

# Demographic and Socio-economic Factors Affecting Antenatal Care Services Utilization in Nepal

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## Abstract

*In Nepal, Antenatal care (ANC) services seeking behavior has improved since the 1990s. More pregnant women are seeking the services now than ever. Still a relatively high percentage does not seek even a onetime ANC care and the percentage of women who seek 4 or more ANC care from a skilled service provider is still low. Research in developing countries shows that various demographic, social and economic factors influence the utilization of ANC services and the number of times the care is sought by pregnant women. This paper examines the likelihood of utilization of ANC services 4 or more times in relation to women's demographic, social and economic status in Nepal. The 2011 Nepal Demographic and Health Survey (NDHS) data set has been utilized by applying bivariate logistics regression analysis technique to examine the effects of these variables in 4 or more ANC use in Nepal. The analysis findings show large variations and gaps in the utilization of ANC care based on demographic, social and economic status of women. Against this finding, the study recommends implementation of appropriate policy and program measures by the government and other agencies to address the existing variations and gaps in ANC services utilization among different sub-groups of women in Nepal. Further research studies focusing on the existing barriers in ANC services utilization need to be conducted in Nepal especially among the women who are disadvantaged and marginalized.*

**Keywords:** Age of first birth, pregnancy termination, ethnicity, mass media habits, and logistic regression.

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## 1. Introduction

In 1996, the Nepal Family Health Survey (NFHS) estimated Nepal's MMR at 539 per 100,000 live births, the highest in South Asia. The Demographic and Health Survey conducted in 2006 estimated MMR to be 281 which was much reduced but still one of the higher MMRs globally (MoHP, 2007). The Maternal Mortality and Morbidity study conducted in Nepal in 2008 in eight of the 75 districts of the country found MMR to be 229 per 100,000 live births, ranging from a MMR of 153 in Okhaldhunga district to 301 in Rasuwa. The study also showed considerable variation in MMR between women of various ages and caste/ethnic groups. The most recent estimates for Nepal done by WHO in 2015 is 258 maternal deaths which is slightly higher than the previous estimates of MMR reported by the study in 2008 (Suvedi et al, 2009). Underutilization of safe motherhood

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services is considered as the main factor contributing to high maternal mortality, for example, more than 60 percent of births still take place at home, many without skilled health providers, utilization of ANC services is low and the trend of birth preparation is still low (MoHP, 2012).

Antenatal care (ANC) is a pivotal factor for safe motherhood. The primary aim of ANC is to achieve healthy mother and a healthy baby at the end of pregnancy. Mothers who have not received good quality ANC are found to be more at risk of having low birth weight babies and there is a clear association between infant mortality rate and low or poor quality ANC.

Moreover, substantial reduction in perinatal mortality takes place even if the initial antenatal check-up is availed by women as late as the third trimester. Antenatal visits may raise awareness about the need for care during delivery or give women and their families a familiarity with health facilities that enable women to seek care (Chauhan, 2012). It often presents the first contact opportunities for a pregnant woman to connect with health services, thus offering an entry point for integrated care, promoting healthy home practices, influencing care-seeking behaviors and linking women with pregnancy complications to a referral system thus impacting positively on maternal and fetal health (Bulattoo & Ross, 2000). Moreover, ANC supports to apply the possible preventive and curative measures to manage the complications in time through various services viz. counseling on nutrition, birth preparedness, delivery care, post-partum care and family planning options after delivery. Due to the crucial role played by a proper ANC in keeping the pregnancy healthy, WHO guideline and Nepal's Safe Motherhood Program recommend every woman to attend ANC care at least 4 times in each pregnancy. The paper is divided into five sections. The first section presents background to current situation of ANC services utilization in Nepal followed by brief presentation of literature review. Third section describes methodology adopted in detail including type of data and analysis techniques. Section 4 presents analysis and interpretation of the findings. Section five presents discussion and conclusion of the research analysis.

