

Maternal Health Care in Nepal: Trends and Determinants



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Krishna Kumar Aryal¹
Sharad K Sharma²
Mukti Nath Khanal³
Bihungum Bista⁴
Shiv Lal Sharma²
Shambhu Kafle⁵
Mona Mehta Steffen⁶

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¹ DFID/NHSP3/MEOR, Abt Associates

² Department of Health Services, Ministry of Health and Population, Nepal

³ Population Division, Ministry of Health and Population, Nepal

⁴ Nepal Health Research Council

⁵ Health Coordination Division, Ministry of Health and Population, Nepal

⁶ The DHS Program, ICF

Corresponding author: Krishna Kumar Aryal, DFID Nepal Health Sector Programme 3 (NHSP3), Monitoring, Evaluation and Operational Research (MEOR) Project, Abt Associates, Lalitpur-10, Lalitpur, Nepal; phone: +977 9851123730; email: krishna.aryal@abtassoc.com.au.



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Additional information about the 2016 NDHS may be obtained from the Ministry of Health and Population, Ramshahpath, Kathmandu; telephone: +977-1-4262543/4262802; internet: <http://www.mohp.gov.np>; and New ERA, Rudramati Marg, Kathmandu, P.O. Box 722, Kathmandu 44600, Nepal; telephone: +977-1-4413603; email: info@newera.com.np; internet: <http://www.newera.com.np>.

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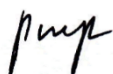
FOREWORD

The 2016 Nepal Demographic and Health Survey (NDHS) is the fifth nationally representative comprehensive survey conducted as part of the worldwide Demographic and Health Surveys (DHS) Program in the country. The survey was implemented by New ERA under the aegis of the Ministry of Health and Population (MoHP). Technical support for this survey was provided by ICF, with financial support from the United States Agency for International Development (USAID) through its mission in Nepal, and support for report production from the United Nations Population Fund (UNFPA).

The standard format of the survey final report included only a descriptive presentation of findings and trends, and did not include analytical methods that can ascertain the significance of change and association among variables. Although largely sufficient, the final report is limited, particularly in providing answers to “why” – answers that are essential in reshaping important policies and programs. After the dissemination of the NDHS 2016, the MoHP and its partners convened and agreed on key areas that are necessary for assessing progress, gaps, and determinants in high-priority public health programs being implemented by the MoHP. In this context, seven further analysis studies have been conducted by technical professionals from the MoHP and its partners who work directly on the given areas, with technical support and facilitation from research agencies.

The primary objective of the further analysis of the 2016 NDHS is to provide more in-depth knowledge and insights into key issues that emerged from the survey. This information provides guidance for planning, implementing, refocusing, monitoring, and evaluating health programs in Nepal. The long-term objective of the further analysis is to strengthen the technical capacity of local institutions and individuals for analyzing and using data from complex national population and health surveys to better understand specific issues related to country need.

The further analysis of the 2016 NDHS is the concerted effort of many individuals and institutions, and it is with great pleasure that I acknowledge the work involved in producing this useful document. The participation and cooperation of the members of the Technical Advisory Committee in the different phases of the survey are highly valued. I would like to extend my appreciation to USAID/Nepal for providing financial support for the further analyses and to the UK Department for International Development (DFID) for additional support it provided through the DFID Nepal Health Sector 3 (NHSP3), Monitoring Evaluation and Operational Research (MEOR) project. I would also like to acknowledge ICF for its technical assistance at all stages. My sincere thanks also go to the New ERA team for the overall management and coordination of the entire process. I would also like to thank the Public Health Administration Monitoring and Evaluation Division, as well as the Policy Planning and Monitoring Division, MoHP, for their efforts and dedication to the completion of this further analysis of the 2016 NDHS.



Dr. Pushpa Chaudhary
Secretary
Ministry of Health and Population

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I would like to express my deep appreciation for the contributions of many different stakeholders and for their valuable input in the various phases of the study and the final report. My sincere gratitude goes to all members of the National Monitoring and Evaluation Technical Advisory Group at MoHP for their valuable input. I appreciate the leadership of Mr. Giri Raj Subedi, Sr. Public Health Administrator, and entire team of the Policy Planning and Monitoring Division, PHAMED, and the Child Health Division for their contributions during the different phases of the study.

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Dr. Bikash Devkota
Chief, Policy Planning and Monitoring Division
Ministry of Health and Population

ABSTRACT

Despite the longstanding efforts of the Ministry of Health and Population (MoHP) in Nepal to promote maternal and neonatal health (MNH), progress has been slow for MNH service use. This analysis aimed to identify determinants of maternal health care use: antenatal care (ANC) visits, institutional delivery, and postnatal care (PNC) check-up. We analyzed 2011 and 2016 Nepal Demographic and Health Surveys (NDHS) data to illustrate the trend of these three outcome variables, and 2016 NDHS data alone for determinants of the outcome variables. The number of women included in the analysis was 1,440 for ANC, 1,478 for place of delivery, and 718 for PNC. We used descriptive and inferential statistics and presented the results as proportions and adjusted odds ratios.

Since 2011, we observed a substantial increase in the proportion of women with four ANC visits and institutional delivery, but only a small increase in PNC check-up. Lower birth order was associated with the ANC visits. Better education, completion of four ANC visits, and birth preparedness were associated with institutional delivery. Having institutional delivery and receiving advice for PNC check-up was associated with PNC check-up. We found an association of all the outcome variables with wealth quintile and province.

These findings suggest that women marginalized by geography, wealth, and education are less likely to access maternal health care. To achieve the goals of increasing the institutional delivery rate to 70%, and of increasing ANC visits and PNC check-up to 90% by 2020, more focused interventions, targeting the underserved and most marginalized population, are required.

KEY WORDS: antenatal care; institutional delivery; postnatal care; determinants; Nepal

ACRONYMS AND ABBREVIATIONS

ANC	antenatal care
aOR	adjusted odds ratio
BCC	behavior change communication
CI	confidence interval
DHS	Demographic and Health Survey
DoHS	Department of Health Services
FCHV	female community health volunteer
HDI	Human Development Index
IEC	information, education, and communication
MMR	maternal mortality ratio
MoHP	Ministry of Health and Population
MPI	Multidimensional Poverty Index
OR	odds ratio
NDHS	Nepal Demographic and Health Survey
NHSP2	Nepal Health Sector Programme-2
NHSP2 IP	Nepal Health Sector Programme-2 Implementation Plan
PHAMED	Public Health Administration Monitoring & Evaluation Division
PNC	postnatal care
PSU	primary sampling unit
SBA	skilled birth attendant
SDG	Sustainable Development Goal
USAID	United States Agency for International Development
WHO	World Health Organization

1 INTRODUCTION

Nepal is a country with a very high maternal mortality ratio (MMR) (258 per 100,000 live births), which is higher than its South Asian neighbors such as India (174), Bhutan (148), Bangladesh (176), Myanmar (178), Pakistan (178), and Sri Lanka (30) (WHO et al. 2015). Although there has been a reduction in pregnancy-related mortality in Nepal from 543 deaths/100,000 live-births in 1996 to 259 deaths/100,000 in 2016 (Ministry of Health, New ERA, and ICF 2017), there is much more to achieve. Receiving antenatal care (ANC) on specified months as per national protocol, delivering at health institutions or being assisted by skilled birth attendants (SBA) at health institutions and at home, and receiving postnatal care (PNC) are vital to preventing maternal and newborn deaths. Nepal is a signatory to the Sustainable Development Goals (SDGs), which have set ambitious targets for the country to reduce the MMR to 70 per 100,000 live births and neonatal mortality to 12 per 1,000 live births, and to achieve coverage of 90% for four ANC visits, institutional delivery, SBA delivery, and three PNC check-ups by 2030 (National Planning Commission 2017).

Although the rate has been stagnant over the last decade, there has been some decline in the neonatal death rate (21 per 1,000 live births) in 2016 compared to 33 per 1,000 live births in 2011 (Ministry of Health, New ERA, and ICF 2017). However, further improvement is needed to meet the 2030 target. Along with the targets for reducing maternal and neonatal mortality, there are also targets for increasing the coverage of essential services related to pregnancy and childbirth that can help achieve the mortality targets. Despite the longstanding efforts of the Ministry of Health and Population (MoHP) to promote safer pregnancy and childbirth, there has not been satisfactory progress in increasing the proportion of four ANC visits, institutional delivery, and PNC, which remain at 59%, 57%, and 57% respectively for the year 2016 (Ministry of Health, New ERA, and ICF 2017). There is a similar proportion (55%) of institutional delivery shown in the health facility data from the Department of Health Services (DoHS) (Department of Health Services 2018).

Nepal has been implementing its safe motherhood program since 1997 with the broad aims of reducing maternal and neonatal morbidity and mortality, and improving maternal and neonatal health. This program includes strategies focused on birth preparedness, ANC check-ups, and institutional delivery that reduce the risks of complications during pregnancy and childbirth and address factors associated with mortality and morbidity (Department of Health Services 2018). In 2005, Nepal introduced the *Aama* Program (Maternity Incentive Scheme) which aims to reduce financial barriers for women who seek institutional delivery (Aryal and Bhatt 2014). Under the current *Aama* program, Nepalese women who deliver in a health facility are given a cash incentive of Nepali Rupees (NRs) 3,000 (mountain districts), NRs 2,000 (hill districts), and NRs 1,000 (Terai districts), with an additional NRs 800 to those women who complete four ANC visits per national protocol (Family Health Division 2018).

In addition to cash incentives, the *Aama* program also provides free delivery, essential newborn care, and care for sick neonates (Department of Health Services 2018). The MoHP in Nepal recommends four ANC visits at the 4th month (12-16 weeks of gestation), 6th month (20-24 weeks of gestation), 8th month (28-32 weeks of gestation), and 9th month (36-40 weeks of gestation) (Family Health Division 2016). The World Health Organization (WHO) has changed its earlier recommendation of four ANC visits to a minimum of eight ANC contacts in its 2016 WHO ANC model. This includes the first contact in the first trimester (up to 12 weeks of gestation), two contacts in second trimester (20 and 26 weeks of gestation) and five contacts in the third trimester (30, 34, 36, 38 and 40 weeks of gestation) (World Health Organization 2016). In addition, three PNC check-ups are recommended to reduce maternal and

neonatal morbidity and mortality: the first within 24 hours of delivery, the second on the 3rd day, and the third on the 7th day of delivery (Department of Health Services 2018).

This further analysis has three outcome variables: four ANC visits as per national protocol in the 4th, 6th, 8th, and 9th month of pregnancy; institutional delivery; and PNC check-ups within 7 days for all women during their last pregnancy. The 2016 NDHS dataset allowed us to analyze the PNC check-up within 7 days without possibility of analyzing three check-ups in the specified time in the national protocol: the first within 24 hours, the second on the 3rd day, and the third on the 7th day (Department of Health Services 2018).

Using data from the 2016 NDHS, we examine determinants of three components of maternal health care: four ANC visits as per protocol, institutional delivery, and PNC check-up within 7 days. The results provide guidance for interventions that are needed for reaching the ambitious targets of improving essential maternal health services and reducing maternal and neonatal mortality.

1.1 Objectives

With an overall objective of identifying the determinants of maternal health care service utilization in Nepal, we specifically aim to identify:

- Factors that affect the completion of four ANC visits as per protocol
- Determinants of delivery in health facility
- Factors associated with PNC check-ups within 7 days

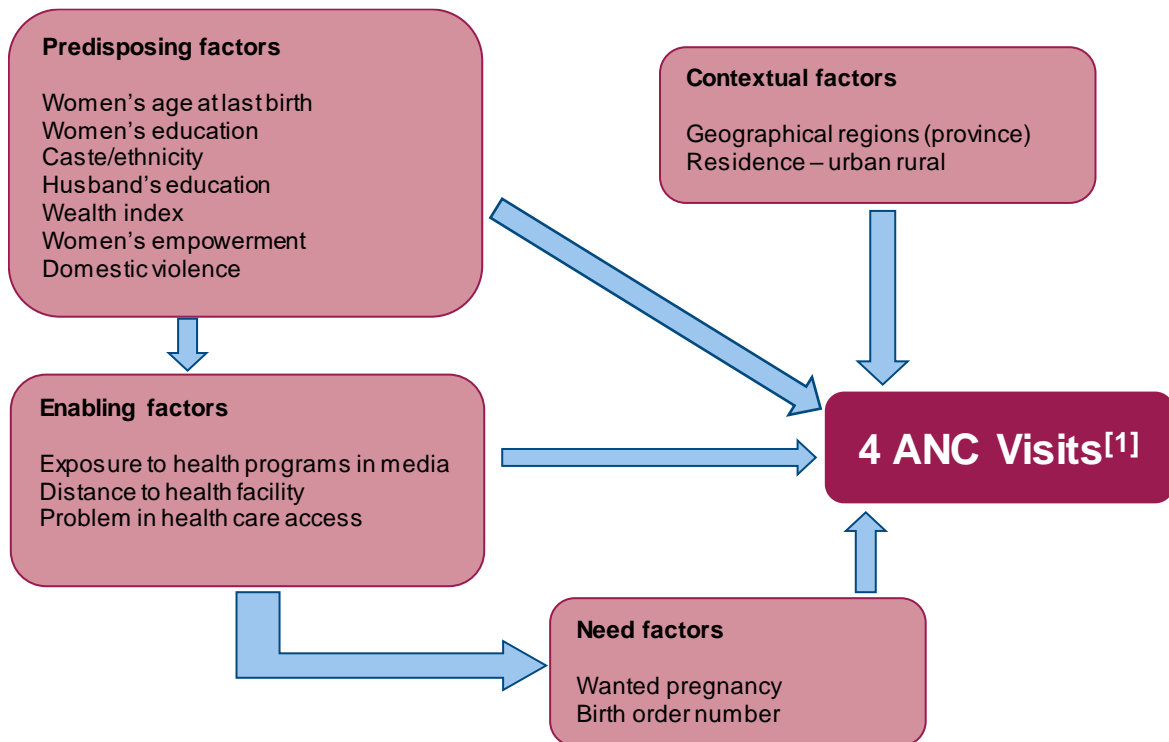
1.2 Conceptual Framework

We have adopted the framework of health-care-seeking behavior used by Kebede et al. in their research on institutional delivery service utilization (Kebede, Hassen, and Nigussie Teklehaymanot 2016) to develop the conceptual framework for all three outcome variables: four ANC visits (Figure 1), institutional delivery (Appendix Figure A1), and PNC check-up within 7 days¹ (Appendix Figure A2). This framework incorporated the predisposing, enabling, and need factors of health-seeking behavior that closely matched our requirements for analyzing the determinants of maternal health care utilization. In addition to the three factors, we considered the geographical regions (provinces) and urban versus rural residence as contextual variables in the analysis. This study uses the nomenclature Province 1 – Province 7, since these are the province names that were in effect at the time of the 2016 survey.²

¹Analyses of DHS data typically examine PNC check-up within 2 days. The Nepal national protocol recommends three PNC check-ups within 7 days. However, we analyze one (or more) PNC check-ups within 7 days because the NDHS does not record data on the number of PNC check-ups in that time period.

