

Inequality in Institutional Delivery of Recent Birth among Married Women in Nepal: A Trend Analysis

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Abstract

The huge discrepancy in health statistics between developed and developing countries occur in the area of maternal mortality, with developing countries contributing most of the figures. This study assesses the trend of institutional delivery of recent birth and compares the inequalities with associated factors that affect institutional delivery in Nepal. The data for this study were obtained from three sequential Nepal Demographic and Health Surveys [NDHS] of 2006, 2011, and 2016. The association between institutional delivery and the explanatory variables was assessed via bivariate analysis (Chi-square test) and multivariate analysis (binary logistic regression). The utilization of health service during delivery stepped up from 21% in 2006 to 62% in 2016. Although the proportion of delivery in health facility increased among poorest over the period of 10 years, the disparity between richest and poorest still persisted from 2006 to 2016 and the association was highly significant in all the surveys. Although government of Nepal has launched the maternity incentive scheme through safe delivery incentive program in 2005, poor women are still deprived from utilizing the service. Poorest and poorer women were 78 per cent (aOR=0.22, 95% CI 0.17-0.27) and 71 Per cent (aOR=0.23, 95%CI 0.23-0.35) respectively less likely to have institutional delivery than the richest women after controlling the other socio-demographic and culture factors. Furthermore, this study has found that education, place of residence, women's autonomy, religion, number of ANC visits, exposure to newspaper and TV were significant predictors for place of delivery. Although there has been three-fold increment in utilization of health services during delivery over the period of 10 years, the discrepancy between rich and poor, educated and uneducated and urban and rural area is highly evident. Overall, the present study highlights the necessity of interventions to promote institutional delivery with greater focus on poor, uneducated, and rural women.

Keywords: inequality, institutional delivery, Nepal, recent birth, trend analysis, women

Introduction

One of the major areas of discrepancy in health status between developed and developing nations is maternal health as developing countries contribute most of the figures of maternal mortality (Sageer et al., 2019). Worldwide, about 295,000 women died every

year due to complications during pregnancy, childbirth, or postpartum period in 2017. Among these deaths, substantial proportion (94%) of women die in developing countries (UN, WHO & WB, 2000; WHO et al., 2019). Studies also indicated that a high majority of these deaths (86%) occurred in Sub-Saharan Africa and Southern Asia. Many maternal deaths are preventable due to availability of advanced health care facilities nowadays. In many developed countries, more than nine out of ten births are attended by skilled health care professionals. In contrast, less than half of all births in many less developed countries are assisted by such skilled health personnel (WHO, 2019; WHO & UNICEF, 2021; Dube-Moyo, 2019). Study also shows that high-quality, obstetric and neonatal care during delivery is one of the essential components to reduce illness and death in mothers and newborns (WHO, 2018).

Nepal has higher maternal mortality ratio (258 per 100,000 births) than its South Asian neighbors. Many studies showed that receiving antenatal care (ANC), delivering at health facilities and receiving postnatal care (PNC) are important contributors to prevent maternal and newborn deaths (WHO et al., 2015; NPC, 2017; Aryal et al., 2019). Maternity incentive scheme was launched by the government of Nepal through safe delivery incentive program in 2005. Government of Nepal removed user fees from all types of delivery in public health facilities nationwide and renamed the program '*Aama*' targeted at increasing institutional delivery by minimizing financial barriers, women face in accessing services so as to improve maternal health outcomes. There has only been mediocre progress in the efforts of Ministry of Health and Population (MoHP) of Nepal to promote safer pregnancy and childbirth, in increasing the maternal health service utilization such as adequate ANC visits, institutional delivery, and PNC (MoH et al., 2016; DoHS, 2018).