## **2. Literature Review**

The literature on utilization of ANC services in a number of developing countries (Chauhan, 2012; Deo et al., 2015; Mehari, 2013) has exhibited the effects of several demographic, social and economic factors whether women utilize or not utilize these services. The studies have indicated that demographic variables like woman's age, inter-birth intervals and children ever born (CEB) are predictors of the use of ANC (IIPS, 2010). Likewise, social variables like woman's education and place of residence are also found to be a strong predictors (Kaule-sabiti, Acheampong & Ngake, 2014; Rahman, 2009; Kulkarni & Nimbalkar, 2008; Baral, Lyons, Skinner, & VanTeijlingen, 2012). Similarly economic variables like household wealth are found to be a predictor of ANC utilization (Jat, Nag & Sebastian, 2011). Thus these findings indicate that use or non-use of components of safe motherhood is influenced by demographic, social and economic background of women.

Few research studies have been conducted in Nepal on aspects of ANC care including demographic and socio-economic factors affecting the utilization of ANC care by women (Pandey & Karki, 2014; Deo et al., 2015). The finding of these studies however is limited either to specific geographical locations, communities or only a few districts. These studies also have not included a spectrum of factors that may influence the service utilization behavior of women in Nepal.

Therefore, there is a need to explore and identify the variables at the national and regional level that have either facilitated or hindered in attending or utilizing the recommended number of ANC visits by women during their pregnancy. The analysis result could be expected to fill the information gaps and also provide inputs for future policy and programs.

Against this background, the paper seeks to answer following research question: *what are the demographic, social and economic factors that may affect ANC services utilization at least 4 or more times by women in Nepal?* The analysis result has shed light on the factors associated with utilization or non-utilization of ANC services 4 or more times by women in Nepal. The paper also presents analysis of ANC service utilization by rural and urban residents and by 3 ecological belts (Mountain, Hill and Tarai) of Nepal.

### **3. The Data and Methodology**

Data files of Nepal Demographic and Health Survey 2011 (NDHS, 2011) have been utilized to analyze the effects of demographic, social and economic factors on the utilization of safe motherhood services in Nepal. This is a nationally representative survey and the total sample consists of 4,079 currently married women between the ages of 15-49 years who had given birth to a child within the 5 years preceding the survey date. After applying weightage the sample size is derived at 4,148 women.

The paper conceptualizes that there are specific categories and number of variables that determines the decision making processes of a woman or her family members on whether to seek ANC services or not. Thus the paper has defined two sets of variables which are respectively categorized as dependent and independent. ANC services utilization 4 or more times is taken as dependent variable. Independent variables include **demographic** (*woman's current age, age at 1<sup>st</sup> birth, children ever born, number of children <5 years of age, pregnancy termination (induced abortion)*); **social** (*caste/ethnicity, religion, woman's education, husband's education, mass media habits, spatial distribution, and rural/urban residence*); and **economic** (*woman's occupation, husband's occupation, woman's employment status, household wealth*) concerning the woman and her family members. These variables influence the safe motherhood behavior and practices of an individual woman.

The dependent and independent variables have been re-coded and specific variables are re-grouped from the data file to make a meaningful analysis. Data has been analyzed by using STATA v. 12. First, data is analyzed on the basis of cross tabulations of dependent and independent variables. Second, bivariate logistic regression has been used to predict the likelihood of utilization of ANC services 4 or more times by pregnant women in Nepal.

The limitations of this research paper are as follows:

- The paper analyzes individual level factors affecting utilization of ANC services representing only demand side factors. The study does not look at the supply side factors.
- The paper does not include time series data in the analysis but includes data only from a single point of time, i.e., NDHS 2011.
- The paper has utilized only those ANC related variables that have been included in NDHS 2011. Thus the study has analyzed only the available data sets concerned with demographic and socio-economic statuses of respondents.

- The paper has only focused on the analysis of quantitative data. So qualitative information has not been used in making inferences.
- The paper has used bivariate logistic regression method in data analysis, so only the ‘gross effects’ have been estimated.

## 4. Data Analysis and Presentation

### 4.1 Demographic variables and utilization of 4 or more ANC services

ANC use in Nepal has been increasing in recent years. During the late 1990s and early 2000/1 about 38% of women had reported at least one ANC visit but only 9% reported 4 or more visits, with most women having two or three antenatal visits (WHO, 2003). In 2011, for example, 15 percent women had not sought ANC care in their last pregnancy, nearly 6 percent had the care only 1 time, about one-third (33.2%) had up to 3 times and only about one-half (52.7%) had sought ANC visits 4 or more times (Table 1).