² Province 4 has since changed its name to Gandaki Province (July 2018), Province 6 to Karnali Province (February 2018), and Province 7 to Sudurpashchim Province (September 2018). The remaining four provinces have not adopted permanent names as of the time of this publication.

Figure 1 Conceptual framework for analyzing determinants of four antenatal care visits per national protocol



[1] The national protocol recommends ANC visits in the 4th, 6th, 8th, and 9th months of pregnancy .

2 DATA AND METHODS

2.1 Data

We used the 2011 and 2016 NDHS data to analyze the three outcome variables. The NDHS, like other DHS surveys, is a nationally representative survey that provides current data on basic demographic and health indicators related to access to health services, some health behaviors, and health outcomes. The 2016 NDHS sampled 11,473 households from 383 clusters by using a two-stage sampling in rural areas and a three-stage sampling in urban areas. From the 11,040 households interviewed, there were 13,089 eligible women, out of whom 12,862 women were interviewed (99% response rate). Details on survey design, sample design, and survey instruments are described in the full 2016 NDHS report (Ministry of Health, New ERA, and ICF 2017). The 2011 NDHS sampled 11,353 households from 289 clusters with a two-stage sampling. Interviews were completed in 10,826 households and with 12,674 women. Details on survey design, sample design, and survey instruments are also described in the full 2011 NDHS report (Ministry of Health and Population, New ERA, and Inc. 2012).

To study the predictors of care, we selected a subset of 4,006 women who had a live birth in the 5 years before the 2016 survey, including the most recent birth, and who were among the 12,862 women interviewed in the survey. One of the variables of interest for this analysis was experience of domestic violence by women. We further restricted this analysis to the subsample of women who were interviewed on the domestic violence module in the survey.

2.1.1 Number of women included in the analysis

For examining determinants of care using 2016 data, 1,538 women met both criteria: had a live birth in the previous 5 years and completed the domestic violence module. In addition, since the ANC analysis included completion of four ANC visits, we included women with at least one ANC visit. This resulted in a total sample of 1,440 woman for ANC-related analysis. With place of delivery, we excluded women who responded that the place of delivery was India or other countries, which resulted in a final sample of 1,478 woman for this subset. With the PNC analysis, there were 1,970 women who both had a live birth in the previous 2 years and completed the domestic violence module. The total sample for PNC-related analysis was 718 women.

2.2 Variables Included in This Study

Table 1 presents the study variables that include background, access to media and health care, women's empowerment and domestic violence, and pregnancy-related criteria. ANC visit variable is defined as four or more ANC visits in the trend analysis using 2011 and 2016 NDHS data, whereas this is defined as having four ANC visits in the specified months per national protocol for the purpose of determinants analysis using 2016 NDHS data.

Table 1 List of variables and their operational definitions

Dependent Variables	Definition	2011	2016
Completion of four ANC visits ¹	Whether or not women had made ANC visit at 4, 6, 8, and 9 months among those with at least one ANC visit	N = 3,468	N = 3,754
Place of delivery	Home, institution/health facility	N = 4,012	N = 3,847
PNC check-up within seven days	Whether the woman received PNC check-up for her last child birth within seven days	N = 1,798	N = 1,961
All three	Women completing all the above three variables	N = 1,552	N = 1,804
Background variables	Definition	Categories	
Age at last birth	Completed age of the women at the time of last child birth	1) <20 Years 2) 20-24 Years 3) 25-29 Years 4) 30-49 Years	
Education	Level of education classified as per the years of schooling/grades completed	1) No education 2) Basic education (with incomplete secondary education and below) 3) Higher education (completed secondary or higher)	
Caste/ethnicity	Ethnic categories that an individual falls into	1) Dalits 2) Muslim 3) Janajati 4) Other Terai 5) Brahmin/ Chhetri	
Husband's education	Level of education classified by the years of schooling/grades completed	1) No education 2) Basic education (with incomplete secondary education and below) 3) Higher education (completed secondary or higher)	
Household wealth quintile	Quintile based on household wealth index score	1) Poorest 2) Poorer 3) Middle 4) Richer 5) Richest	
Place of residence	Urban and rural	1) Rural 2) Urban	
Province	Geographical origin of the women	1) Province 1 2) Province 2 3) Province 3 4) Province 4 5) Province 5 6) Province 6 7) Province 7	
Access-related variables			
Exposure to health programs in media (heard/seen at least 2)	Whether or not the women saw or heard at least two of the following health programs: <i>jana swasthya radio karyakram, janasankhya chetana karyakaram, jeevan chakra tv karyakram, thorai bhaye pugi sari tv karyakram, saathi sanga mann ka kura radio karyakram, bhanchhin ama radio karyakram, bhandai sundai radio karyakram, parivaar niyojan smart banchha jeevan tv/radio karyakram, navi malam tv/radio karyakram</i>	1) No: Not heard or seen at least two programs 2) Yes: Heard or seen at least two programs	
Distance to health facility	Duration to reach nearest health facility in minutes	1) >30 mins 2) <30 mins	
Problem in health care access	Whether or not the women perceived the following as a problem: getting permission to go for treatment (medical help), getting money needed for treatment, distance to health facility, not wanting to go alone to the health facility, concern of no female health provider	1) All five problems 2) Some 3) None	

(Continued...)

Table 1—Continued

Women's empowerment and domestic violence		
Women's empowerment	Whether or not women can refuse sex, women can decide on own health care, and can decide to use contraception	1) No: Women cannot refuse sex, cannot decide on own health care and cannot decide to use contraception 2) Yes: Women can refuse sex, can decide on own health care, and can decide to use contraception
Domestic violence	Experienced any spousal violence (emotional, physical or sexual) in last 12 months	1) Yes: Experienced any of the three types of spousal violence 2) No: Not experienced any of the three types of spousal violence
Pregnancy-related variables (Four ANC Visits)		
Birth order number	Birth order of the last child born	1) 1: First 2) 2: Second 3) 3: Third or higher
Wanted pregnancy	Whether the pregnancy of the last child birth was wanted	1) No 2) Yes
Pregnancy-related variables (Institutional delivery)		
Four ANC visits as per protocol	Whether or not women had received an ANC visit at 4, 6, 8 and 9 months among those with at least 1 ANC visit	1) Not completed 2) Completed
ANC quality of care	Whether or not women were advised for SBA delivery, for institutional delivery, to look for possible problems with pregnancy, and to get postnatal check-up	1) No: None or some of them 2) Yes: All four aspects
Birth preparedness	Whether or not women were prepared with money, food, and clothes as a birth preparation	1) No: None or some of them 2) Yes: All three aspects
Pregnancy-related variables (PNC within 7 days)		
Birth order number	Birth order of the last child born	1) 1: First 2) 2: Second 3) 3: Third or higher
Wanted pregnancy	Whether the pregnancy of the last child birth was wanted	1) No 2) Yes
Four ANC visits per protocol	Whether or not women had received an ANC visit at 4, 6, 8 and 9 months among those with at least one ANC visit	1) Not completed 2) Completed
Place of delivery	Place where women delivered their last child	1) Home 2) Institution
Sex of baby	Sex of the last child born	1) Girl 2) Boy
Advised PNC check-up	Whether or not women were advised to get postnatal check-up	1) No 2) Yes

¹ The "Four ANC visits" variable used for the 2016 determinants analysis is as defined above and follows the timings per the national protocol, whereas for the trends analysis the "Four ANC visits" variable used is defined as four or more ANC visits, without the timings specified.

2.3 Data Analysis

The NDHS 2011 and 2016 data sets were used to assess changes over time in the outcome variables. We carried out bivariate analysis for proportions for each of the three outcome variables by all the independent variables and examined the difference in proportion using chi square tests. We performed logistic regression initially using the domestic violence weight, primary sampling unit (PSU), and stratum variable. Some variables were excluded after the multicollinearity tests. Variables not significant at the 0.05 level in the bivariate logistic regression were included in the multivariable logistic regression due to their contextual importance. The final logistic regression model for each of the three outcome variables included relevant, contextually important independent variables for ANC visits, institutional delivery, and PNC check-ups. Distribution results are presented, followed by the odds ratio

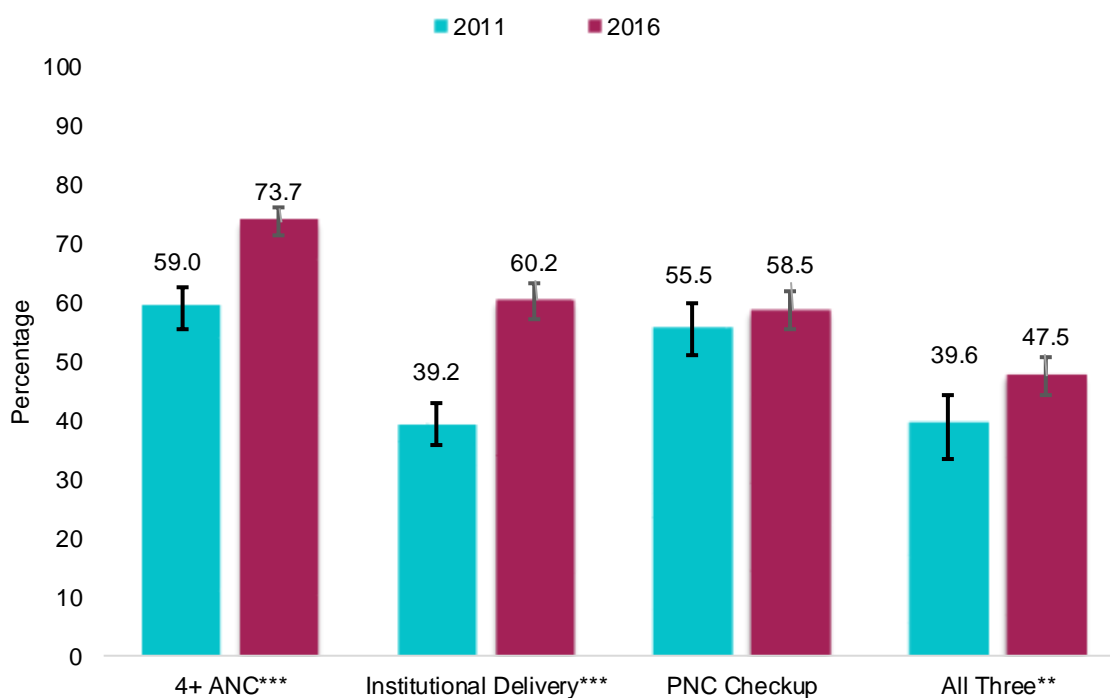
(OR) and adjusted odds ratio (aOR) with 95% confidence intervals (95% CI). In addition, we present some of the distribution results in figures using significant levels as per chi square tests.

3 TRENDS IN FOUR ANC VISITS, INSTITUTIONAL DELIVERY, AND PNC CHECK-UP WITHIN 7 DAYS

We planned to assess changes in the three outcomes from 2011 to 2016. However, since the 2011 ANC visit data included a different definition, we used four or more ANC visits during the last pregnancy for examining the change in ANC data from 2011 to 2016. The delivery and PNC variables are presented for change from the 2011 to the 2016 NDHS, as well as in the determinants analysis of the 2016 NDHS.

Changes in the three variables from 2011 to 2016 are shown in Figure 2. The proportion of women with four or more ANC visits has increased from 59% in 2011 to 74% in 2016. Similarly, the institutional delivery rate has increased from 39% in 2011 to 60% in 2016 for the last child born. In comparison to the ANC visit and place of delivery, the percentage of PNC check-ups within 7 days among women for their last childbirth has increased only slightly from 56% in 2011 to 59% in 2016. Similarly, the proportion of women who completed four or more ANC visits, delivered in a health facility, and had a PNC check-up within 7 days increased from 40% in 2011 to 48% in 2016.