Studies show that various factors like wealth, distance, religion, and knowledge of maternal health services determine the utilization of institutional delivery services. Further analysis of the Multiple Indicator Cluster Survey (MICS) shows that the utilization of institutional delivery has increased over time and varied to a large extent by wealth quintile in both 2014 and 2019. The richest-to-poorest difference had reduced to 38.8 per cent in 2019 from 62.8% in 2014. The concentration index value also indicates that the inequality between the richest and poorest has been decreasing over time as it decreased to 0.0988 in 2019 from 0.2082 in 2014 (Pokheral et al., 2021). On the other hand, further analysis of NDHS 2016 showed that a larger proportion of marginalized women had home delivery (47%) than non-marginalized women (26%) (Devkota et al., 2020). Studies also showed that distance from health facilities affected institutional delivery, as the probability of institutional delivery was 26 per cent less for women who lived 2-4 km from the closest birthing facility and 43 per cent less for women who lived 5 km or more away. However, the distance impacts mainly for poor women. Another study in Eastern Nepal showed that religion, knowledge of maternal health services, and

incentive program were significantly associated with institutional delivery service utilization (Bhaskar & Deo., 2018).

Despite this evidence and little progress, there is a need for investigation into the marginal increase in maternal health service utilization in the country despite the government of Nepal's high priority and efforts. After Nepal's national flagship program (*Aama*) since 2005, which provides free delivery care and transportation incentive schemes to women delivering in a health facility, we have hypothesized that there is no inequality between the poorest and richest in the utilization of institutional delivery services in Nepal. This study assessed the trend of institutional delivery of recent birth and compared the inequalities with associated factors that affect institutional delivery in Nepal.

Methods

The data for this study were obtained from three sequential Nepal Demographic and Health Surveys [NDHS] of 2006, 2011, and 2016. These surveys used multi-stage, stratified, and cluster sampling methods. The sampling frame contained wards, primary sampling unit [PSU] as well as enumeration areas [EA]. The NDHS used two stages selection for PSU/EA in rural areas and three stages in urban areas. Details of sampling strategy/design/frame, survey questionnaire are publicly available in the NDHS reports and website. The information was collected from mothers having a child within last five years preceding the survey years of 2006, 2011, and 2011.

NDHS collected data from 10793, 12862, 12674 women on NDHS 2006, NDHS 2011, and NDHS 2016 respectively. There were 4066, 4148, and 3998 mothers having a child within last five years preceding the survey 2006, 2011, and 2016, respectively. Therefore, we included all 12212 samples for statistical analysis as per study objectives. Respondents' characteristics: age, age at marriage, number of children born, caste, religion, educational status, place of residence, employment status, wealth index, women's autonomy in household decision making, exposure to media were all considered as independent variables and utilization of health service during delivery was considered as dependent variable.

IBM SPSS Statistics version 20 was used to analyze the data. Three levels of analyses were made. In univariate analysis, simply frequencies and per centage were calculated. Bivariate analysis showed the association between independent and dependent variables using chi-square test as per the survey years separately. However, in multivariate analysis, we pooled all data from NDHS 2006, 2011 and 2016. Multi-level Binary logistic regression model was used to predict the adjusted effects of covariates on utilization of health service during delivery. Before the multivariate analysis, multicollinearity between the variables was assessed. We found age and number of children born were highly correlated ($r > 0.7$). So, we removed age from the logistic model. We put wealth status in

Model I and added other socio-demographic variables in Model II. We presented adjusted odds ratios [aOR] with reference categories at 95 per cent confidence interval [95% CI].