**Table 1: Distribution of respondents by ANC service utilization, 2011**

Description	Number	Percent
No ANC services	611	15.0
Use of ANC service 1 time	234	5.7
Use of ANC services 2 times	426	10.4
Use of ANC services 3 times	657	16.1
Use of ANC services 4 or more times	2151	52.7
<b>Total</b>	<b>4079</b>	<b>100.0</b>

Source: Calculated from NDHS 2011 data files

High variation exists in the use of 4 time ANC visits according to demographic and socio-economic background of women. By age, over one-half of the women (54%) in the age groups of 15-19, 20-24 and 25-29 years have 4 or more ANC visits in their last pregnancy. Similarly, over half of the women who are in their twenties at the time of their first child (20-24 and 25-29 years) have 4 ANC visits compared to the women who deliver their first child below 20 years of age. By age of women at their first birth, comparatively low percentage of women whose age at first birth is below 20 years (10-14 and 15-19 year age groups) have attended 4 or more ANC visits than women whose age at their first birth is above 20 years. The highest percentage of women (68.2%) taking ANC services 4 or more times are from those whose age is between 25-29 years. Similarly, nearly 6 in every 10 women (58.3%) who are at 30 years and higher ages at their first birth have also taken ANC services 4 or more times. This findings indicate that women in higher ages (>30 years) tend more to follow the ANC guidelines than those who have their first child delivery in younger ages (Table 2).

By parity, high percentage of women (>50%) who have only 1-2 children have visited for the recommended number of at least 4 ANC services. Overall, the data indicates that women who

have higher number of children ever born tend to have recommended number of ANC visits than the women who have lower number of children ever born to them (Table 2).

High percentage of women who have few (1-2) number of young siblings (<5 years of age) have at least 4 ANC visits in their last pregnancy compared to women who have 3 or more young siblings. About 56 percent of women who have 1 child have taken 4 or more times of ANC services. About 4 in every 10 women having 2 children have taken ANC services 4 or more times. The analysis results also show that about half of the women (49.6%) who have had induced abortion (pregnancy termination) earlier than the last birth also have at least 4 ANC visits during the last pregnancy (Table 2).

**Table 2: Use of 4 or more ANC services in Nepal according to demographic characteristics of women**

Description	Use of 4 or more ANC		Use of no or less than 4 ANC		Total respondents	
	Number	Percent	Number	Percent	Number	Percent
15-19	181	54.4	152	45.6	333	100.0
20-24	736	55.4	592	44.6	1328	100.0
25-29	712	54.4	598	45.6	1310	100.0
30-34	311	46.4	359	53.6	670	100.0
35-39	105	33.1	212	66.9	317	100.0
40-44	27	19.1	114	80.9	141	100.0
45-49	6	12.0	44	88.0	50	100.0
<b>Total</b>	<b>2078</b>	<b>50.1</b>	<b>2071</b>	<b>49.9</b>	<b>4149</b>	<b>100.0</b>
<b>Age at First Birth</b>						
10-14	16	24.2	50	75.8	66	100.0
15-19	953	44.8	1173	55.2	2126	100.0
20-24	901	54.8	744	45.2	1645	100.0
25-29	180	68.2	84	31.8	264	100.0
30+	28	58.3	20	41.7	48	100.0
<b>Total</b>	<b>2078</b>	<b>50.1</b>	<b>2071</b>	<b>49.9</b>	<b>4149</b>	<b>100.0</b>

(Continued...)

(Table 2 continued...)