Figure 2 Trends in four or more antenatal care visits, institutional delivery, postnatal check-up, and all three outcomes, Nepal DHS 2011-2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

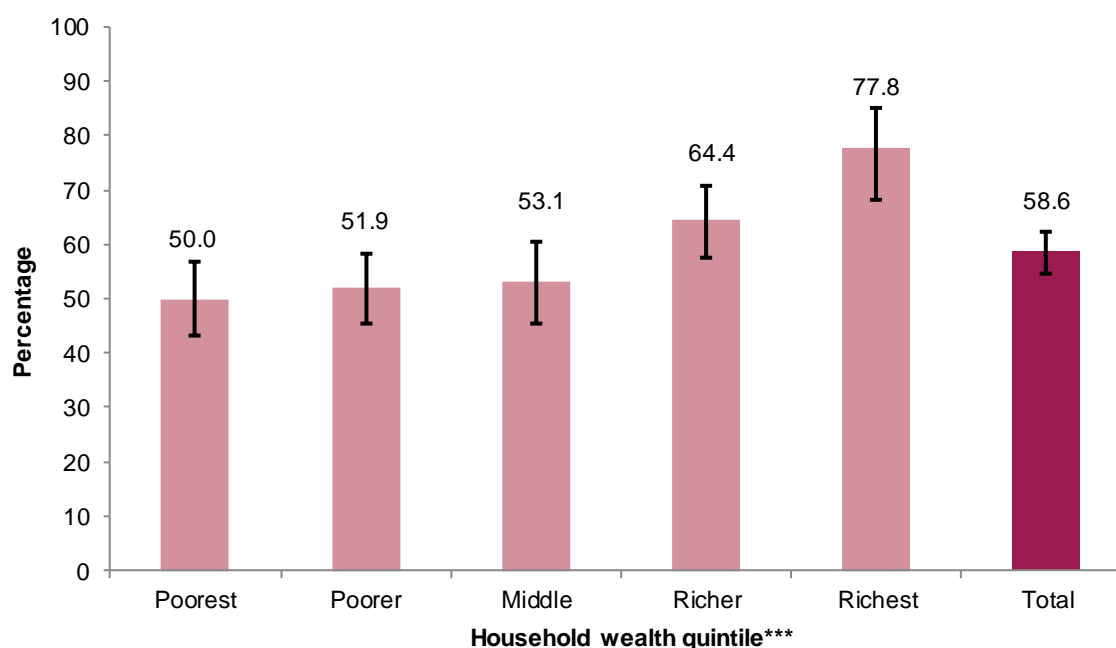
4 ANTENATAL CARE

This section presents the results for determinants analysis for ANC using 2016 NDHS data, starting with the proportion of women having four ANC visits by background and other independent variables followed by predictors of four ANC visits.

4.1 Women Completing Four ANC Visits for Their Last Pregnancy by Background and Contextual Characteristics

Table 2 presents the proportion of women who completed four ANC visits for their last pregnancy during the months (4th, 6th, 8th, and 9th) stipulated in the national ANC protocol by background characteristics. A slightly lower proportion (53%) of women in the higher age category had completed four ANC visits compared to other age groups. The proportion of women completing four ANC visits increased with education, with 76% among the women with higher education. Among the different ethnic groups, a higher proportion (69%) of Brahmin and Chhetri women had four ANC visits compared to the other ethnic groups, while other Terai castes had the smallest proportion (41%) of women who completed the four ANC visits per the national protocol. We found a similar pattern of care-seeking behavior among women by the education status of their husband, with a higher proportion (71%) of women whose husband had higher education having completed four ANC visits compared to those with husbands who had low or no education.

Figure 3 Four antenatal care visits per national protocol by household wealth quintile, Nepal DHS 2016

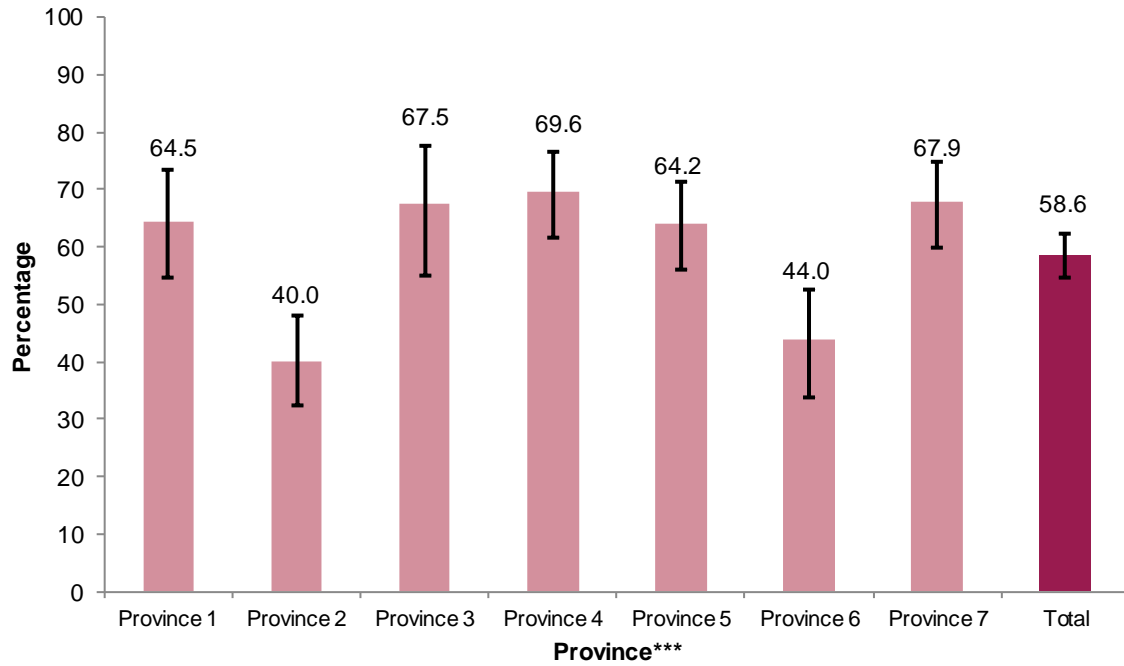


*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The national protocol recommends ANC visits in the 4th, 6th, 8th, and 9th months of pregnancy.

The analysis also showed that ANC-seeking behavior increased with economic status, with 78% of women in the richest wealth quintile having completed four ANC visits (Figure 3). More women from urban areas (65%) completed the four ANC visits than the rural women (Table 2), while 70% of women in Province 4 (Gandaki Province) completed four ANC visits compared to a low of 40% in Province 2 (Figure 4).

Figure 4 Four antenatal care visits per national protocol by province, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The national protocol recommends ANC visits in the 4th, 6th, 8th, and 9th months of pregnancy .

Table 2 Percentage of women who had four antenatal care visits per protocol during their most recent pregnancy by background characteristics, Nepal DHS 2016

Background Characteristics	%	N	95% CI
Age at last birth (years)			
15-19	60.8	267	53.2-68.0
20-24	58.7	564	53.1-64.1
25-29	60.3	378	54.4-65.9
30-49	52.9	231	43.2-62.4
Education			
No education	41.0	441	34.9-47.4
Basic education	60.4	641	55.3-65.3
Higher education	76.2	358	69.4-81.9
Caste/ethnicity¹			
Dalits	55.3	229	46.5-63.8
Muslim	44.5	69	29.8-60.2
Janajati	62.1	456	55.2-68.7
Other Terai	40.8	187	33.0-49.0
Brahmin/Chhetri	69.0	493	63.2-74.3
Husband's education²			
No education	33.9	185	26.7-41.9
Basic education	56.7	786	51.8-61.4
Higher education	70.7	458	64.0-76.5
Household wealth quintile			
Poorest	50.0	357	43.1-56.9
Poorer	51.9	325	45.4-58.3
Middle	53.1	291	45.6-60.5
Richer	64.4	286	57.4-70.8
Richest	77.8	181	68.3-85.1
Place of residence			
Rural	51.0	610	45.6-56.4
Urban	65.0	830	59.4-70.2
Province			
Province 1	64.5	221	54.6-73.3
Province 2	40.0	266	32.3-48.1
Province 3	67.5	176	55.2-77.8
Province 4	69.6	151	61.6-76.5
Province 5	64.2	229	56.2-71.4
Province 6	44.0	206	33.7-52.5
Province 7	67.9	191	60.0-74.9
Total	58.6	1,440	54.7-62.4

¹ 6 cases falling to other category dropped from analysis

² 11 cases excluded from analysis because of nonresponse or don't know response

4. 2 Women Completing Four ANC Visits for Their Last Pregnancy by Other Variables (Health Care Access, Women's Characteristics)

Table 3 presents the proportion of women who completed four ANC visits for their last pregnancy during the months (4th, 6th, 8th, and 9th) stipulated in the national ANC protocol by background characteristics. A higher proportion of women (70%) who had exposure to at least two health programs in mass media had four ANC visits compared to those with fewer than two exposures. (52%). The proportion of four ANC visits was slightly higher (62%) among women who lived less than 30 minutes distance to a health facility as compared to those who lived more than 30 minutes (52%). Problems in health care access were measured by how women perceived the following five dimensions: obtaining permission to go for treatment (medical help), obtaining money needed for treatment, distance to a health facility, not wanting to go alone to the health facility, and concern about there being no female health provider. About 47% of women who had a problem with all five aspects completed four ANC visits in comparison to those who had no problem with any of the five aspects (71%).

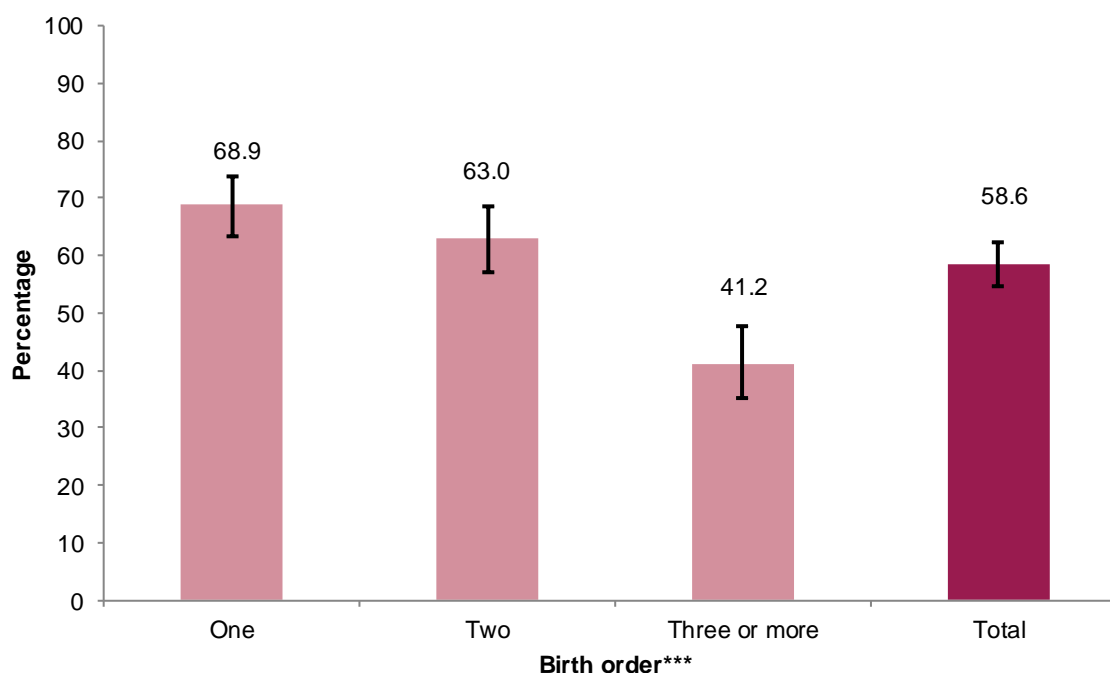
Table 3 Percentage of women who had four antenatal care visits per protocol during their most recent pregnancy by additional characteristics, Nepal DHS 2016

Characteristics	%	N	95% CI
Access to health care			
Exposure to health programs in media (heard/seen at least two)			
No	51.6	882	46.8-56.5
Yes	70.4	558	65.7-74.8
Distance to health facility			
>30 mins	52.0	487	45.6-58.4
<30 mins	61.5	953	56.9-65.9
Problem in health care access			
All	46.9	268	38.5-55.5
Some	59.0	950	54.6-63.3
None	71.1	222	61.4-79.1
Pregnancy related characteristics			
Birth order number			
1	68.9	489	63.4-73.9
2	63.0	474	57.0-68.6
3+	41.2	477	35.1-47.7
Wanted pregnancy			
No	52.1	263	42.7-61.3
Yes	60.2	1,177	55.9-64.3
Women's empowerment and domestic violence			
Women's empowerment¹			
No	57.8	708	52.5-62.9
Yes	60.3	629	55.1-65.3
Domestic violence			
Yes	53.6	100	43.8-63.1
No	59.5	1,229	55.6-63.4
Total	58.6	1,440	54.7-62.4

¹ 103 cases falling short due to missing response

With pregnancy-related characteristics, the proportion of four ANC visits decreased with birth order, from 69% among women whose last child was the first birth, to 41% among women whose last birth was the third or higher-order birth (Table 3, Figure 5).

Figure 5 Four antenatal care visits per national protocol by birth order, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The national protocol recommends ANC visits in the 4th, 6th, 8th, and 9th months of pregnancy .

Four ANC visits were slightly more common (60%) among women whose last pregnancy was a wanted pregnancy than those who did not want their last pregnancy (52%) (Table 3). The 2016 NDHS measured women’s empowerment by three characteristics: if women can refuse sex, if they can decide about their own health care, and if they can decide to use contraception on their own. The proportion of women completing four ANC visits among those who were empowered or not was similar. The proportion of four ANC visits was 60% among women who did not experience domestic violence (any emotional, physical or sexual violence), which was slightly higher than those who experienced domestic violence (54%). (Table 3)

4.3 Determinants of Four ANC Visits per Protocol for Their Last Pregnancy

Table 4 presents the results of the bivariate and multivariate binary logistic regressions, which illustrate the odds of having completed four ANC visits per protocol for women with their pregnancy of the last child born. After an initial bivariate logistic regression, a multivariate logistic regression was used to adjust the effects of covariates. Women in the richer wealth quintile had nearly two times (aOR=1.76; 95% CI=1.07-2.89) higher odds of having four ANC visits compared to those in the lowest wealth quintile. Women in Province 4, Gandaki Province (aOR=2.07; 95% CI=1.10-3.91) and Province 7, Sudurpashchim Province (aOR=2.54; 95% CI=1.29-5.00) had slightly more than twice the odds of having four ANC visits as compared to women living in Province 2. The order of birth was also a significant factor in completing the four ANC visits. Women whose last child was the first birth had twice higher odds (aOR=1.96; 95% CI=1.15-3.32) and those with second birth order had slightly more than one-half times higher odds (aOR=1.65; 95% CI=1.09-2.52) of having completed four ANC visits as compared to those with birth order of third or more.