Results

Background Characteristics

The total number of women aged 15-49 years who had a live birth in the five years preceding the survey was alike in all three surveys, which were 4066, 4148 and 3998 in the survey of 2006, 2011 and 2016 respectively. Nearly half of the women were aged between 25-34 years (45%, 48% and 51% in 2006, 2011 and 2016) respectively. More than two-fifths (43%) women were married at the age of 15-17 years followed by 18-20 years (30%) in the year 2016. The proportion of such women was higher among Brahmins/Chhetris (50%) in the year 2006 than among Janajatis in the year 2011 (37%) and 2016 (33%). Similarly, higher proportion of uneducated women had a live birth in the survey of the year 2006 (58%) and 2011 (44%) than their counterparts while the proportion was higher among women having secondary or above education in the survey of the year 2016 (49%). More than four out of five women were Hindus in all three surveys. Likewise, in regards to place of residence, 87% and 90% of such women resided in rural area in the survey of 2006 and 2011, respectively. In contrast, more than half women (56%) resided in urban area in the survey of 2016. The proportion of currently working women who had a live birth in the preceding five years of the survey decreased gradually with time, 70%, 56% and 51% in the survey of 2006, 2011 and 2016 respectively. The proportion of such women was homogeneous among all levels of wealth quintiles in all surveys. More than a third of all women (36%) had no autonomy and moderate autonomy (34%). Similarly, in regards to exposure to mass media, three-fourth (75%) of all women had no exposure to newspapers; only nearly two-fifths each had high exposure to radios (39%) and televisions (38%).

Table 1

Background Characteristics of Women and Live Birth

	NDHS 2006		NDHS 2011		NDHS 2016		Total	
	N	%	N	%	N	%	N	%
Age group								
Less than 25 years	1680	41.3	1662	40.1	1606	40.2	4948	40.5
25-34	1823	44.8	1980	47.7	2033	50.9	5836	47.8
35 or above	563	13.8	507	12.2	359	9.0	1428	11.7
Age at marriage/cohabitation								
Less than 15	126	3.1	311	7.5	376	9.4	812	6.7
15-17	457	11.2	1140	27.5	1712	42.9	3309	27.1
18-20	333	8.2	777	18.7	1179	29.5	2290	18.8
21 and above	3150	77.5	1920	46.3	726	18.2	5796	47.5
Number of children born								
One	1094	26.9	1302	31.4	1498	37.5	3894	31.9