<b>Children Ever Born</b>						
1	869	66.7	433	33.3	1302	100.0
2	658	56.7	503	43.3	1161	100.0
3	307	41.9	426	58.1	733	100.0
4	139	35.0	258	65.0	397	100.0
5+	105	18.9	450	81.1	555	100.0
<b>Total</b>	<b>2078</b>	<b>50.1</b>	<b>2070</b>	<b>49.9</b>	<b>4148</b>	<b>100.0</b>
<b>Child &lt; 5 Years</b>						
0	138	55.9	109	44.1	247	100.0
1	1235	56.6	946	43.4	2181	100.0
2	568	42.5	767	57.5	1335	100.0
3	107	35.8	192	64.2	299	100.0
4+	31	36.0	55	64.0	86	100.0
<b>Total</b>	<b>2079</b>	<b>50.1</b>	<b>2069</b>	<b>49.9</b>	<b>4148</b>	<b>100.0</b>
<b>Pregnancy Termination</b>						
Yes	395	49.6	401	50.4	796	100.0
No	1683	50.2	1669	49.8	3352	100.0
<b>Total</b>	<b>2078</b>	<b>50.1</b>	<b>2070</b>	<b>49.9</b>	<b>4148</b>	<b>100.0</b>

**Source:** Calculated from NDHS 2011 data files

Weights are applied

Totals may not equal 100.0 due to rounding off of cases

Logistic regression has been used to examine the effects of selected demographic variables on the use of at least 4 ANC visits by women during their pregnancy. The variables used for examining effects are: current age, age of women at first birth of their child, parity (CEB), number of children under 5 years of age, and women's history of pregnancy termination (induced abortion). The result shows that young age, age at 1<sup>st</sup> birth, parity and number of children less than 5 years of age have strong effects on use or nonuse of 4 or more ANC visits. The logistic regression results show that young women who are up to the age of 29 years are more than 8 times likely to have at least 4 ANC visits (Table 3).

Similarly, women who are at the age of 20-29 are 2.6 times likely to have at least 4 ANC visits than the woman who are at younger ages (below 24 years) or women at higher ages (above 30 years).

Women who have low parity (only 1 and 2 child respectively) are 8.5 times and 5.6 times likely to take at least 4 ANC visits compared to women with high (3 or more) parity. Likewise, women who have 1 or 2 children who are <5 years of age are more than two times likely to get at least 4 ANC visits than women with 3 or more <5 children. The result is significant at 5% (Table 3).

**Table 3: Effects of selected demographic variables on utilization of ANC 4 or more times in Nepal using logistic regression**

Description	Odds ratio (OR)	95% Confidence interval (CI)	P value
<b>Age Group</b>			
15-19	8.879	2.456 - 32.097	0.001
20-24	9.290	2.627 - 32.851	0.001
25-29	8.902	2.518 - 31.469	0.001
30-34	6.491	1.825 - 23.096	0.004
35-39	3.709	1.024 - 13.437	0.046
40-44	1.757	.455 - 6.782	0.414
45-49	Ref.	--	--
<b>Age at First Birth</b>			
10-14	.392	.211- .724	0.003
15-19	Ref.	--	--
20-24	1.492	1.274 -.748	0.000
25-29	2.657	1.904 - .708	0.000
30+	1.721	.836 - 3.541	0.140
<b>Children Ever Born</b>			
1	8.594	6.395 -11.548	0.000
2	5.609	4.180 - 7.526	0.000
3	3.094	2.259 - 4.237	0.000
4	2.299	1.623 - 3.257	0.000
5+	Ref.	--	--
<b>Number of Child &lt; 5 Years</b>			
0	2.276	1.212 - 4.273	0.011
1	2.355	1.352 - 4.102	0.002
2	1.337	.763 - 2.343	0.310
3	1.003	.5403 - 1.861	0.993
4+	Ref.	--	--
<b>Pregnancy Termination</b>			
Yes	.976	.812 - 1.173	0.795
No	Ref.	--	--

**Source:** Calculated from NDHS 2011 data files

Weights are applied

Ref.: Reference category

#### 4.2 Social variables and utilization of 4 or more ANC services

A very high percentage (82.7%) of respondents from Newar group has 4 or more ANC visits in their last pregnancy. Similarly high percentage (63.5%) of respondents who belonged to relatively advantaged caste groups (Brahmin, Chhetri, Gurung, Thakali and others) have reported of having at least 4 ANC visits in 2011. Among other caste groups, relatively high percentage (46.4%) of women respondents from Janjati (indigenous) groups of Hill and Tarai region also have 4 or more ANC visits in their last pregnancy. By religion, over half of Hindu women (51.9%) have 4 or more ANC visits compared to only about 41 percent women who belong to other religious groups. Likewise higher percentages of women living in urban areas (71.8%) and over one-half of the women from Tarai and Hilly regions have at least 4 ANC visits. By education, higher percentage of women (71.7%) with secondary education has at least 4 ANC visits. Similar result is observed among women whose husband have secondary level of education (Table 4).