Table 4 Logistic regression of women who had four antenatal care visits per protocol during their most recent pregnancy, Nepal DHS 2016

Characteristics	N	OR	95% CI	aOR	95% CI
Background Variables					
Age at last birth (years)					
30-49	231	Ref		Ref	
15-19	267	1.38	0.84-2.26	0.79	0.41-1.52
20-24	564	1.26	0.81-1.96	0.87	0.52-1.45
25-29	378	1.35	0.90-2.02	1.01	0.64-1.57
Education					
No education	441	Ref		Ref	
Basic education	641	2.20***	1.59-3.03	1.21	0.82-1.79
Higher education	358	4.61***	2.99-7.12	1.49	0.83-2.66
Caste/ethnicity¹					
Dalits	229	Ref		Ref	
Muslim	69	0.65	0.32-1.31	0.62	0.25-1.52
Janajati	456	1.32	0.85-2.05	0.76	0.48-1.20
Other Terai	187	0.55*	0.33-0.92	0.61	0.31-1.20
Brahmin/Chhetri	493	1.80*	1.15-2.79	0.99	0.59-1.65
Husband's education²					
No education	185	Ref		Ref	
Basic education	786	2.55***	1.76-3.68	1.54	0.98-2.43
Higher education	458	4.69***	2.99-7.36	1.69	0.94-3.03
Household wealth quintile					
Poorest	357	Ref		Ref	
Poorer	325	1.07	0.76-1.53	1.05	0.71-1.56
Middle	291	1.13	0.77-1.66	1.33	0.83-2.15
Richer	286	1.80**	1.20-2.70	1.76*	1.07-2.89
Richest	181	3.50***	2.00-6.14	1.61	0.79-3.29
Place of residence					
Rural	610	Ref		Ref	
Urban	830	1.78**	1.28-2.47	1.26	0.89-1.79
Province					
Province 2	221	Ref		Ref	
Province 1	266	2.73***	1.61-4.64	1.82	0.96-3.43
Province 3	176	3.12***	1.68-5.81	1.82	0.88-3.77
Province 4	151	3.43***	2.11-5.58	2.07*	1.10-3.91
Province 5	229	2.69***	1.68-4.31	1.69	0.96-2.98
Province 6	206	1.18	0.73-1.90	0.97	0.50-1.88
Province 7	191	3.17***	1.97-5.12	2.54**	1.29-5.00
Access to health care					
Exposure to health programs in media (heard/seen at least two)					
No	882	Ref		Ref	
Yes	558	2.23*	1.69-2.93	1.1	0.78-1.54
Distance to health facility					
>30 mins	487	Ref		Ref	
<30 mins	953	1.47*	1.07-2.03	1.27	0.92-1.76
Problem in health care access					
All	268	Ref		Ref	
Some	950	1.63*	1.10-2.41	0.98	0.66-1.45
None	222	2.79***	1.61-4.79	1.22	0.69-2.14
Pregnancy-related characteristics					
Birth order number					
3+	477	Ref		Ref	
1	489	3.15***	2.24-4.44	1.96*	1.15-3.32
2	474	2.42***	1.74-3.38	1.66*	1.09-2.52
Wanted pregnancy					
No	263	Ref		Ref	
Yes	1,177	1.39	0.91-2.11	1.33	0.90-1.98

(Continued...)

Table 4—Continued

Characteristics	<i>N</i>	OR	95% CI	aOR	95% CI
Women's empowerment and domestic violence					
Women's empowerment³					
No	708	Ref		Ref	
Yes	629	1.11	0.83-1.49	0.88	0.65-1.20
Domestic violence					
Yes	100	Ref		Ref	
No	1,229	1.27	0.86-1.90	1.05	0.73-1.52

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

¹ 6 cases in "other" category excluded from analysis.

² 11 cases excluded from analysis because of nonresponse or don't know response.

³ 103 cases excluded from analysis due to missing response.

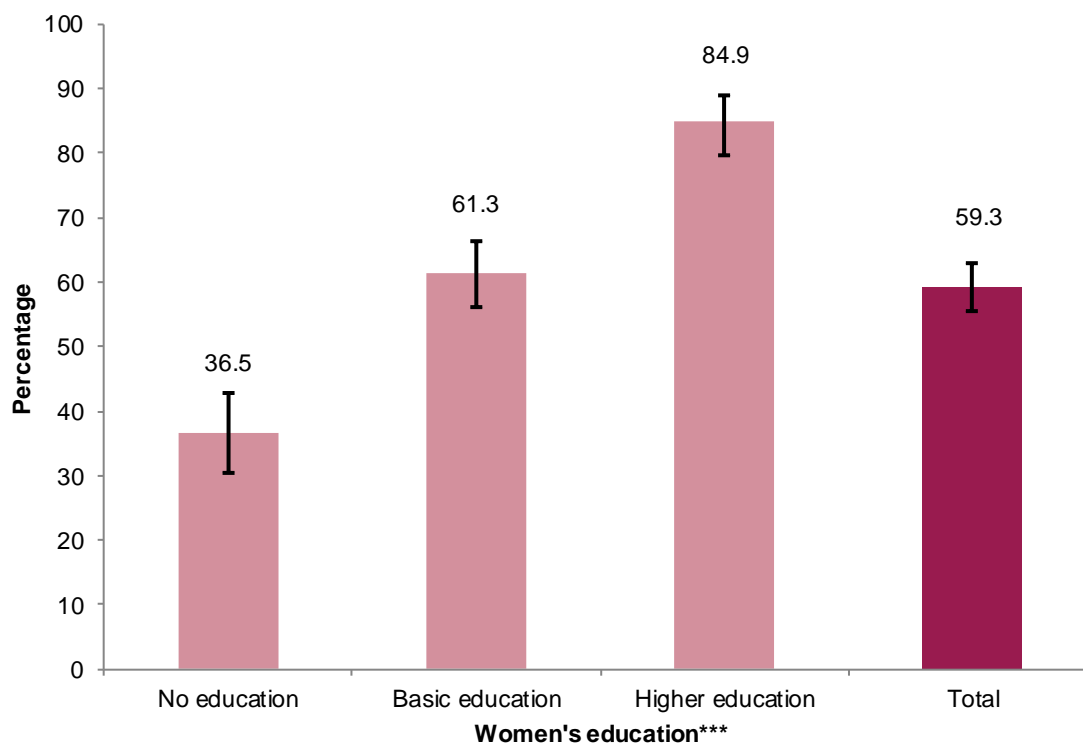
5 INSTITUTIONAL DELIVERY

This section presents the results for determinants analysis for institutional delivery using 2016 NDHS data, starting with the proportion of women delivering in a health facility (institutional delivery) by background and other independent variables followed by predictors of institutional delivery.

5.1 Women Delivering Their Last Child in a Health Facility by Background and Contextual Characteristics

Table 5 presents the proportion of women who delivered their last child in a health facility by background and contextual characteristics. About two-thirds (66%) of women younger than age 20 at last birth delivered their last child at a health facility, whereas this proportion was 48% among women age 30-49. Compared to women with no education (37%), a larger proportion of women with basic education (61%) and women with higher education (85%) delivered their last child at a health facility (Table 5, Figure 6).

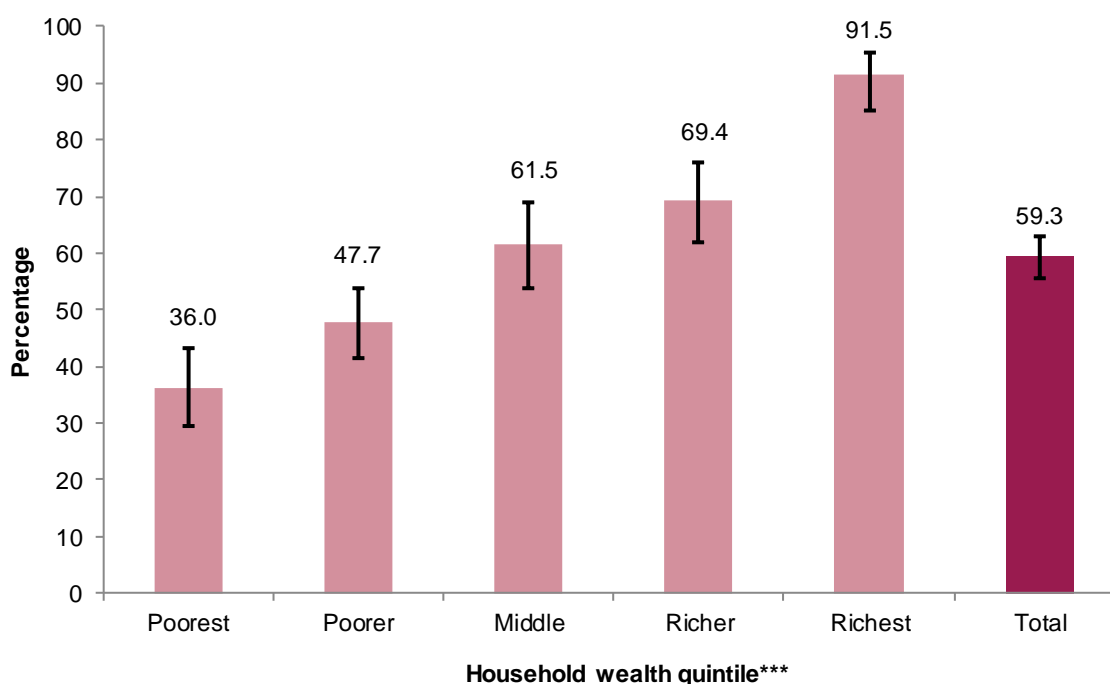
Figure 6 Institutional delivery by women's education, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

With caste/ethnicity, a higher proportion (69%) of the Brahmin/Chhetri caste groups delivered their last child at a health facility. This proportion was lowest (44%) for other Terai caste groups (Table 5). The proportion of institutional delivery was higher (77%) among women whose husband had higher education in comparison to women whose husband had no education (32%) (Table 5).

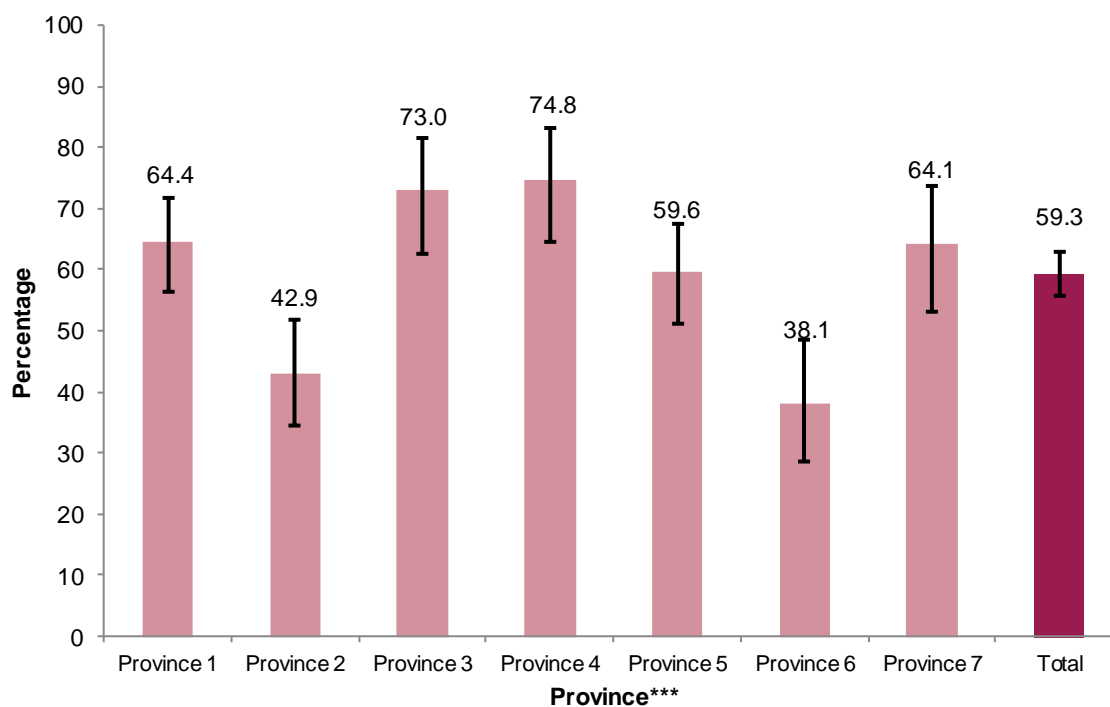
Figure 7 Institutional delivery by household wealth quintile, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

A large proportion (92%) of women in the richest wealth quintile delivered their last child at a health facility. This was true for only 36% for women in the poorest wealth quintile (Table 5, Figure 7). Around 69% of the urban women delivered at a health facility (Table 5).

Figure 8 Institutional delivery by province, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

With respect to geographic differences, the proportion of women delivering in a health facility was more than 70% in Provinces 3 and 4, while it was as low as 38% in Province 6, Karnali Province (Table 5, Figure 8).

