78 (CI 0.61-1.00, $p < 0.05$) to utilize the service. Significant association was observed for women from Brahmin/ Chhetri ethnic group, who were 1.43 (CI 1.09-1.89, $p < 0.01$) times likely to give birth in health institution.

DISCUSSION

Findings from the study reveal that inequalities were observed among women who were educated and uneducated, women from poorest background were found to be lacking in terms of service utilization, likewise disadvantage group of women like dalit and other backward ethnic group were also observed using the service.

In the present study we found that 60.6% of the women were delivering in health institution and 69.4% had taken four or more ANC visit. Service seekers in both categories were found to reside in urban areas. In Africa, 53.4% women delivered in health facility, the number is found to be less in southern Asia 45% and southeast Asia about 40%. Women who were poorest or in the lowest wealth quintile were less likely to give birth in the health institution where as richer women were more likely to do so. This figure was seen higher in southeast Asia. Women who lived in urban area were more likely to deliver in health facility, about 30% urban women delivered in health institution compared to their rural counterparts.⁷

A systematic review conducted in low and middle income countries revealed that wealth quintile, parity and regions were highly significant factor in maternal health service utilization. It was also seen that ANC was highly associated with skilled birth attendance. The strength of significant was not so strong for socio- ethnic group, maternal age, religion, and rural/urban residence⁸ Similar results were observed in the present study.

Present study showed significant association between wealth and education with institutional delivery and more than four ANC visits, similar results were observed in studies conducted in different parts of the world. A study conducted in Indonesia to observe the trend of maternal health care service from 1986-2012 revealed that women's education was observed as the main predictor of the use of institutional delivery. Women having higher education levels were 4.36 times more likely to give birth in health institution. Similarly mother from the richest quintile were 5.45 times likely to give birth in health facilities compared to the poorest.⁹ Another study conducted in Ethiopia revealed that women having higher education and those from urban areas were more likely to utilize ANC service.¹⁰ Similarly, a study conducted in rural India found that there was a strong relationship between institutional delivery, wealth, education, and birth order.¹¹

A study conducted in far western Nepal revealed that among 500 women 65.6% had used institutional delivery for their last delivery. Those who had ANC 4+ visit had significant increment in institutional delivery.¹² Likewise, another conducted in eastern Nepal among 372 randomly selected women found that about 69% women had attended at least 4 or more ANC visit. Women from advantaged ethnic group were likely to have utilized the service 2.4 times more than those from the disadvantage group. Similarly, women from richest quintile were 2.3 times likely to utilize the service compared to those

from the poorest group.¹³ The similarity in results suggests that institutional delivery and ANC visits might be consistent throughout the country. However, a more extensive study covering more areas would be needed to establish this result with more certainty and might prove helpful in designing programs for increasing women's access to health services during pregnancy.

A study to analyze the trend and inequality in use of MCH in Nepal using the NDHS data from 1994 to 2011 revealed that, Richest women were 5 times likely to utilize four or more ANC and 9 times more likely to give birth in health institution. Urban women were 1.5 times likely to utilize four or more ANC and 3 times more likely to use institutional delivery.¹⁴ The present study which utilized the NDHS 2016 data also revealed that there has been a significant increment in the utilization of ANC for or more visit and institutional delivery, whereas the women in the richest quintile were 2.25 times likely to use have four or more ANC visit and 9.48 times likely to have delivery in health institution. Urban women were 1.24 times likely to have four or more ANC visit and 1.69 times more likely to have institutional delivery. Another study using NDHS 2011 data revealed that, higher level of education, household economic status, higher parity and older age of women were significantly related to attendance of four or more ANC visit. Similar findings were present in our study.¹⁵

CONCLUSIONS

The study explored factors related to four or more ANC visit and Institutional delivery in Nepal. Four or more ANC checkup service was utilize by 69.4% women where as 60.6 % had given delivery in health institution. Women residing in province 3 were found to utilize ANC 4+ and institutional delivery in higher proportion compared to other province. Higher educated and richest women were found to take the service in higher proportion compared to the less educated counterparts. The findings from the study revealed the importance of education, economic improvement and empowerment among the women.