**Table 4: Use of 4 or more ANC services in Nepal according to social characteristics**

Description	Use of ANC4 or more times		Use of no ANC or used less than 4 times		Total respondents	
	Number	Percent	Number	Percent	Number	Percent
<b>Caste/ethnicity</b>						
Brahmin/Chhetri & other castes	814	63.5	468	36.5	1282	100.0
Other Tarai Caste	148	35.8	265	64.2	413	100.0
Dalit	272	39.9	410	60.1	682	100.0
Newar	105	82.7	22	17.3	127	100.0
Hill and Tarai Janajati	648	46.4	748	53.6	1396	100.0
Muslim	82	34.7	154	65.3	236	100.0
<b>Religion</b>						
Hindu	1787	51.9	1658	48.1	3445	100.0
Non Hindu	291	41.3	413	58.7	704	100.0
<b>Residence</b>						
Rural	1778	47.7	1952	52.3	3730	100.0
Urban	300	71.8	118	28.2	418	100.0
<b>Ecological Region</b>						
Mountain	840	42.6	829	57.4	305	100.0
Hill	1108	50.3	1067	49.7	1669	100.0
Tarai	2078	50.9	2071	49.1	2175	100.0

(Continued...)



(Table 4 continued...)

<b>Respondent Education</b>						
Higher	243	92.4	20	7.6	263	100.0
Secondary	881	71.7	348	28.3	1229	100.0
Primary	431	51.6	404	48.4	835	100.0
No education	523	28.7	1299	71.3	1822	100.0
<b>Husband's Education*</b>						
Higher	368	79.7	94	20.3	462	100.0
Secondary	1104	61.1	704	38.9	1808	100.0
Primary	396	40.2	588	59.8	984	100.0
No education	200	22.9	672	77.1	872	100.0
<b>Media Habits</b>						
<b>Newspaper</b>						
At least once a week	264	88.0	36	12.0	300	100.0
Less than once a week	563	72.5	214	27.5	777	100.0
Not at all	1251	40.7	1820	59.3	3071	100.0
<b>Radio</b>						
At least once a week	896	58.4	639	41.6	1535	100.0
Less than once a week	777	48.1	840	51.9	1617	100.0
Not at all	405	40.6	592	59.4	997	100.0
<b>Television</b>						
At least once a week	1090	69.8	471	30.2	1561	100.0
Less than once a week	542	47.3	603	52.7	1145	100.0
Not at all	446	30.9	997	69.1	1443	100.0
<b>Mass Media Habits</b>						
Yes	138	85.2	2047	14.8	162	100.0
No	1940	48.7	2071	51.3	3987	100.0
<b>Total</b>	<b>2078</b>	<b>50.1</b>	<b>2047</b>	<b>49.9</b>	<b>4149</b>	<b>100.0</b>

**Source:** Calculated from NDHS 2011 data files

Weights are applied

\*\*22 weighted cases missing

Totals may not equal 100.0 due to rounding off of cases

The percentage of women using ANC 4 or more times is high among those who read newspaper, listen to radio, and watch TV at least once a week. Overall, a high percentage of women (85.2%) who have access to all three media sources have utilized ANC services 4 or more times in their last pregnancy (Table 4).

The logistic regression analysis shows strong effect of selected social variable on the use of at least 4 ANC visits. Women's caste/ethnicity, religion, place of residence (rural, urban) and education has strong effects on the utilization of 4 or more ANC visits. Among the different caste/ethnic groups, Newar women are 9 times more likely (95% CI 4.655 - 17.464) and women from Brahmin/Chhetri and other caste groups are more than three times likely to use at least 4 ANC than women from Tarai, Janjati and Muslim groups. The analysis shows the likelihood effect significant at 5% level. By religion, Hindu women are 1.5 times more likely to take 4 or more ANC visits than women from non-Hindu groups. By ecological regions, the odds of taking at least 4 ANC visits is higher among women living in Mountain region than those living in Hill and Tarai regions (Table 5).

