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ABSTRACT

The purpose of this study is to examine the effect of internal migration on the use of reproductive and maternal health services in Nepal, using data from the 2016 Nepal Demographic and Health Survey. The study population is married women age 15-49. The study used descriptive and logistic regression analysis, with three outcome measures: current use of modern contraception, at least four antenatal care visits, and place of delivery.

Overall, 44% of eligible women reported current use of modern contraception, 71% of women made at least four antenatal visits, and 58% of women delivered their most recent birth in the past 5 years in a health facility. Our findings show that, after adjusting for background characteristics, women who are recent migrants to the current district (arrived 0-4 years ago) have lower odds of using modern contraceptives, higher odds of attending at least four antenatal visits, and higher odds of delivering in a health facility. By migration streams, modern contraceptive use is significantly higher among urban-to-urban migrants and urban non-migrant women. Urban-to-urban migrant women and rural-to-urban migrant women have significantly higher odds of attending at least four antenatal visits for the most recent birth compared with rural-to-rural migrant women. Women who moved between urban areas, women who moved from an urban to a rural area, women who moved from a rural area to an urban area, and urban non-migrants are significantly more likely to deliver in a health facility compared with women who moved between rural areas.

Several socioeconomic and demographic factors are also significant in their association with contraceptive use, antenatal visits, and place of delivery. These differences by internal migration status should be considered in reproductive and maternal health services interventions.

KEY WORDS: Migration, migration streams, migrant, non-migrant, contraceptive use, antenatal care, duration of stay, place of delivery

1 INTRODUCTION

Nepal is a landlocked country, sandwiched between two giant nations—China in the north and India in the south. This is a country of multi-ethnic, multi-lingual, multi-religious, and geographical diversity. Nepal's environmental, socioeconomic, demographic, cultural, and religious characteristics vary from one region to another. Migration is not new phenomenon in Nepal; it has existed since early days, when more people moved from western to eastern parts of the country (Subedi 1988). Since 1950, with the control of malaria in Terai region, people have been migrating from Mountain and Hill regions to Terai region (Gurung 1998). Nepal has been experiencing a rapid increase in the volume of internal migration over the last 30 years. The volume of interdistrict lifetime migrants in Nepal increased from 9% in 1981 to 15% in 2011. Similarly, the volume of inter-regional lifetime migrants increased from 7% in 1981 to 10% in 2011 (KC 2003, Suwal 2014). Census data show that most internal migration in Nepal occurs from Hill to Terai regions, and from rural to urban areas (UNFPA Nepal 2017).

Internal migration has been an integral part of socioeconomic transformation in a country. Managed internal migration can bring benefits for countries as well as individuals. Poorly managed internal migration, however, can result in various difficulties, including reproductive and maternal health problems. Internal migration has both a direct and indirect impact on population dynamics. Changes in population structure and distribution are direct impacts of migration, whereas behavioral changes among migrants are an indirect impact. When people migrate, they may interact with new social, cultural, and economic environments that could offer them different opportunities for health services, or could change their thinking and behavior related to using reproductive and maternal health services.

Internal migration can be classified into four groups: rural-to-rural, rural-to-urban, urban-to-urban, and urban-to-rural. Of these, rural-to-rural migration and rural-to-urban migration are the most prominent migration streams in Nepal. Internal migration is the largest contributor to urban growth (Ministry of Urban Development 2017); other contributors are an increase in the number of municipalities and expansion of urban areas.

Types of migration and health are interconnected in different ways. Migrants are a more vulnerable group for reproductive and maternal health problems, which pose different challenges to meeting their medical needs (Evans 1987). The negative effects of migration are more prominent for women than men (Adanu and Johnson 2009), although the effect of migration (internal and international) on migrants' health is complex, and variations exist between migrant groups. The effect of migration on health outcomes varies according to who migrates, when they migrate, where they migrate from, where they migrate to, and what health outcome is measured (McKay, Macintyre and Ellaway 2003). Nepal has witnessed a significant moment in its history, in which the country has transitioned into a new political system, from a kingship to federal system. During this transitional period, Nepal has been experiencing different socioeconomic and political obstacles as well as different challenges, including the destructive earthquake on 25 April 2015, which may have had an effect on reproductive health among migrant women. Research on the use of reproductive and maternal health services has been given prime priority in Nepal. Very little research, however, has been conducted in relation to migration and use of reproductive and maternal health services in the context of Nepal.