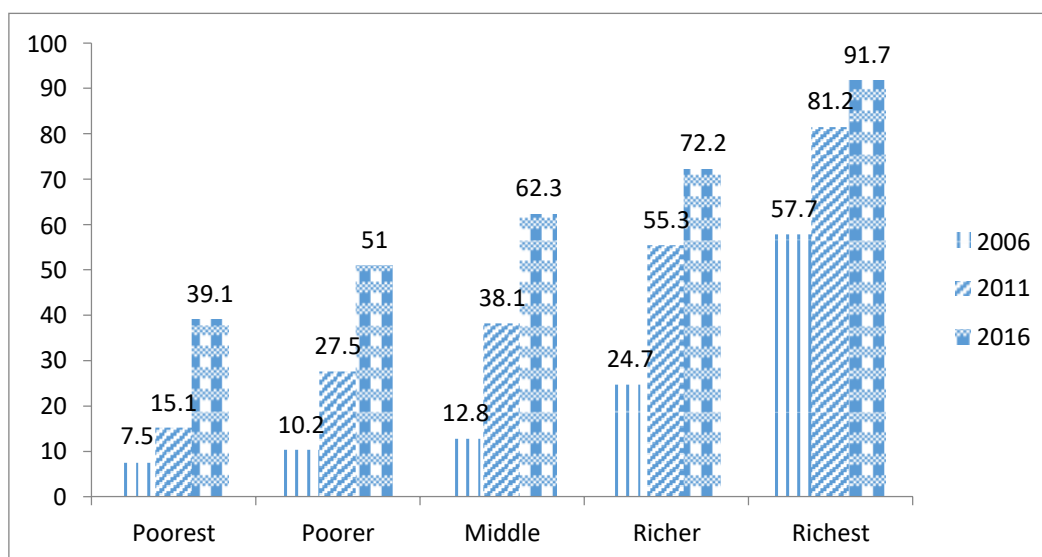
Two	1121	27.6	1162	28.0	1207	30.2	3490	28.6
Three	665	16.4	733	17.7	626	15.7	2024	16.6
Four	448	11.0	397	9.6	315	7.9	1159	9.5
Five or more	738	18.2	555	13.4	352	8.8	1645	13.5
Ethnicity								
Brahmin/Chhetri	1388	49.7	1283	31.0	1159	29.0	3830	35.0
Janajati	491	17.6	1523	36.8	1303	32.6	3318	30.4
Dalit	370	13.2	683	16.5	545	13.6	1597	14.6
Other	544	19.5	649	15.7	990	24.8	2183	20.0
Education								
No education	2357	58.0	1822	43.9	1257	31.4	5436	44.5
Primary	743	18.3	835	20.1	777	19.4	2354	19.3
Secondary or above	966	23.8	1492	36.0	1964	49.1	4422	36.2
Religion								
Hindu	3453	84.9	3444	83.0	3421	85.6	10318	84.5
Buddhist	312	7.7	360	8.7	178	4.4	849	7.0
Muslim	195	4.8	235	5.7	251	6.3	680	5.6
Kirat/Christian	106	2.6	109	2.6	148	3.7	364	3.0
Place of residence								
Urban	536	13.2	418	10.1	2223	55.6	3177	26.0
Rural	3530	86.8	3730	89.9	1775	44.4	9035	74.0
Currently working								
No	1236	30.4	1820	43.9	1945	48.6	5000	40.9
Yes	2830	69.6	2329	56.1	2053	51.4	7212	59.1
Wealth status								
Poorest	956	23.5	979	23.6	822	20.5	2757	22.6
Poorer	859	21.1	899	21.7	839	21.0	2598	21.3
Middle	811	20.0	873	21.0	863	21.6	2547	20.9
Richer	752	18.5	748	18.0	830	20.8	2330	19.1
Richest	687	16.9	649	15.7	643	16.1	1980	16.2
Women's autonomy in household decision								
No autonomy	1699	41.8	1284	30.9	1450	36.3	4433	36.3
Moderate autonomy (involved in 1-2 issues)	993	24.4	1292	31.1	1361	34.0	3646	29.9
High autonomy (involved in all 3 issues)	1373	33.8	1573	37.9	1187	29.7	4133	33.8
Exposure to newspaper								
No exposure	3051	75.1	3071	74.0	3019	75.5	9142	74.9
Low exposure	773	19.0	777	18.7	742	18.6	2293	18.8
High exposure	238	5.9	300	7.2	237	5.9	774	6.3
Exposure to Radio								
No exposure	439	10.8	996	24.0	1882	47.1	3317	27.2
Low exposure	1441	35.4	1617	39.0	1140	28.5	4198	34.4
High exposure	2186	53.8	1535	37.0	976	24.4	4697	38.5
Exposure to TV								
No exposure	1369	33.7	1443	34.8	1423	35.6	4236	34.7
Low exposure	1410	34.7	1144	27.6	833	20.8	3387	27.7
High exposure	1286	31.6	1561	37.6	1742	43.6	4589	37.6
Total	4066	100.0	4148	100.0	3998	100.0	12212	100.0

Bivariate Analysis

The utilization of health services during delivery among women aged 15-49 years who had a live birth in the five years preceding the survey for most recent live birth was assessed and bi-variate analysis was done to find the statistical significance with socio-demographic variables. The utilization of health service during delivery increased from 21% in 2006 to 40% in 2010 and 62% in 2016. Although the proportion of delivery in health facility increased among poorest over the period of 10 years, the disparity between richest and poorest still persisted from 2006 to 2016 and the association was highly significant in all the surveys. The proportion of poorest women utilizing health services during delivery increased from 8% to 39% over the period of 10 years (2006 to 2016). But there's still a huge gap between rich and poor with 92% richest and 39% poorest women utilizing the services in 2016.