**Table 5: Effects of selected social variables on utilization of ANC 4 or more times in Nepal using logistic regression**

Description	Odds ratio(OR)	95% Confidence interval (CI)	P value
<b>Caste/ethnicity</b>			
Brahmin/Chhetri & other castes	3.263	2.174 - 4.897	0.000
Other Tarai Caste	1.050	.651 - 1.694	0.842
Dalit	1.244	.810 - 1.912	0.318
Newar	9.017	4.655 - 17.464	0.000
Hill and Tarai Janajati	1.626	1.080 - 2.446	0.020
Muslim	Ref.		
<b>Religion</b>			
Hindu	1.526	1.238 - 1.882	0.000
Non Hindu	Ref.	--	
<b>Residence</b>			
Rural	Ref.	--.	
Urban	2.792	2.322 - 3.357	0.000
<b>Ecological Region</b>			
Mountain	.717	.594-.865	0.001
Hill	.977	.835-1.142	0.767

(Continued...)

(Table 5 continued...)

Tarai	Ref.	--	
<b>Respondents, Education</b>			
Higher	30.856	16.97 - 56.103	0.000
Secondary	6.280	5.157 - 7.648	0.000
Primary	2.646	2.154 - 3.250	0.000
No education	Ref.	--	
<b>Husbands, Education</b>			
Higher	.399	.298 - .536	0.000
Secondary	.171	.126 - .234	0.000
Primary	.076	.054 - .106	0.000
No education	Ref.		
<b>Media Habits</b>			
<b>Newspaper</b>			
At least once a week	10.647	7.463 - 15.192	0.000
Less than once a week	3.829	3.221 - 4.553	0.000
Not at all	Ref.		
<b>Radio</b>			
At least once a week	2.051	1.744 - 2.412	0.000
Less than once a week	1.353	1.153 - 1.587	0.000
Not at all	Ref.		
<b>Television</b>			
At least once a week	5.170	4.426 - 6.039	0.000
Less than once a week	2.008	1.710 - 2.359	0.000
Not at all	Ref.		
<b>Mass Media Habits</b>			
Yes	6.147	3.482 - 10.852	0.000
No	Ref.	--	--

**Source:** Calculated from NDHS 2011 data files

Weights are applied

Totals may not equal 100.0 due to rounding off of cases

Ref. Reference category

Place of residence however has significant effect as women residing in urban areas are 2.79 times more likely (95% CI 2.322 - 3.357) to utilize at least 4 ANC visits than women residing in rural areas. Similarly, the analysis result shows highly significant effect of women's education on ANC use. Women with higher level of education are 30.85 times more likely (95% CI 16.97 - 56.103) to utilize at least 4 ANC than women with no education (Table 5).

Analysis result further shows significant effect of education and 4 ANC at secondary (OR 6.28; 95% CI 5.157 - 7.648) and primary (OR 2.64; 95% CI 2.154 - 3.250) level. It is however surprising to observe that husband's education does not have much effect on the use of recommended number of ANC. Women having access to media show strong effect on the utilization of ANC services. Women who read newspaper at least once a week are 10 times more likely to utilize recommended number of ANC services than those who have less access or no access to newspapers (Table 5).

It is estimated that women who listen Radio at least once a week take twice the number of recommended ANC services (OR 2.051; 95% CI 1.744 - 2.412). However, women who watch Television at least once a week take 4 times of ANC services (OR 5.170; 95% CI 4.426 - 6.039). Overall, the likelihood of ANC 4 service utilization is 6 times more among women who have access to all three media channels in comparison to women who have no access to the media. The result is significant at  $p < 0.001$  (Table 5).