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REFERENCES

1. World Health Organization, United Nations Children's Fund, United Nations Population Fund, World Bank, United Nations Population Division. Trends in maternal mortality: 1990 to 2015. Geneva: World Health Organization; 2015. Available At http://apps.who.int/iris/bitstream/handle/10665/194254/9789241565141_eng.pdf;jsessionid=5956A8191E50D21ADF462EC7E5A50C07?sequence=1
2. WHO. WHO recommendations on antenatal care for a positive pregnancy experience. 2016 Available At http://apps.who.int/iris/bitstream/handle/10665/250796/9789241549912_eng.pdf?sequence=1
3. WHO. New guidelines on antenatal care for a positive pregnancy experience. Available At <http://www.who.int/reproductivehealth/news/antenatal-care/en/> [accessed 11 January 2018].
4. UNICEF. Global distribution of women attended at least four times during pregnancy by any provider, latest available data in the period 2010-2016. (Web: <https://data.unicef.org/topic/maternal-health/antenatal-care/#>) (accessed 11 January 2018).
5. UNICEF. Percentage of births assisted by a skilled birth attendant, by country, 2011-2016. (Web: <https://data.unicef.org/topic/maternal-health/delivery-care/>) (accessed 11 January 2018).
6. Ministry of Health, Nepal; New ERA; and ICF. 2017. Nepal Demographic and Health Survey 2016. Kathmandu, Nepal: Ministry of Health, Nepal. (Web: <https://www.dhsprogram.com/pubs/pdf/fr336/fr336.pdf>)
7. Diamond-Smith N, Sudhinaraset M. Drivers of facility deliveries in Africa and Asia: regional analyses using the demographic and health surveys. *Reprod Health*. 2015;12:6. Available At <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4320522/>
8. Banke-Thomas OE, Banke-Thomas AO, Ameh CA. Factors influencing utilisation of maternal health services by adolescent mothers in low-and middle-income countries: a systematic review. *BMC Pregnancy Childbirth*. 2017;17(1):65. [DOI]
9. Nababan, Y.H., et.all. Trends and Inequities in Use Maternal Health Care Service in Indonesia, 1986-2012. *Int J Womens Health*. 2018;10:11-24. [PubMed]

10. Tarekegn SM, Lieberman LS, Giedraitis V. Determinants of maternal health service utilization in Ethiopia: analysis of the 2011 Ethiopian Demographic and Health Survey. *BMC Pregnancy Childbirth*. 2014;14:161. [\[DOI\]](#)
11. Kesterton AJ, Cleland J, Sloggett A, Ronsmans C (2010) Institutional delivery in rural India: the relative importance of accessibility and economic status. *BMC Pregnancy and Childbirth* 10(30): 2–9. [\[DOI\]](#)
12. Freidoony L, Ranabhat CL, Kim CB, Kim CS, Ahn DW, Doh YA. Predisposing, enabling, and need factors associated with utilization of institutional delivery services: A community-based cross-sectional study in far-western Nepal. *Women Health*. 2016:1–21. [\[PubMed\]](#)
13. K. K. Deo, Y. R. Paudel, R. B. Khatri, R. K. Bhaskar, R. Paudel, S. Mehata, et al., “Barriers to Utilization of Antenatal Care Services in Eastern Nepal,” *Front Public Health*, vol. 3, p. 197, 2015 [\[PubMed\]](#)
14. Mehata, S., Paudel, Y.R., Dariang, M., Aryal, K.K., Lal, B.K., Khanal, M.N. et al, Trends and inequalities in use of maternal health care services in Nepal: strategy in the search for improvements. *BioMed Res Int*. 2017;2017. [\[DOI\]](#)
15. Joshi C, Torvaldsen S, Hodgson R, Hayen A. Factors associated with the use and quality of antenatal care in Nepal: a population-based study using the demographic and health survey data. *BMC Pregnancy Childbirth*. 2014;14(1):94. [\[DOI\]](#)