Figure 1

Institutional Delivery of Recent Birth by Wealth Status



In regards to age, significantly higher proportion of women aged less than 25 years utilized health service during delivery in the year 2006 (24%), 2011 (46%) and 2016 (67%). In regards to ethnicity, significantly higher proportion of Brahmins/Chhetris ($p > 0.001$) had their recent delivery in health facility than their counterparts in all three surveys (25% in 2006, 49% in 2011 and 74% in 2016). Similarly, proportion of delivery in health facility increased with increase in education of women and the relation was statistically significant ($p > 0.001$) in all three surveys. Health service delivery among women having secondary or above education increased from 47% in 2006 to 79% in 2016. Although decreasing, the urban rural difference in health service delivery continued

from 2006 to 2016. Higher proportion of women in urban area had their most recent birth in health facility and the difference was statistically significant in all the surveys. In the similar manner, significantly higher proportion of women who were currently working had their most recent birth in health facility in all the surveys. Number of ANC visits completed was highly statistically significant with place of delivery in all three surveys. Forty three per cent of women who had four or more ANC visits had their most recent delivery in health facility in the survey of 2006, which increased to 74% in 2016. Exposure to mass media (newspapers, radios and TV) was also directly proportional to delivery in health facility as significantly higher proportions of women with high exposure to mass media had their delivery in health facility than those with low exposure in all three surveys.

Table 2*Women with Live Birth by Place of Delivery*

	NDHS 2006			NDHS 2011			NDHS 2016		
	Home facilities	Health facilities	N	Home facilities	Health facilities	N	Home facilities	Health facilities	N
Wealth status			***			***			***
Poorest	92.5	7.5	956	84.9	15.1	979	60.9	39.1	822
Poorer	89.8	10.2	859	72.5	27.5	899	49.0	51.0	839
Middle	87.2	12.8	811	61.9	38.1	873	37.7	62.3	863
Richer	75.3	24.7	752	44.7	55.3	748	27.8	72.2	830
Richest	42.3	57.7	687	18.8	81.2	649	8.3	91.7	643
Age group			***			***			***
Less than 25 years	76.4	23.6	1680	53.7	46.3	1662	32.6	67.4	1606
25-34	79.2	20.8	1823	60.6	39.4	1980	40.2	59.8	2033
35 or above	87.8	12.2	563	76.5	23.5	507	50.4	49.6	359
Age at marriage/cohabitation			***			***			***
Less than 15	87.3	12.7	126	70.0	30.0	311	55.8	44.2	376
15-17	85.0	15.0	457	64.8	35.2	1140	45.0	55.0	1712
18-20	68.3	31.7	333	54.5	45.5	777	33.6	66.4	1179
21 and above	79.2	20.8	3150	57.2	42.8	1920	19.7	80.3	726
Number of children born			***			***			***
One	61.8	38.2	1094	38.4	61.6	1302	19.3	80.7	1498
Two	78.9	21.1	1121	58.7	41.3	1162	37.2	62.8	1207
Three	87.2	12.8	665	71.3	28.7	733	54.7	45.3	626
Four	92.2	7.8	448	74.7	25.3	397	62.6	37.4	315
Five or more	90.4	9.6	738	86.2	13.8	555	69.4	30.6	352
Ethnicity			***			***			***
Brahmin/Chhetri	74.7	25.3	1388	50.6	49.4	1283	25.8	74.2	1159
Janajati	83.8	16.2	491	63.1	36.9	1523	37.1	62.9	1303