In the literature, three theoretical explanations have been used to explain the cause of differentials in use of reproductive and maternal health services between migrant and non-migrant women: selection, adaptation, and disruption. The selection theory explains that, outside of natural disasters, migrants are not randomly selected, but rather are selected on the basis of background characteristics such as age, education, and occupational status. Adaptation is the process of change in the migrants' attitudes, values, culture, beliefs, and behaviors in line with their new environment. Adaptation in the new environment depends on the migrants' sociocultural and economic background. Migration disruption refers to separation of spousal partners, family members, and relatives immediately after migration (Lindstrom 2003; Chattopadhyay, White and Debpuur 2006; Santelli, Abradio-Lanza and Melnikas 2009; Ochako et al. 2016).

In Nepal a Demographic and Health Survey has been conducted every 5 years since 1996. Data from these five Nepal DHS show that the use of modern contraceptive methods has increased, from 26% in 1996 to 43% in 2016. Over the past 20 years, the percentage of women who had at least four ANC visits during their pregnacy has also increased, from 14% in 2001 to 69% in 2011. Similarly, the percentage of women who delivered in a health facility has increased significantly, from 8% in 1996 to 57% in 2016.

A study in Peru shows that rural migrant women face different problems in their health needs compared with non-migrant women. The study further shows that rural migrant women are less likely to use modern contraceptive methods and to receive appropriate ANC compared with urban non-migrant women. The study further pointed out that rural migrant women are more likely to have only a primary level of education, to have no health insurance, and to be in the lowest wealth category compared with urban migrants and urban non-migrants (Subaiya 2007).

A study in Myanmar showed that female internal migrants had better reproductive health outcomes compared with non-migrants (Sudhinaraset, et al. 2016). Another study in Bangladesh showed that women who migrated to urban areas were significantly less likely than non-migrants to use reproductive health services related to pregnancy and ANC, or to use modern contraceptives (Islam and Gagnon 2016). Studies in Chinese contexts found that internal migrants used ANC significantly less than non-migrants (Shaokang, Zhenwei and Blas 2002). A hospital-based cross-sectional study on ANC use showed that rural-to-urban migrant women did not receive adequate antenatal care. Inadequate use of ANC is associated with low socioeconomic status and with demographic factors (Zhao et al. 2012). A study in Guatemala showed that current use of modern contraceptives was positively associated with women's education. The study also found that urban non-migrants were more likely to use modern contraception compared with rural non-migrants (Lindstrom and Hernandez 2006).

1.1   Research Question

What are the net associations between the internal migration status of women and reproductive and maternal health outcomes?

1.2   Objectives

- To analyze the use of reproductive and maternal health services by duration of residence, migration streams, and background characteristics of women age 15-49.

- To examine the effects of duration of stay on the use of reproductive and maternal health services.

- To examine the effects of migration streams on the use of reproductive and maternal health services.

1.3 Conceptual Framework

Women's use of reproductive and maternal health services is determined by various factors. The conceptual framework of the study explains the interconnections between reproductive and maternal health services, duration of stay, migration streams, and background variables. Modern contraceptive use, ANC visits, and place of delivery are dependent variables, which are influenced by duration of residence and migration streams. Women's age, education, caste/ethnicity, residence, occupation, and wealth status are socioeconomic and demographic factors that also affect the use of reproductive and maternal health services. Figure 1 depicts the hypothesized relationship between migration variables, background characteristics, and outcomes.