Table 5 Percentage of women who delivered their last child in a health facility by background characteristics, Nepal DHS 2016

Background Characteristics	%	N	95% CI
Age at last birth (years)			
15-19	66.3	267	59.0-72.8
20-24	61.9	557	56.7-66.9
25-29	57.7	402	51.6-63.6
30-49	48.2	252	38.9-57.6
Education			
No education	36.5	480	30.5-42.9
Basic education	61.3	648	56.1-66.3
Higher education	84.9	350	79.7-88.9
Caste/ethnicity¹			
Dallits	53.9	231	45.1-62.5
Muslim	47.5	68	29.6-66.1
Janajati	61.7	480	55.0-67.9
Other Terai	44.4	183	35.9-53.3
Brahmin/Chhetri	69.2	510	63.2-74.5
Husband's education²			
No education	31.6	202	24.0-40.4
Basic education	55.5	806	50.6-60.2
Higher education	77.2	456	72.1-81.6
Household wealth quintile			
Poorest	36.0	401	29.5-43.1
Poorer	47.7	338	41.5-53.9
Middle	61.5	283	53.8-68.8
Richer	69.4	279	62.0-76.0
Richest	91.5	177	85.3-95.3
Place of residence			
Rural	48.2	634	42.7-53.6
Urban	68.7	844	63.5-73.4
Province			
Province 1	64.4	222	56.4-71.6
Province 2	42.9	259	34.5-51.7
Province 3	73.0	181	62.5-81.5
Province 4	74.8	161	64.4-83.0
Province 5	59.6	237	51.2-67.5
Province 6	38.1	231	28.7-48.4
Province 7	64.1	187	53.0-73.8
Total	59.3	1,478	55.6-62.9

¹ 6 cases in "other" category excluded from analysis.

² 14 cases excluded from analysis because of nonresponse or don't know response.

5.2 Women Delivering Their Last Child in a Health Facility by Other Variables (Health Care Access, Women's Characteristics)

Table 6 presents the proportion of women who delivered their last child in a health facility (institutional delivery) by access-related variables. A total of 74% of women exposed to health programs in mass media (at least two programs) delivered their last child at a health facility as compared to 51% of women who either did not hear or see health programs in media, or had heard or seen fewer than two media programs. The proportion of health facility delivery was 65% among women living within less than 30 minutes walking distance to a health facility compared to 48% among women with walking distance greater than 30 minutes. Problems in health care access were assessed by how women perceive the following five dimensions: obtaining permission to go for treatment (medical help), obtaining money

needed for treatment, distance to health facility, not wanting to go alone to the health facility, and concern about not having a female health provider. The institutional delivery rate was 75% among women who had no problems with any of the five components, while it was 60% among those who perceived some of the components as a problem, and 46% among those women who had problems in all five components.

Table 6 Percentage of women who delivered their last child in a health facility by additional characteristics, Nepal DHS 2016

Characteristics	%	N	95% CI
Access to health care			
Exposure to health programs in media (heard/seen at least two)			
No	50.5	908	45.9-55.1
Yes	74.1	570	69.6-78.1
Distance to health facility			
>30 mins	48.0	517	42.0-54.0
<30 mins	64.6	961	60.2-68.9
Problem in health care access			
All 5 problems	46.0	285	39.2-52.7
Some	59.5	969	55.2-63.7
None	75.4	224	67.2-82.0
Pregnancy related characteristics			
4 ANC visits as per protocol¹			
Not completed	42.4	559	37.1-47.8
Completed	74.8	826	70.8-78.4
ANC quality of care²			
No	54.6	696	49.6-59.5
Yes	69.6	680	64.5-74.3
Birth preparedness (money, food, clothes)			
No	53.1	1,002	48.6-57.5
Yes	73.5	476	68.3-78.1
Women's empowerment and domestic violence			
Women's empowerment³			
No	56.5	728	51.2-61.7
Yes	62.3	643	57.6-67.8
Domestic violence			
Yes	51.9	219	42.4-61.3
No	60.7	1,259	56.8-64.6
Total	59.3	1,478	55.6-62.9

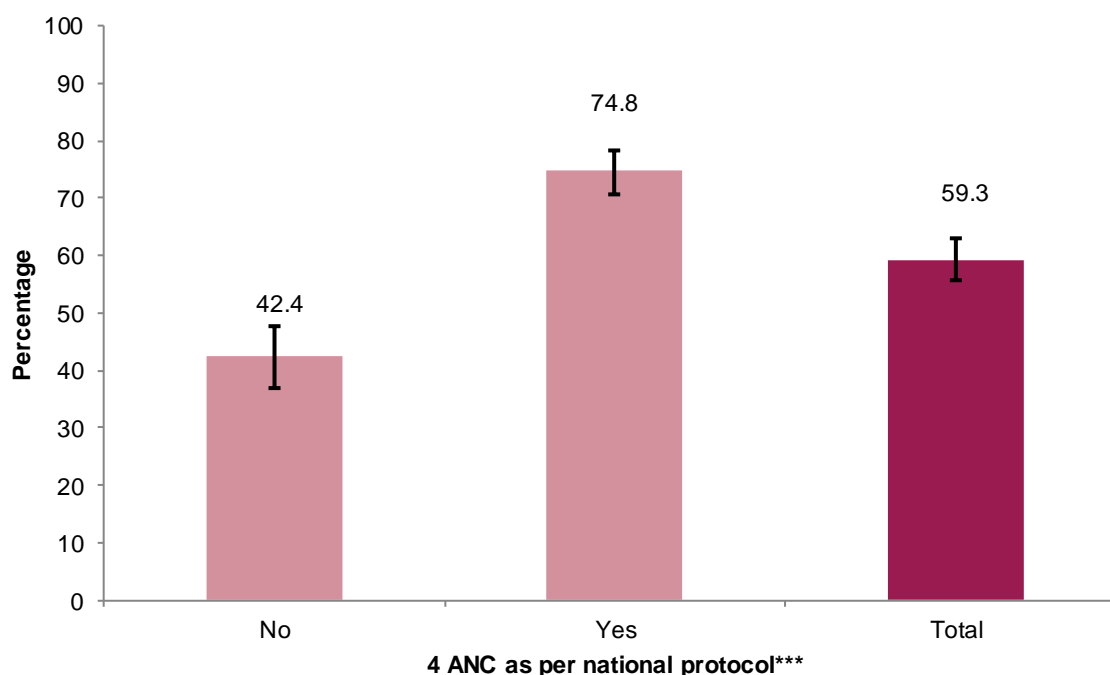
¹ 93 cases excluded from analysis due to missing response.

² 102 cases excluded from analysis due to missing response.

³ 107 cases excluded from analysis due to missing response.

Among women who completed four ANC visits per national protocol, about 75% delivered at a health facility as compared to those who did not complete the recommended four ANC visits (42%) (Figure 9, Table 6).

Figure 9 Institutional delivery by four antenatal visits per national protocol, Nepal DHS 2016

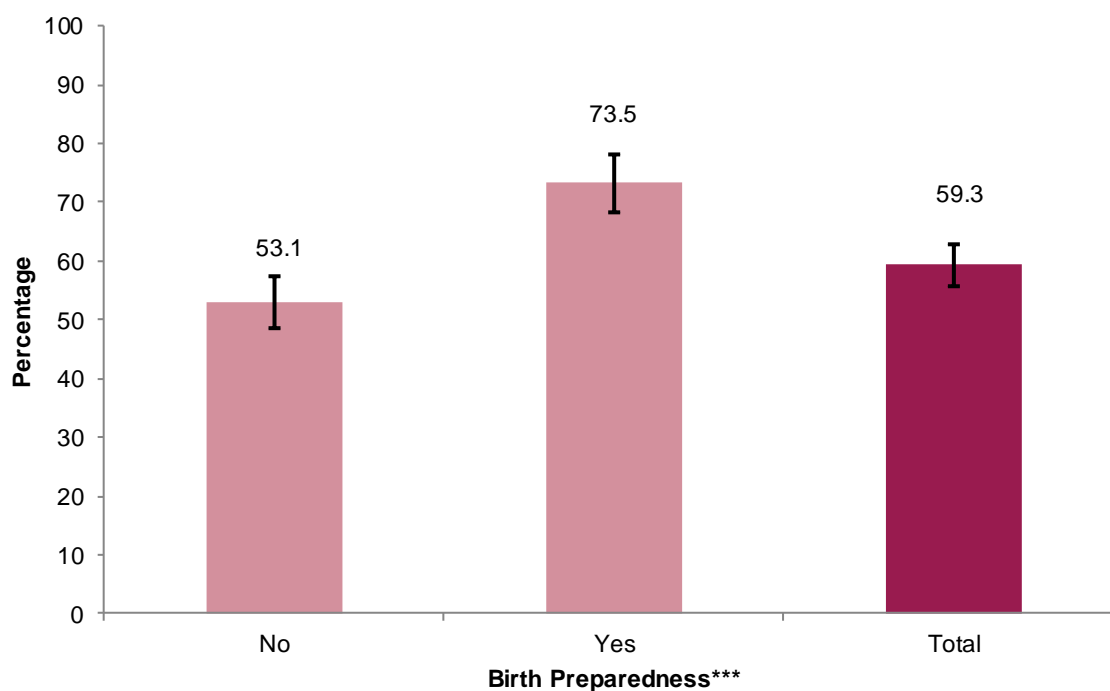


*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The national protocol recommends ANC visits in the 4th, 6th, 8th, and 9th months of pregnancy .

The 2016 NDHS measured the ANC quality of care by four different types of advice: if women were advised about seeking SBA delivery, having an institutional delivery, looking for possible problems with pregnancy, and obtaining a postnatal check-up. The composite score was categorized as yes for all four types of advice, and no for some or none of the types of advice. We found that 70% of women who had fulfilled all four criteria of ANC quality of care delivered their last child in a health facility in comparison to those who met fewer than four criteria (55%) (Table 6). Similarly, the 2016 NDHS measured the birth preparedness among the survey respondents with three categories: if women were prepared with money, food, and clothes as a birth preparation, with responses categorized as YES (all three) or NO (none or less than three). We found that nearly three-quarters (74%) of those women prepared with all three aspects delivered their last child in the health facility, compared to those not prepared or prepared in only few aspects (53%) (Figure 10, Table 6).

Figure 10 Institutional delivery by birth preparedness, Nepal DHS 2016



*** p<0.001; ** p<0.01; * p<0.05

The 2016 NDHS measured women’s empowerment by three characteristics: if women can refuse sex, if they can decide about their own health care, and if they can decide to use contraception on their own. A slightly higher proportion of empowered women (62%) delivered their last child in the health facility than women who were not empowered (57%) (Table 6). Similarly, the proportion of health facility delivery was slightly higher (61%) among women who didn't face domestic violence (any emotional, physical, or sexual violence) than women who did (52%) (Table 6).

5.3 Determinants of Institutional Delivery

Table 7 presents the results of the bivariate and multivariate logistic regressions, which illustrate the odds of delivering at a health facility for the last child borne. After an initial bivariate logistic regression, a multivariable logistic regression model was used to adjust for the effects of covariates. The analysis showed a significant association between women’s educational status and utilization of health facility delivery service. Women who had basic education had one and one-half times higher odds (aOR=1.51; 95% CI=1.00-2.26) and women with higher education had nearly two and one-half times higher odds (aOR=2.19; 95% CI=1.19-4.04) of giving birth at health institution than those with no education. Women in the middle (aOR=3.70; 95% CI=2.18-6.28) and the richer (aOR=4.11; 95% CI=2.43-6.96) wealth quintiles had higher odds of health-facility delivery services than those in the poorest wealth quintile. Respondents in the richest wealth quintile had 11 times higher odds of delivering at a health facility than those in the poorest (aOR=11.16; 95% CI=4.70-26.49). Women from Province 4, Gandaki Province (aOR=2.46; 95% CI=1.26-4.83), and Province 7, Sudurpashchim Province (aOR=2.11; 95% CI=1.00-4.47), had slightly more than two times higher odds of delivering at a health facility delivery compared to women in Province 6 (Karnali Province). The analysis revealed that women who have completed four ANC visits per protocol had two and one-half times higher odds (aOR=2.39; 95% CI=1.72-3.32) of delivering at a health facility than those who have not completed the visits. Women

with birth preparedness had one and one-half times higher odds (aOR=1.58; 95% CI=1.11-2.24) of delivering at a health facility compared to women who were not prepared.

Table 7 Logistic regression of women who delivered their last child in a health facility, Nepal DHS 2016

Characteristics	N	OR	95% CI	aOR	95% CI
Background Variables					
Age at last birth (years)					
30-49	267	Ref		Ref	
15-19	557	2.11**	1.31-3.39	1.69	0.99-2.90
20-24	402	1.75*	1.14-2.68	1.22	0.75-1.96
25-29	252	1.46	0.99-2.17	0.98	0.61-1.58
Education					
No education	480	Ref		Ref	
Basic education	648	2.76***	1.98-3.85	1.51*	1.00-2.26
Higher education	350	9.79***	6.28-15.26	2.19*	1.19-4.04
Caste/ethnicity¹					
Dalits	231	Ref		Ref	
Muslim	68	0.77	0.34-1.76	0.67	0.22-2.01
Janajati	480	1.37	0.87-2.17	0.84	0.51-1.37
Other Terai	183	0.68	0.41-1.12	0.76	0.37-1.54
Brahmin/Chhetri	510	1.91**	1.25-2.92	0.96	0.57-1.61
Husband's education²					
No education	202	Ref		Ref	
Basic education	806	2.69***	1.78-4.07	0.98	0.58-1.68
Higher education	456	7.31***	4.53-11.78	1.11	0.59-2.06
Household wealth quintile					
Poorest	401	Ref		Ref	
Poorer	338	1.62*	1.11-2.36	1.56	0.96-2.55
Middle	283	2.84***	1.87-4.32	3.70***	2.18-6.28
Richer	279	4.03***	2.59-6.26	4.11***	2.43-6.96
Richest	177	19.23***	9.65-38.32	11.16***	4.70-26.49
Place of residence					
Rural	634	Ref		Ref	
Urban	844	2.36***	1.17-3.25	1.42	0.96-2.10
Province					
Province 6	222	Ref		Ref	
Province 1	259	2.93***	1.17-5.03	1.39	0.71-2.73
Province 2	181	1.22	0.70-2.12	0.71	0.30-1.71
Province 3	161	4.40***	2.31-8.39	1.89	0.96-3.70
Province 4	237	4.83***	2.52-9.26	2.46**	1.26-4.83
Province 5	231	2.4**	1.39-4.13	1.01	0.54-1.91
Province 7	187	2.89**	1.55-5.40	2.11*	1.00-4.47
Access to health care					
Exposure to health programs in media (heard/seen at least two)					
No	908	Ref		Ref	
Yes	570	2.80***	2.14-3.66	1.17	0.80-1.71
Distance to health facility					
>30 mins	517	Ref		Ref	
<30 mins	961	1.98***	1.47-2.67	1.31	0.87-1.97
Problem in health care access					
All 5 problems	285	Ref		Ref	
Some	969	1.73***	1.29-2.33	1.1	0.65-1.88
None	224	3.61***	2.25-5.79	1.07	0.72-1.58

(Continued...)