Dalit	66.5	33.5	370	68.8	31.2	683	49.5	50.5	545
Other	85.6	14.4	544	61.3	38.7	649	47.4	52.6	990
Education			***			***			***
No education	89.9	10.1	2357	77.8	22.2	1822	60.0	40.0	1257
Primary	79.6	20.4	743	63.7	36.3	835	46.3	53.7	777
Secondary or above	52.8	47.2	966	35.6	64.4	1492	20.8	79.2	1964
Religion			***			***			NS
Hindu	79.2	20.8	3453	58.3	41.7	3444	37.8	62.2	3421
Buddhist	71.7	28.3	312	69.9	30.1	360	38.7	61.3	178
Muslim	87.2	12.8	195	62.7	37.3	235	45.1	54.9	251
Kirat/Christian	87.9	12.1	106	66.1	33.9	109	32.2	67.8	148
Place of residence			***			***			***
Urban	47.8	52.2	536	24.6	75.4	418	27.7	72.3	2223
Rural	84.0	16.0	3530	63.7	36.3	3730	51.0	49.0	1775
Currently working			***			***			***
No	69.8	30.2	1236	49.6	50.4	1820	35.0	65.0	1945
Yes	83.3	16.7	2830	67.7	32.3	2329	40.9	59.1	2053
Women's autonomy in household decision			***			***			***
No autonomy	82.4	17.6	1699	65.1	34.9	1284	42.6	57.4	1450
Moderate autonomy (involved in 1-2 issues)	71.8	28.2	993	57.5	42.5	1292	34.7	65.3	1361
High autonomy (involved in all 3 issues)	80.6	19.4	1373	57.3	42.7	1573	36.4	63.6	1187
Number of ANC visits for the most recent live birth			***			***			***
less than 4 visit	88.3	11.7	2868	79.2	20.8	2071	64.1	35.9	1225
4 or more visits	57.4	42.6	1198	40.5	59.5	2078	26.5	73.5	2773
Exposure to newspaper			***			***			***
No exposure	87.5	12.5	3051	68.9	31.1	3071	45.9	54.1	3019
Low exposure	60.8	39.2	773	40.8	59.2	777	16.5	83.5	742
High exposure	33.2	66.8	238	16.0	84.0	300	5.5	94.5	237
Exposure to Radio			***			***			***
No exposure	89.9	10.1	439	64.4	35.6	996	44.3	55.7	1882
Low exposure	82.8	17.2	1441	63.1	36.9	1617	32.9	67.1	1140
High exposure	74.7	25.3	2186	53.3	46.7	1535	32.1	67.9	976
Exposure to TV			***			***			***
No exposure	93.5	6.5	1369	79.0	21.0	1443	56.9	43.1	1423
Low exposure	84.5	15.5	1410	67.1	32.9	1144	38.3	61.7	833
High exposure	58.2	41.8	1286	36.7	63.3	1561	22.5	77.5	1742
Total	79.2	20.8	4066	59.8	40.2	4148	38.1	61.9	3998

Note *** Significant in chi-square test at $p < 0.001$; **= $p < 0.01$ and *= $p < 0.05$

Multivariate Analysis

The predictors of institutional delivery among women aged 15-49 years were investigated through multivariate logistic regression analysis. At first, while calculating unadjusted odds ratio, wealth status was a significant predictor of institutional delivery in which poorest were 92 per cent (OR=0.075, 95% CI=0.065-0.086) times less likely to deliver their recent child in health facility than the richest.

Although attenuated, wealth status still remained significant predictor of institutional delivery after adjusting all other variables where poorest were almost 78 per cent (aOR=0.218, CI=0.174-0.272) less likely to practice institutional delivery than richest. Adjusted odd's ratio was calculated for all other remaining variables. Time period was another significant predictor of institutional delivery as women in the survey of 2016 and 2011 were almost 6 and 3 times respectively more likely to deliver their child in health facility than in the year 2006. Similarly, women married at an age of 21 and above were significantly more likely to have institutional delivery than women married at an age of less than 15 years. Number of children was also significant predictor of institutional delivery in which women having two or more children were significantly less likely to deliver their child in health facility. In regard to ethnicity, women who belonged to Janajatis (aOR=0.732, CI=0.641-0.837) and other castes (aOR=0.749, CI=0.636-0.881) were less likely to practice institutional delivery.

Secondary level education had significant positive impact on institutional delivery as women having secondary and above education were more likely to deliver their child in health facility than those women who had no education. Compared to Hindu women, Muslim women were more likely to practice institutional delivery although this was only marginally significant (aOR=1.291, CI=1.043-1.599). Likewise, women living in rural areas and currently working women were significantly less likely to deliver their most recent child in health facility. Women with moderate and high autonomy were also significantly more likely to deliver their child in health facility than women with no autonomy. Number of ANC visits was also a significant predictor of institutional delivery in which women completing four or more ANC visits (aOR=2.739, CI=2.472-3.035) were nearly three times more likely to practice institutional delivery than their counterparts. Similarly, exposure to mass media like newspapers and televisions had significant positive influence on institutional delivery.