#### **4.3 Economic variables and utilization of 4 or more ANC services**

In 2011 about one-half (50.1%) of the women have reported of taking at least 4 ANC visits during their previous pregnancy. Of these, higher percentages of women whose occupation is manual labor (57.7%) and those who are not working (56.7%) have utilized ANC services 4 or more times. Less than half of women (42.1%) whose occupation is agriculture have taken ANC services 4 or more times. On the contrary, a high percentage (65.1%) of women whose husband's occupation is service/trade have taken at least 4 ANC visits. By employment status, percentage of currently employed women taking 4 or more visits is lower (48.3%) than the women who are currently unemployed. Likewise by household wealth status, a high percentage of women who are from rich category (74.2%) and relatively high percentage of women who belong to middle category (45.2%) have taken at least 4 ANC visits while only about one-third (30.9%) of women from poor category have taken at least 4 ANC visits in their previous pregnancy (Table 6).

**Table 6: Use of 4 or more ANC services in Nepal according to economic characteristics, 2011**

Description	Use of ANC 4 or more times		Use of no ANC or used less than 4 times		Total respondents	
	Number	Percent	Number	Percent	Number	Percent
<b>Respondent's Occupation</b>						
Manual	105	57.7	77	42.3	182	100.0
Service/trade	303	76.1	95	23.9	398	100.0
Agriculture	1016	42.1	1400	57.9	2416	100.0
Not working*	652	56.7	498	43.3	1150	100.0
<b>Total</b>	<b>2077</b>	<b>50.1</b>	<b>2071</b>	<b>49.9</b>	<b>4148</b>	<b>100.0</b>
<b>Husband's Occupation</b>						
Manual	579	44.0	736	56.0	1315	100.0
Service/trade	1099	65.1	589	34.9	1688	100.0
Agriculture	334	33.2	671	66.8	1005	100.0
<b>Total</b>	<b>2079</b>	<b>50.1</b>	<b>2070</b>	<b>49.9</b>	<b>4149</b>	<b>100.0</b>
<b>Respondent's Employment</b>						
Yes	1126	48.3	1203	51.7	2329	100.0
No	952	52.3	868	47.7	1820	100.0
<b>Total</b>	<b>2078</b>	<b>50.1</b>	<b>2071</b>	<b>49.9</b>	<b>4149</b>	<b>100.0</b>
<b>Household Wealth+</b>						
Rich	1026	74.2	356	25.8	1382	100.0
Middle	624	45.2	758	54.8	1382	100.0
Poor	427	30.9	956	69.1	1383	100.0
<b>Total</b>	<b>2077</b>	<b>50.1</b>	<b>2070</b>	<b>49.9</b>	<b>4147</b>	<b>100.0</b>

**Source:** Calculated from NDHS 2011 data files

Weights are applied

+ Household wealth have been regrouped into following 3 categories by combining: Richer and Richest = Rich; Middle = Middle; Poorer and Poorest = Poor

\*141 cases not included in the analysis

Totals may not equal 100.0 due to rounding off of cases

The logistic regression analyses result shows that women who are in service or trade related occupation are 2.43 times more likely (95% CI 1.761 - 3.368) to use ANC services 4 or more times than those women who are not working. Similarly women's husband whose occupation is agriculture and trade/business is 2.43 and 1.04 times respectively are more likely to utilize ANC 4 or more times than those whose husbands are not working. Likewise, women from rich categories are 6.44 times more likely (95% CI 5.291 - 7.852) to utilize ANC 4 or more times than the women from poor category. Women from middle category are also 1.8 times more likely (95% CI 1.535 - 2.217) to utilize ANC services 4 or more times than women who belong to poor category (Table 7).

## 5. Concluding Remarks

In 2011 about one-half (52.7%) of the women have sought 4 or more ANC visits, about one-third (33.2%) have up to three visits, nearly 6 percent receives the care only once. About 15 percent women have not sought ANC care at all. Based on the age group, about 7 in every 10 women (69.7%) in their 20s (20-29 years) have 4 or more ANC visits in their previous pregnancy. A high percentage of women who are younger at the time of their first child birth (10-14 and 15-19 years) have 4 ANC visits as compared to the pregnant women in their twenties. High percentage of women who have only 1-2 children have few (1-2) young sibling (<5 years of age) have at least 4 ANC visits. A high percentage of women (81%) who have had induced abortion (pregnancy termination) earlier than the last birth also have at least 4 ANC visits. The study finds that young age, age at 1<sup>st</sup> birth, parity and number of children less than 5 years of age have strong effects on the use of 4 or more ANC visits. Young women up to the age of 29 years, who have low parity are more likely to take at least 4 ANC visits. Women who have 1 or 2 children who are <5 years of age are more likely to get at least 4 ANC visits than the women with 3 or more <5 children. The result is significant at 5% level (*See Table 7 in appendix*). The findings especially on the likely effect of young siblings and the number of child women have and history of induced abortion on ANC services utilization 4 or more times is an added dimension to the existing knowledge.