Table 7—Continued

Characteristics	N	OR	95% CI	aOR	95% CI
Pregnancy-related characteristics					
4 ANC visits as per protocol³					
Not completed	559	Ref		Ref	
Completed	826	4.03***	3.04-5.36	2.39***	1.72-3.32
ANC quality of care⁴					
No	696	Ref		Ref	
Yes	680	1.9***	1.41-2.57	1.07	0.73-1.55
Birth preparedness (money, food, clothes)					
No	1,002	Ref		Ref	
Yes	476	2.44***	1.84-3.25	1.58*	1.11-2.25
Women's empowerment and domestic violence					
Women's empowerment⁵					
No	728	Ref		Ref	
Yes	643	1.3	0.97-1.75	0.95	0.68-1.32
Domestic violence					
Yes	219	Ref		Ref	
No	1,259	1.43	0.95-2.16	1.22	0.77-1.94

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

¹ 6 cases in "other" category excluded from analysis.

² 14 cases excluded from analysis because of nonresponse or don't know response.

³ 93 cases excluded from analysis due to missing response.

⁴ 102 cases excluded from analysis due to missing response.

⁵ 107 cases excluded from analysis due to missing response.

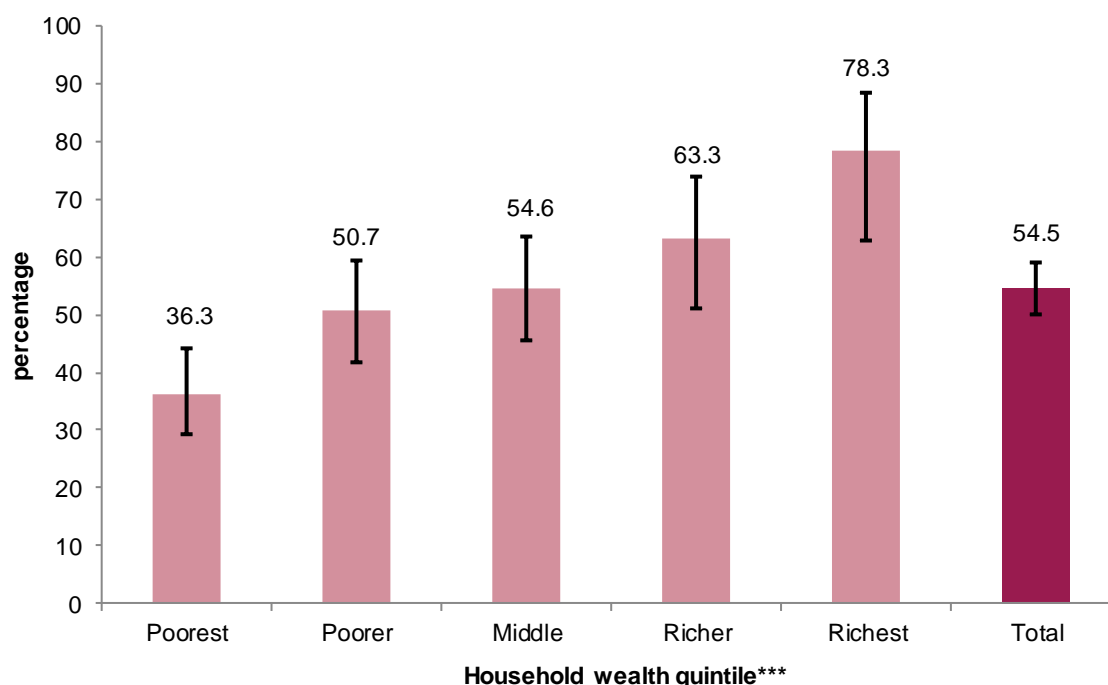
6 POSTNATAL CARE

This section presents the results for determinants analysis for PNC check-up using 2016 NDHS data, starting with the proportion of women with a PNC check-up within 7 days by background and other independent variables followed by predictors of PNC check-up within 7 days.

6.1 Women with a PNC Check-up within 7 Days by Background and Contextual Characteristics

Table 8 presents the proportion of women who had at least one PNC check-up within 7 days of their last childbirth by background characteristics. The proportion of women who had a PNC check-up was the highest (57%) among mothers age 20-24 at the time of last birth, followed by 54% among those age 15-19, 55% among those age 25-29, and 48% among those between age 30-49.

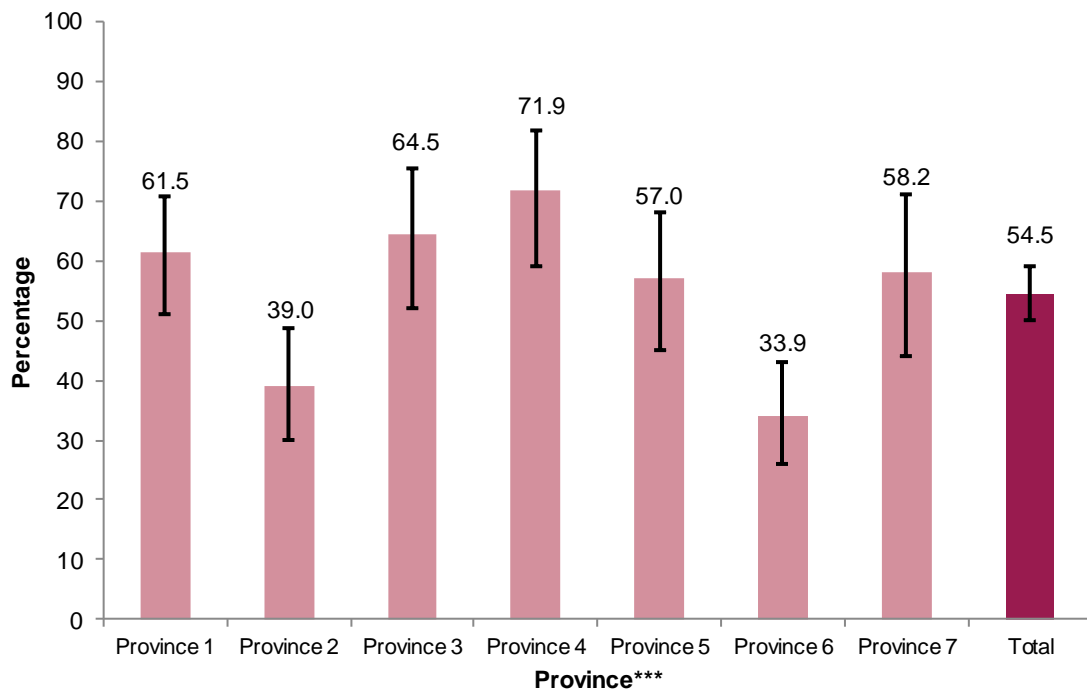
Figure 11 Postnatal check-up by household wealth quintile, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The utilization of PNC services was the highest among women with higher education (78%), with only about 37% of women with no education having had a PNC check-up within 7 days (Table 8). With caste/ethnicity, the percentage of women with a PNC check-up ranged from 41% (other Terai caste groups) to 66% among the Brahmin/Chhetri (Table 8). Similar to women's education, the proportion of women with a PNC check-up was the highest among women whose husband had higher education (67%) (Table 8). The proportion was the highest (78%) among women in the richest wealth quintile, with the proportion as low as 36% among those in the poorest wealth quintile (Table 8, Figure 11). With place of residence, the percentage of PNC check-ups was slightly higher (58%) among urban women than rural women (Table 8). In relation to geographical differences, the proportion of women with a PNC check-up ranged from as low as 34% in Province 6 (Karnali Province) to 72% in Province 4, Gandaki Province (Table 8, Figure 12).

Figure 12 Postnatal check-up by province, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Table 8 Percentage of women with a postnatal check-up within 7 days of delivery, among women with a live birth in the past 2 years, by background characteristics, Nepal DHS 2016

Characteristics	%	N	95% CI
Age at last birth (years)			
15-19	53.7	149	44.6-62.5
20-24	57.3	259	49.4-64.8
25-29	55.2	197	47.6-62.6
30-49	47.7	113	34.6-61.0
Education			
No education	37.0	219	28.9-46.0
Basic education	54.4	336	48.2-60.5
Higher education	77.9	163	68.9-84.8
Caste/ethnicity¹			
Dalits	56.8	119	45.2-67.7
Muslim	42.6	42	22.2-65.8
Janajati	54.6	227	46.8-62.1
Other Terai	41.3	94	29.8-53.8
Brahmin/Chhetri	65.6	232	58.0-72.5
Husband's education²			
No education	38.0	102	25.7-52.1
Basic education	51.8	398	46.1-57.4
Higher education	67.4	218	59.4-74.5
Household wealth quintile			
Poorest	36.3	197	29.1-44.2
Poorer	50.7	161	41.8-59.5
Middle	54.6	148	45.5-63.4
Richer	63.3	134	51.1-73.9
Richest	78.3	78	62.8-88.5
Place of residence			
Rural	51.1	331	44.1-58.0
Urban	58.2	387	52.4-63.8
Province			
Province 1	61.5	112	51.1-70.9
Province 2	39.0	124	30.0-48.8
Province 3	64.5	75	52.1-75.3
Province 4	71.9	81	59.2-81.8
Province 5	57.0	119	45.2-68.1
Province 6	33.9	119	26.0-42.9
Province 7	58.2	88	44.2-71.0
Total	54.5	718	50.1-58.9

¹ 4 cases in "other" category excluded from analysis

² 14 cases excluded from analysis because of nonresponse or don't know response

6.2 Women with a PNC Check-up within 7 Days by Other Variables (Health Care Access, Women's Characteristics)

Table 9 presents the proportion of women who had at least one PNC check-up within 7 days of their last child's birth by access-related variables. The proportion of women with a PNC check-up was 71% among those exposed to at least two health programs in the media, compared to those with fewer than two or no media exposures (46%). The proportion of women with PNC check-ups varied slightly by the distance to the health facility, with 59% among women with less than 30 minutes distance to health facility as compared to those with more than 30 minutes (45%). Problems in health care access were measured by how women perceive the five different dimensions: obtaining permission to seek treatment (medical help), obtaining money needed for treatment, distance to health facility, not wanting to go alone to the health facility, and concern about not having a female health provider. A substantial proportion of women (69%) who had no problem in the five specified dimensions of problems in health care access had a PNC check-up within 7 days in comparison to about 48% among those to whom all five aspects were a problem.

Table 9 Percentage of women with a postnatal check-up within 7 days of delivery, among women with a live birth in the past 2 years, by additional characteristics, Nepal DHS 2016

Characteristics	%	N	95% CI
Access to health care			
Exposure to health programs in media (heard/seen at least two)			
No	45.8	457	39.9-51.9
Yes	71.4	261	64.7-77.3
Distance to health facility			
>30 mins	44.9	247	37.0-53.2
<30 mins	59.0	471	53.6-64.3
Problem in health care access			
All	47.6	153	38.0-57.3
Some	53.7	459	48.2-59.0
None	68.9	106	57.5-78.3
Pregnancy-related characteristics			
Birth order number			
3+	40.5	235	32.0-49.5
1	66.0	272	59.3-72.1
2	52.5	211	45.3-59.5
Wanted pregnancy			
No	55.8	151	46.1-65.0
Yes	54.2	567	49.0-59.3
4 ANC visits per protocol¹			
Not completed as per protocol	38.8	295	32.3-45.8
Completed as per protocol	68.2	389	62.0-73.9
Place of delivery²			
Home	13.1	261	9.3-18.1
Institution	80.0	428	74.7-84.4
Sex of baby³			
Girl	49.6	334	43.3-56.0
Boy	60.8	365	54.5-66.7
Advised PNC check-up⁴			
No	40.2	273	33.8-46.9
Yes	67.5	410	61.5-73.0
Women's empowerment and domestic violence			
Women's empowerment⁵			
No	52.8	413	46.7-58.8
Yes	58.9	279	51.5-65.9
Domestic violence			
Yes	45.6	115	35.0-56.6
No	56.4	603	51.6-61.1
Total	54.5	718	50.1-58.9

¹ 34 cases excluded from analysis due to missing response

² 29 cases in categories such as "out of country" and "others" as place of delivery were excluded from analysis.