Table 3*Adjustment of Odd Ratio (aOR) and Institutional Delivery Services*

		Unadjusted	95% CI		Adjusted	95% CI	
		OR	lower	Upper	OR	lower	Upper
Wealth Status							
	Poorest (ref.)	.075***	.065	.086	.218***	.174	.272
	Poorer	.128***	.112	.146	.285***	.233	.348
Wealth status	Middle	.191***	.167	.218	.385***	.318	.465
	Richer	.326***	.286	.372	.469***	.393	.561
	Richest	1.00			1.00		
Others variables							
	2006 (ref.)				1.00		
Year of survey	2011				2.831***	2.441	3.282
	2016				5.605***	4.685	6.705
	Less than 15 (ref.)				1.00		
Age at	15-17				.937	.772	1.138
marriage/cohabitation	18-20				1.052	.856	1.293
	21 and above				1.276*	1.044	1.560
	One (ref.)				1.00		
	Two				.445***	.394	.503
Number of children	Three				.345***	.297	.402
borne	Four				.361***	.296	.439
	Five or more				.341***	.280	.414
	Brahmin/Chhetri				1.00		
	(ref.)						
Ethnicity	Janajati				.732***	.641	.837
	Dalit				.934	.798	1.094
	Other				.749**	.636	.881
	No education (ref.)				1.00		
Education	Primary				1.139	.994	1.306
	Secondary or above				1.515***	1.310	1.751
	Hindu (ref.)				1.00		
	Buddhist				.854	.691	1.055
Religion	Muslim				1.291*	1.043	1.599
	Kirat/Christian				1.077	.806	1.440
	Urban (ref.)				1.00		
Place of residence	Rural				.564***	.498	.638
	NO (ref.)				1.00		
Currently working	Yes				.742***	.668	.824
Women's autonomy	No autonomy (ref.)				1.00		

in household decision	Moderate autonomy (involved in 1-2 issues)	1.163*	1.030	1.313
	High autonomy (involved in all 3 issues)	1.155*	1.023	1.303
Number of ANC visits	less than 4 visit (ref.)	1.00		
	4 or more visits	2.739***	2.472	3.035
Exposure to newspaper	No exposure (ref.)	1.00		
	Low exposure	1.152*	.999	1.328
	High exposure	1.676**	1.296	2.166
Exposure to Radio	No exposure (ref.)	1.00		
	Low exposure	.986	.862	1.128
	High exposure	.950	.824	1.094
Exposure to TV	No exposure (ref.)	1.00		
	Low exposure	1.357***	1.189	1.548
	High exposure	1.628***	1.416	1.872
Constant		.244***		.168***
-2 Log likelihood		14652.8		10246.8
Cox & Snell R Square		.142		.351

Note * significant at $p < 0.05$, ** $P < 0.01$, *** $P < 0.001$, ref= reference category

Discussion

Only less than two-thirds (62%) women in our country delivered their recent child in health facility in 2016. The proportion of institutional delivery in our country matches with that of various African countries as shown by different studies. In studies conducted in Ethiopia (Eshete et al., 2019), Mokuua, 2014, Zambia (Mwewa & Michelo, 2010) and Sub-Saharan Africa (Tey & Lai, 2013), the proportion of institutional delivery was 60.5%, 61%, 62.2% and 57% respectively.

This study illustrates the positive influence of education on institutional delivery. In multivariate logistic regression analysis, educated women were significantly more likely to practice institutional delivery than uneducated women. This finding is consistent with the studies conducted in Ethiopia (Eshete et al., 2019; Aregay et al., 2014; Abeje et al., 2014;), India (Kesterton et al., 2010) and also Nepal (Shah et al., 2015). This could be because less educated mothers were less aware about the importance of safe delivery and complications of child birth. So, the impact of education on health care seeking behavior of women is evident from different studies.