Women's caste/ethnicity, religion, place of residence (rural, urban) and education together have strong effect on the utilization of 4 or more ANC visits. Among the different caste/ethnic groups, Newar and Brahmin/Chhetri and other caste groups are more likely to use at least 4 ANC than women from Tarai, Janjati and Muslim groups. Hindu women are 1.5 times more likely to take recommended ANC visits than women from non-Hindu groups. Place of residence also has significant effect as women residing in urban areas are more likely to utilize at least 4 ANC visits. Women with higher level of education are more likely to utilize at least 4 ANC than women with no education. It is observed that husband education does not have much effect on the use of ANC. Access to media shows strong effect on the utilization of ANC services. Overall, the likelihood of ANC service utilization 4 or more times is strong among women who have access to all three media channels than the women who have no access to these media channels. The finding on the effect of place of residence on ANC utilization is consistent with the finding of studies conducted in Nepal and other countries (Kaule-sabiti, *Acheampong & Ngake, 2014*; Rahman, 2009; Kulkarni & Nimbalkar, 2008; Baral, Lyons, Skinner, & VanTeijlingen, 2012). The other social variables like level of women's education and access to media also have shown strong effects in Nepal which is

confirmed by a study conducted in Nepal by Deo et al. (2015). Strong effect of educational level on ANC utilization is also found in Ethiopia (Tura, Afework & Yalew, 2014).

The study finds that women who are in service or trade related occupation are more likely to use ANC services 4 or more times than women whose occupation is agriculture, manual work or who are not working. Women from rich categories are more likely to utilize ANC 4 or more times than the women from poor category. Women from middle category are also more likely to utilize ANC services 4 or more times than poor category women. Similar finding is drawn in the analysis of a cross sectional quantitative study conducted in Sunsari district of eastern Nepal (Deo et al., 2015).

The analysis shows large variations and gaps in the utilization of ANC at least 4 times on the basis of demographic, social and economic characteristics of women such as women's age, parity and age at 1<sup>st</sup> childbirth, caste/ethnicity and levels of education, employment status, household wealth and many others. Against this finding, the study recommends implementation of appropriate policy and program measures by the government and other agencies to address the existing variations and gaps in ANC services utilization among various sub-groups of women. Moreover, further in-depth research, both qualitative and quantitative, that address the demographic, social and economic diversity are recommended to be implemented which could help in understanding people's knowledge, attitudes, and practices on ANC care. These researches also need to focus on the existing barriers in safe motherhood service utilization in Nepal, especially among the women who are disadvantaged and marginalized.

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**Appendix: 1****Table 7: Effects of selected economic variables on utilization of ANC 4 or more times in Nepal using logistic regression**

<b>Variable name</b>	<b>Odds ratio (OR)</b>	<b>Confidence interval (CI)</b>	<b>P value</b>
<b>Respondent's Occupation</b>			
Manual	1.048	.703 - 1.560	0.819
Service/trade	2.436	1.761 - 3.368	0.000
Agriculture	.554	.462 - .665	0.000
Not working	Ref.	--	--
<b>Husband's Occupation</b>			
Service/trade	1.578	1.285 - 1.938	0.000
Agriculture	3.747	3.067 - 4.578	0.000
Not working	Ref.	--	--
<b>Respondent's Employment</b>			
Yes	.854	.733 - .996	0.044
No	Ref.		
<b>Household wealth Status</b>			
Rich	6.445	5.291 - 7.852	0.000
Middle	1.845	1.535 - 2.217	0.000
Poor	Ref.	--	--
Calculated from NDHS 2011 data files Weights are applied Ref: Reference category			