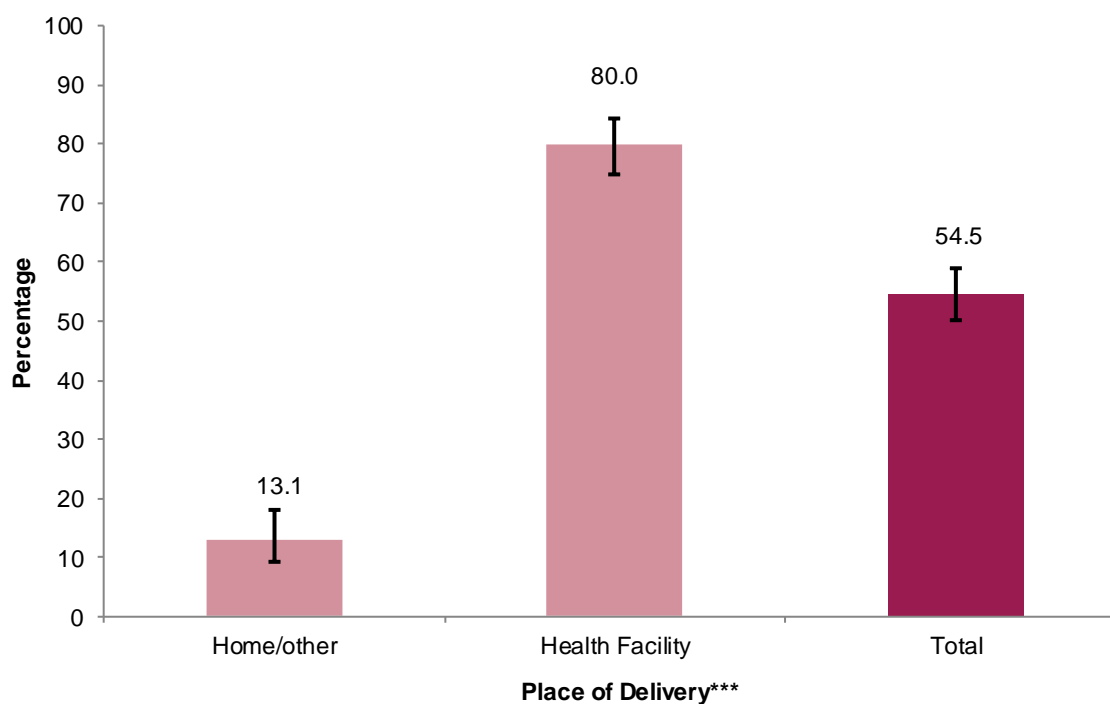
³ 19 cases excluded from analysis due to missing response

⁴ 35 cases excluded from analysis due to missing response

⁵ 26 cases excluded from analysis due to missing response

With pregnancy-related characteristics (Table 9), the proportion of women with PNC check-ups decreased with birth order from 66% among women with their last child as first birth to 41% among women with third or higher-order births. The PNC check-up was not different by the women's desire to have their last pregnancy, but was higher (68%) among women who completed four ANC visits per protocol.

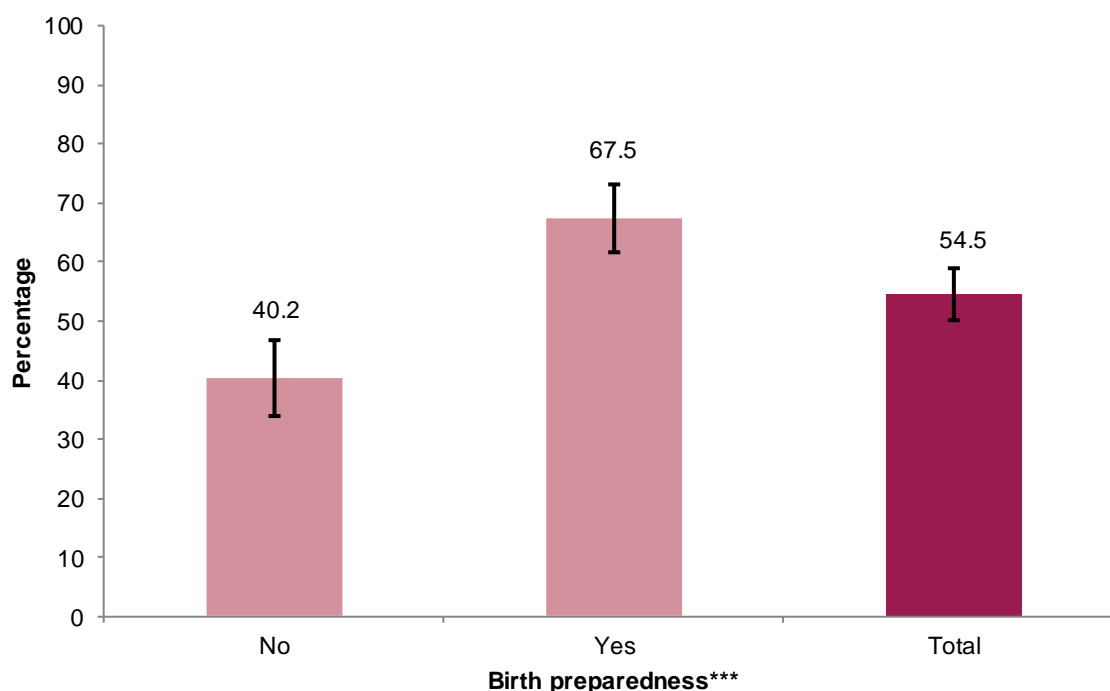
Figure 13 Postnatal check-up by place of delivery, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The percentage of women with a PNC check-up was higher (80%) among women who had an institutional delivery compared to those with a home delivery (13%) (Table 9, Figure 13). By sex of child, 61% of women who had a boy as their last child had a PNC check-up in comparison to 50% for women with a baby girl (Table 9). The proportion of PNC check-ups was higher (68%) among women who were advised about PNC check-ups during their pregnancy, while it was 40% among those who were not advised (Table 9, Figure 14).

Figure 14 Postnatal check-up by advice for postnatal check-up, Nepal DHS 2016



*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

The 2016 NDHS measured women’s empowerment by three characteristics: if women can refuse sex, if they can decide on their own health care, and if they can decide to use contraception on their own. With women’s empowerment, we found that the proportion of PNC check-ups was slightly higher (59%) among empowered women (Table 9). Similarly, among women who didn't face domestic violence (emotional, physical, or sexual violence), we found a slightly higher proportion (56%) of PNC check-ups than with the women who faced domestic violence (46%) (Table 9).

6.3 Determinants of PNC Check-up within 7 Days

Table 10 presents the results on bivariate and multivariate binary logistic regression that illustrates the odds of women having had a PNC check-up within 7 days of delivering their last child. After an initial bivariate logistic regression, a multivariate logistic regression was used to adjust the effects of covariates and the results presented in the table. The odds of PNC check-ups were nearly three times higher among women from middle (aOR=2.67; 95% CI=1.21-5.88) and richer (aOR=2.95; 95% CI=1.22-7.13) wealth quintile compared to women in the poorest wealth quintile. Surprisingly, women from the urban areas had lower odds of having had a PNC check-up than those from the rural areas, although this finding was marginally significant. Women from Province 1 had three and one-half times (aOR=3.60; 95% CI=1.35-9.59) higher odds of having had a PNC check-up as compared to women from Province 6 (Karnali Province). The odds of a PNC check-up were nearly 30 times higher (aOR=30.08; 95% CI=15.56-58.12) among women who delivered their child at a health facility as compared to women with a home delivery. Women who were advised about a PNC check-up had more than two and one-half times higher odds (aOR=2.62; 95% CI=1.50-4.59) of having had a PNC check-up as compared to those who were not advised.

Table 10 Logistic regression of women with a postnatal check-up within 7 days of delivery, among women with a live birth in the past 2 years, Nepal DHS 2016

Characteristics	N	OR	95% CI	aOR	95% CI
Background variables					
Age at last birth (years)					
30-49	149		Ref		Ref
15-19	259	1.27	0.65-2.48	0.86	0.28-2.61
20-24	197	1.47	0.78-2.76	1.18	0.46-3.05
25-29	113	1.35	0.74-2.47	0.93	0.40-2.19
Education					
No education	219		Ref		Ref
Basic education	336	2.03**	1.32-3.11	1.48	0.78-2.81
Higher education	163	5.98***	3.27-10.94	3.06	0.85-10.95
Caste/ethnicity¹					
Dalits	119		Ref		Ref
Muslim	42	0.56	0.20-1.60	0.75	0.27-2.04
Janajati	227	0.91	0.51-1.63	0.90	0.43-1.89
Other Terai	94	0.53	0.27-1.07	0.60	0.21-1.76
Brahmin/Chhetri	232	1.45	0.80-2.62	1.51	0.71-3.23
Husband's education					
No education	102		Ref		Ref
Basic education	398	1.75	0.97-3.15	0.52	0.25-1.09
Higher education	218	3.37***	1.75-6.48	0.60	0.19-1.86
Household wealth quintile					
Poorest	197		Ref		Ref
Poorer	161	1.80*	1.09-2.98	1.98	0.92-4.29
Middle	148	2.11**	1.30-3.43	2.67*	1.22-5.88
Richer	134	3.02***	1.67-5.47	2.95*	1.22-7.14
Richest	78	6.33***	2.77-14.47	1.82	0.52-6.44
Place of residence					
Rural	331		Ref		Ref
Urban	387	1.33	0.92-1.93	0.52*	0.31-0.89
Province					
Province 6	112		Ref		Ref
Province 1	124	3.11***	1.76-5.50	3.60*	1.35-9.59
Province 2	75	1.25	0.72-2.17	1.70	0.51-5.61
Province 3	81	3.55***	1.87-6.73	2.06	0.67-6.36
Province 4	119	4.98***	2.52-9.83	2.08	0.58-7.48
Province 5	119	2.58**	1.40-4.76	2.00	0.69-5.81
Province 7	88	2.71**	1.37-5.36	0.84	0.30-2.37
Access to health care					
Exposure to health programs in media (heard/seen at least two)					
No	457		Ref		Ref
Yes	261	2.96***	1.95-4.49	1.11	0.56-2.21
Distance to health facility					
>30 mins	247		Ref		Ref
<30 mins	471	1.77**	1.17-2.68	0.75	0.39-1.44
Problem in health care access					
All	153		Ref		Ref
Some	459	1.28	0.81-2.01	0.83	0.32-2.11
None	106	2.44**	1.32-4.50	0.74	0.38-1.47

(Continued...)

Table 10—Continued

Characteristics	N	OR	95% CI	aOR	95% CI
Pregnancy-related characteristics					
Birth order number					
3+	235		Ref		Ref
1	272	2.86***	1.79-4.58	0.72	0.30-1.74
2	211	1.62*	1.04-2.52	0.97	0.46-2.05
Wanted pregnancy					
No	151		Ref		Ref
Yes	567	0.94	0.60-1.46	0.60	0.31-1.17
4 ANC visits per protocol²					
Not completed per protocol	295		Ref		Ref
All ANC visits as specified	389	3.38***	2.24-5.10	1.77	0.97-3.23
Place of delivery³					
Home	261		Ref		Ref
Institution	428	26.44***	15.98-43.74	30.08***	15.56-58.12***
Sex of baby⁴					
Girl	334		Ref		Ref
Boy	365	1.57*	1.09-2.27	1.02	0.57-1.82
Advised PNC check-up⁵					
No	273		Ref		Ref
Yes	410	3.10***	2.12-4.52	2.62**	1.50-4.59**
Women's empowerment and domestic violence					
Women's empowerment⁶					
No	413		Ref		Ref
Yes	279	1.28	0.85-1.92	0.69	0.36-1.33
Domestic violence					
Yes	115		Ref		Ref
No	603	1.54	0.96-2.47	1.24	0.69-2.22

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

¹ 4 cases falling to other category dropped from analysis.

² 34 cases falling short due to missing response.

³ 29 cases falling short because some categories such as out of country and others as place of delivery were dropped.

⁴ 19 cases falling short due to missing response.

⁵ 35 cases falling short due to missing response.

⁶ 26 cases falling short due to missing response.

7 DISCUSSION

This further analysis of the 2016 NDHS data focused on the determinants of three outcome variables of interest in maternal health care utilization: ANC, institutional delivery, and PNC. In the determinants analysis, four ANC visits as per national protocol, place of delivery, and PNC check-ups within 7 days of delivery for the last pregnancy/last childbirth were the outcome variables. In addition to the determinants analysis, we also assessed the change in prevalence between 2011 and 2016 of four or more ANC visits (four ANC visits per protocol was not available in 2011 NDHS), place of delivery, and PNC check-up within 7 days. Results indicate that there are substantial subgroup differences in the prevalence of the three outcome variables and in some key determinants associated with those outcomes. In addition, trend analysis of the three outcome variables shows some significant changes in prevalence from 2011 to 2016.

7.1 Trends of Four ANC Visits, Institutional Delivery, and PNC Check-up within 7 Days

There has been a substantial increase from the 2011 to the 2016 NDHS in the proportion of pregnant women who completed four or more ANC visits results, with the proportion nearly three-fourths in 2016 compared to just 56% in 2011. The proportion of institutional delivery also increased significantly, with every two in five women giving birth to their last child in a health facility in 2011 compared to three in five women in 2016. There was minimal progress in PNC check-ups within 7 days of delivery, which only increased from 55% in 2011 to 58% 2016, and the change was not statistically significant. This could be due to several factors including the initiation of the *Aama* program in 2009, which included incentives for women who completed four ANC visits but not for PNC separately (Aryal and Bhatt 2014). The safe motherhood program that was initiated in 1997 (Department of Health Services 2018) included an enhanced focus on behavior change communication (highlighted in the National Communication Strategy for Maternal, Newborn and Child Health, 2011-2016), which could have stimulated the increase in the utilization of maternal health care services. The National Safe Motherhood and Neonatal Health Long Term Plan 2006-2017 aimed to socially empower individuals, groups, and networks to practice safe motherhood and neonatal health behaviors, which could lead to increased equity and access to health services. The plan also focused on enhanced, equitable provision of quality maternal and neonatal health services by strengthening the supply-side environment (Family Health Division 2006). Interventions guided by the plan could have helped to increase the utilization of maternal health care services. Similarly, the Nepal Health Sector Programme-2 Implementation Plan (NHSP2 IP) 2010-2015 aimed to increase the proportion of pregnant women who completed at least four ANC visits to 80%, and institutional delivery to 40% by 2016. This was meant to strengthen and expand maternal and newborn health care services with a major focus on the *Aama* program and its integration with the incentive for four ANC visits (Ministry of Health and Population 2010). Service delivery was guided by this sector strategy from 2010-2015, and could have helped to increase the utilization of ANC visits and institutional delivery.