This study also showed that wealth status is a significant predictor of institutional delivery both with and without controlling other variables. The results are similar with the study conducted in Bangladesh (Yaya, et al., 2017), Gambila (Ketemaw, et al, 2020),

Southwest Ethiopia (Yoseph, et al., 2020), and Mozambique (Yaya, et al., 2020). The finding is also consistent with other studies conducted in Pakistan (Agha & Cartoon, 2011), Eastern Nepal (Kumar & Kumar, 2018) and other different low-income countries (Bishanga, et al., 2018; Rutaremwa, et al., 2015; Singh, et al., 2015; Mustafa & Mukhtar, 2015). Despite Nepal's national flagship programs (Aama) since 2005 that concerns with promoting safe motherhood through initiatives such as providing free delivery care and transportation incentive schemes to women delivering in a health facility, it is discouraging that poor women are less likely to deliver their recent child in the health facilities.

This study highlights the importance of completing four or more ANC visits for greater utilization of institutional delivery as women completing four or more ANC visits were nearly three times more likely to deliver in health facility. This finding is in-line with the findings of studies conducted in Chitwan (Shah, et al., 2015) and Kavrepalanchowk (Shrestha, et al., 2012) districts of Nepal and also in Ethiopia (Feyissa & Genemo, 2013) and Sudan (Bayo, et al., 2020). Other different studies (Agha & Carton, 2011; Birmeta, et al., 2013; Jat, et al. 2011; Kidanu, et al. 2017) also showed that improving ANC practices can help increase institutional delivery. This can be justified by the fact that women are also counseled for institutional delivery in their ANC check-up as birth-preparedness is also a component of ANC. Similarly, women having a greater number of children were also less likely to practice institutional delivery in our study which is in accordance with the findings of studies in Bangladesh (Amin, et al. 2010; Chakraborty, et al., 2003), and Nepal (Kumar & Kumar, 2018). Institutional delivery also significantly increased with increase in autonomy among women through our analysis which is also further supported by other studies in Ethiopia (Tsegay, et al., 2013) and also in Nepal (Acharya et al., 2010; Adhikari, 2016). From the findings of this study, it is revealed that women living in rural area were less likely to deliver in health facilities than urban area which matches to the findings of another study in African country (Alemikebede & Teklehaymanot, 2016). Variations according to regions within the nation has also been demonstrated in different other studies in African nations (Bishanga et al., 2018; Kabakyenga et al., 2012, Rutaremwa et al., 2015; Feyissa & Genemo, 2013; Moyer et al. 2013).

Conclusion

There has been three-fold increment in utilization of health services during delivery over the period of 10 years; from 21% in 2006 to 62% in 2016. But nearly two-fifths women did not deliver in health facility which is an evidence that there's still a lot of space for improvement. The discrepancy between rich and poor, educated and uneducated and those living in urban and rural area is still evident in 2016 which is also statistically significant. Apart from this, age at marriage, caste, women's autonomy and exposure to mass media were also significant predictors of practice of institutional delivery. Likewise,

completion of four or more ANC visits also had significant positive impact on increasing institutional delivery.

Overall, our study highlights the necessity of interventions to promote institutional delivery with greater focus on poor, uneducated, and women in rural area. Furthermore, attempts to encourage women to practice four or more ANC visits can be a powerful strategy to increase institutional delivery.

Declaration

Ethics approval and consent to participate

This study used secondary data. The survey protocol was reviewed and approved by the Nepal Health Research Council (NHRC) and the Institutional Review Board (ICF).

Availability of data and materials

The datasets generated and/or analyzed during the current study are available in the [DHS PROGRAM] repository, [<https://dhsprogram.com/data/Using-DataSets-for-Analysis.cfm>]

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