Although there is some progress in the utilization of maternal health care services, the path ahead for increasing institutional delivery rate to 70% by 2020 (Ministry of Health and Population 2015) and 90% by 2030 (National Planning Commission 2017), and four ANC visits and PNC check-ups to 90% by 2030 (National Planning Commission 2017), will not be easy. The stagnant MMR, which has remained at 239 per 100,000 live births for the 7-year period before the 2016 NDHS (Ministry of Health, New ERA, and ICF 2017), remains a concern. Reducing the MMR would require further improvement in

maternal health service utilization such as ANC visits, institutional delivery, and PNC check-ups. This could be achieved through more focused interventions that target the underserved and most marginalized population, as evidenced by our regression analyses.

7.2 Four ANC Visits

In the bivariate analysis, we found subgroup differences in the four ANC visits as per protocol. However, in the multivariate analysis, wealth quintile, province, and birth order were the only variables independently associated with four ANC visits.

By wealth quintile, our analysis showed that women in the richer wealth quintile had nearly twice higher odds of completing the four ANC visits in the 4th, 6th, 8th, and 9th month of their last pregnancy. The significant association of pregnant women in the richest wealth quintile completing the four ANC visits in the bivariate analysis was not statistically significant after adjusting for the covariates. This could be due to the small sample size in the richest group in comparison to other subgroups, and other reasons not measured in the 2016 NDHS. The number of ANC visits remains low among the poorer group, despite health sector efforts to improve maternal health status among the poor (Ministry of Health and Population 2010) with government incentive schemes for those women who complete the ANC visits and deliver their babies in a health facility (Aryal and Bhatt 2014).

Poorer women have other financial barriers. Research in other low- and middle-income countries such as Nigeria show that acquiring money was one of the three major barriers for women, in addition to long distance and unavailability of transport to ANC services (Fagbamigbe and Idemudia 2015). Previous studies, including the 2011 NDHS results, show that the odds of completing four or more ANC visits is higher among richer women (Pandey et al. 2013). This finding is supported by other small-scale studies from Nepal, which found richer women had higher odds of using ANC services and higher levels of autonomy associated with being a member of an advantaged ethnic group (Deo et al. 2015). This suggests that poor economic status continues to be a barrier to utilizing ANC services in Nepal because although ANC care is free, associated costs, for example those related to the travel to health facilities, are barriers to ANC service utilization. We found that women in Provinces 4 and 7 performed well with completing four ANC visits during their last pregnancy. The most recent annual report of the Department of Health Services for the fiscal year 2016/17 also rated these provinces among the high-performing provinces with completion of four ANC visits, although Province 3 ranked higher than Provinces 4 and 7 (Department of Health Services 2018).

Our analysis indicates that there is a need for targeted interventions that can decrease the gap between underperforming and well-performing provinces. The Human Development Index (HDI) in the western hills and western mountains that was higher than the national average could have contributed to the greater likelihood of women seeking care (National Planning Commission 2014). In a recently released report from the National Planning Commission, nearly half of the population of Provinces 2 and 6 are poor, according to the multidimensional poverty index (MPI), while Province 4 (Gandaki Province) has one of the lowest scores (National Planning Commission & Oxford Poverty and Human Development Initiative 2018). These findings further emphasize the importance of need-based interventions in maternal health in provinces with a low HDI and high MPI index.

This study found that women are less likely to complete the four ANC visits with an increase in the birth order. Women whose last pregnancy was first and second in order had higher odds of completing four ANC visits. Women could perceive their first pregnancy as high risk and thus may seek more care with their first pregnancy.

In addition, although this analysis did not find an association of ANC utilization with distance to health facility, a study from the Banke District in Nepal has shown that shorter distance, low traveling cost, and less waiting time were associated with four or more ANC visits (Paudel, Thepthien, and Hong 2016).

7.3 Institutional Delivery

The bivariate analysis of institutional delivery showed subgroup differences in a number of variables. Basic and higher education; middle, richer, and richest wealth quintiles; residence in Provinces 4 and 7; completion of four ANC visits; and birth preparation were independently associated with institutional delivery.

Most findings in this study concur with previous findings. For example, the further analyses of 2011 NDHS showed that better education and wealthier economic status are associated with higher institutional delivery rates (Karkee, Lee, and Khanal 2014; Shahabuddin et al. 2017). The association between education and health care behavior has been clearly demonstrated by other global studies that found educated women to be more aware about safe delivery issues, have higher self-efficacy, and exhibit better adherence to self-care and healthy behaviors (Zahodne et al. 2015). This analysis did not demonstrate a significant association of husband's education after adjusting the covariates, although this factor was associated with health care behavior in the further analysis of the 2007 Bangladesh DHS (Kamal, Hassan, and Alam 2015). The strong association of household wealth quintile with institutional delivery shows that women could have been deprived of using health facilities for delivery due to their poor wealth status. In an attempt to address this, the Government of Nepal through MoHP in its *Aama* program has made the provision of transport incentives for those delivering in the health facility (Aryal and Bhatt 2014), and this has been doubled since the beginning of the current fiscal year 2018/19 (Family Health Division 2018). However, there are no targeted programs yet specifically for the poorer households.

Our analysis has shown a higher likelihood of institutional delivery in Provinces 4 and 7. The findings, particularly in Province 7 (Sudurpashchim Province), concur with the recent annual report of DoHS which showed that Province 7 is among the two provinces with much higher institutional delivery rates compared to other provinces and the national average. However, Province 4 (Gandaki Province) had an institutional delivery rate for 2016/17 of only 46%, which is much lower than the national average (Department of Health Services 2018). Our study's findings deviate slightly from those of the DoHS, and the higher likelihood of institutional delivery observed in Province 4 (Gandaki Province) in our study could also be linked to higher HDI in the western hills and western mountains than that of national average (National Planning Commission 2014).

This analysis has shown that women who complete four ANC visits with birth preparedness were more likely to have an institutional delivery. This finding is similar to the 2011 NDHS further analysis report, which also showed significant association of four or more ANC visits and birth preparedness (Karkee, Lee, and Khanal 2014). Timely contact of the pregnant women with the health care providers during ANC visits could motivate women and help them understand the importance of delivering in a health facility. Similarly, a woman who has made preparations (money saved, food ready, and clothes available) for the delivery may be better motivated to have a facility delivery. Birth preparedness could also be a result of regular contact with health workers during the ANC visits. It is likely that women who complete ANC visits are encouraged to adopt effective measures for safe delivery. Thus, it appears that the ANC visit and birth preparedness are related to choosing the place of delivery.

7.4 Postnatal Check-up

The prevalence of PNC check-ups within 7 days was different among several subgroups in the bivariate analysis. A PNC check-up within 7 days is an important window of opportunity for assessing the mother and newborn for health and other problems. Factors that affect PNC check-ups within 7 days include wealth quintile, geography (provinces), and urban versus rural location. Women in the richer wealth groups, those living in Province 1, and those residing in rural areas were more likely to have at least one PNC check-up within 7 days.

Wealthier women are more likely to complete four ANC visits and to deliver in a health facility. Wealth continues to be a significant determinant of PNC check-ups as well. The analysis also shows that women delivering in a health facility and those who were advised about a PNC check-up were more likely to have a PNC check-up within 7 days. This finding could be a result of interventions focused on improving overall maternal health care as guided by the National Safe Motherhood and Newborn Health Long Term Plan 2006 -2017. This plan aimed to empower individuals for safe motherhood and enhance the equitable provision of maternal health services (Family Health Division 2006), and to increase healthy practices and utilization of quality maternal health services (Ministry of Health and Population 2010). Our analysis has found that women who delivered in a health facility had very high odds of having a PNC check-up within 7 days. It is possible that the contact with health care workers before women are discharged from the health facility after the delivery could have contributed to a major portion of PNC check-ups.

Our analysis also showed that women who reside in urban areas are less likely to have PNC check-ups in comparison to rural women, although the findings were minimally significant. This could be related to the active role of female community health volunteers (FCHVs) in the rural areas. More awareness, information, education, and behavior change communication (IEC/BCC) interventions are needed to increase women's awareness of the importance of postnatal check-ups, although there may be other factors that were not included in this study and may have affected the underutilization of PNC services in urban areas.

7.5 Conclusion

Findings from the 2016 NDHS analysis of women's maternal health care seeking found that every three in five women completed four ANC visits per protocol, delivered their baby in a health facility, and had a PNC check-up within 7 days of delivery. Four or more ANC visits increased by 15 percentage points from 59% in 2011 to 74% in 2016. Compared to the 2011 NDHS, institutional delivery increased with statistical significance by 21 percentage points in 2016, while the increase in the proportion of women who had a PNC check-up within 7 days was very minimal with 3 percentage points and not statistically significant.

Belonging to a richer wealth quintile, residing in provinces 4 and 7, and lower birth order were the only variables independently associated with four ANC visits per protocol. Similarly, women's education, belonging to richer wealth quintile, living in Provinces 4 and 7, having completed four ANC visits per protocol, and birth preparedness were independently associated with institutional delivery. Belonging to the middle or richer wealth quintile, living in province 1, institutional delivery, and having had advice about PNC check-ups were independently associated with PNC check-up within 7 days. Four ANC visits per protocol predicted institutional delivery, and institutional delivery predicted PNC check-up, indicating the completion of continuum of care. Province 2 appears to have performed poorly with

regard to four ANC visits per protocol, while Province 6 (Karnali Province) in particular has performed poorly with institutional delivery and PNC check-up.

In summary, maternal health care utilization was better among women from richer wealth groups, those with higher education, and those from Provinces 4 and 7. Outcomes such as institutional delivery and PNC check-ups were dependent upon factors such as complete ANC check-ups as per protocol and birth preparedness.

7.6 Recommendations and Policy Implications

Based on the results of this further analysis, common background characteristics such as improved education level, improved socioeconomic status, belonging to advantaged ethnic groups, and living in certain high-performing provinces with a higher HDI are associated with greater utilization of maternal health care services. It is clear that those who are marginalized are less likely to access maternal health care. There is a need for government interventions that focus on broader social determinants of health that can reduce equity gaps among different subgroups. Barriers such as obtaining permission to seek health care and money for health care can be expected to improve with the improvement in educational and socioeconomic status across all categories and geographies. In contrast, barriers such as unavailability of a health facility within 30 minutes of distance and perceived barriers at the point-of-service utilization such as the unavailability of female health care providers call for urgent action from the government at all levels: federal, provincial, and local. We also found that certain factors have also positively affected the outcomes, such as four ANC visits per protocol and birth preparedness that directly affect institutional delivery, and advice to obtain PNC check-ups within 7 days. There is a need to sustain the focus on these interventions and to increase access to these pre-interventions in order to achieve improvements in outcome variables such as institutional delivery and PNC check-ups.

7.6.1 Policy level

- Federal and provincial governments must continue acting upon broader social determinants of health such as improving the education and socioeconomic status of women.
- There is a need to develop and update policies and strategies that reduce the equity gap among education levels, wealth quintile, and geographical disparities.

7.6.2 Program/implementation level

- Enhance efforts to increase ANC check-ups and the quality of ANC so that more women will deliver their child in a health facility and attend timely PNC check-ups.
- Sustain and strengthen IEC and BCC so that more women will seek ANC, which will ensure birth preparedness that encourages women to complete ANC visits per protocol and choose a health facility for delivery of their child.

Ultimately, there is a need for generating more evidence on the barriers to utilizing ANC, institutional delivery, and postnatal care.

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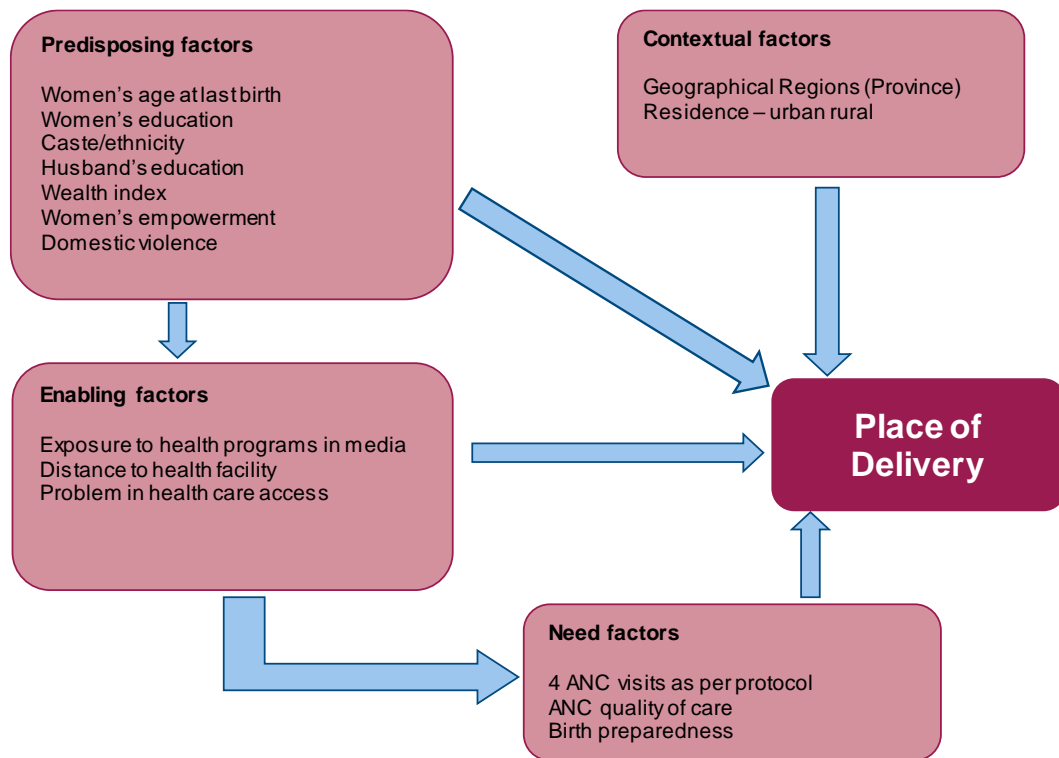
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APPENDIX

Appendix Figure A1 Conceptual framework for analyzing determinants of place of delivery



Appendix Figure A2 Conceptual framework for analyzing determinants of PNC check-up within 7 days