Figure 1   Conceptual framework of the study
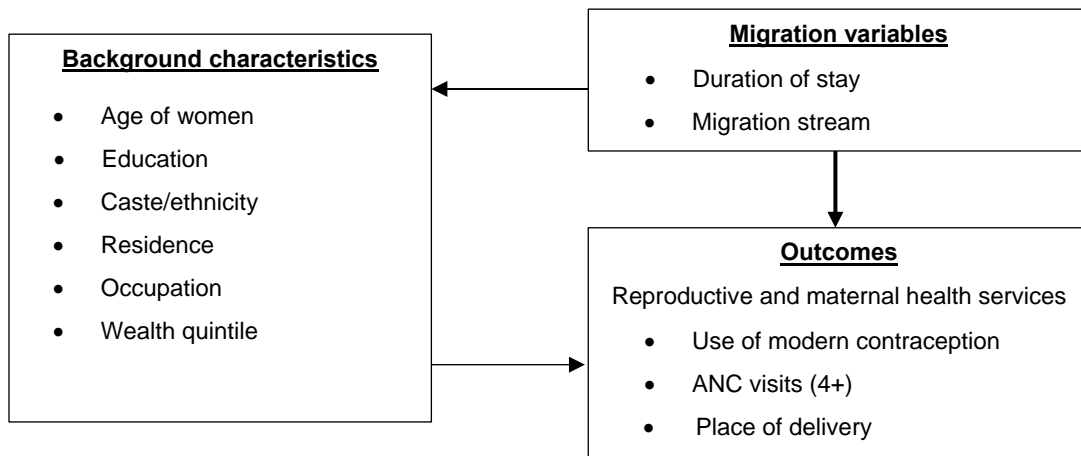
2 DATA AND METHODS

2.1 Data

This study used data from the 2016 Nepal Demographic and Health Survey. The NDHS is the fifth and most recent Demographic and Health Survey conducted in Nepal, and is a nationally representative population-based survey. The survey was conducted under the aegis of the Ministry of Health, Government of Nepal, with the financial support of the United States Agency for International Development (USAID) and technical assistance from ICF through The DHS Program. The survey involved the use of two-stage sampling in rural areas and three-stage sampling in urban areas. In rural areas, wards were selected as primary sampling units (PSUs), and households were selected from the sample PSUs. In urban areas, wards were selected as PSUs, one enumeration area (EA) was selected from each PSU, and households were selected from the sample EAs. In this survey, 11,473 households were selected for the sample, of which 11,040 households were interviewed. Likewise, 13,089 women age 15-49 were identified for individual interviews, and 12,862 were successfully interviewed, yielding a 96% response rate.

The United Nations recommends that migration data should be collected from four routine direct questions on place of birth, place of last residence, duration of residence, and place of last residence at fixed prior date (United Nations 2008). Based on a single question, "How long have you been living in this place?" it is possible to identify whether a respondent is a migrant or not. Persons who have lived in the current place all their lives are considered to be non-migrants, while those who have moved to the area are considered as migrants (United Nations 1970). With this theoretical consideration, reports on current place of residence and previous place of residence are taken into account in identifying migration variables for the study.

The study population is women age 15-49. In order to ensure uniform comparisons, we excluded women who were temporary visitors to the surveyed household (n=410) and women who stated that they had moved to the area from abroad (n=685). The total weighted number of internal migrants and non-migrant women eligible for the study is 7,876 and 3,791 respectively.

The sample population is different for modern contraceptive use than for ANC visits and place of delivery. The sample population for modern contraceptive use is restricted to the 8,937 (weighted) women who are currently married. The total weighted number of analytic sampled population for ANC visits and place of delivery is 3,300 women. Women whose most recent birth was longer ago than the year they moved to the district (n=283) are excluded from the analysis. The sample populations for each outcome are given in Table 1.

Table 1   The sample population for each outcome of the study

Outcomes	Description	Exclusion criteria	Sample population
Modern contraceptive use	Women who are currently married and are using any modern contraceptive methods	Unmarried women; household visitors, and those who moved to the district from abroad	8,937
At least four ANC visits	Women who attended at least four ANC visits for the most recent birth in the 5 years preceding the survey	Unmarried women; household visitors, those who moved to the district from abroad; women who have not given birth in the past 5 years; women whose most recent birth was longer ago than the year they moved to the district.	3,300
Delivered in heath facility	Women who delivered in a health facility for the most recent birth in the 5 years preceding the survey	Unmarried women; household visitors and those who moved to the district from abroad; women who have not given birth in the past 5 years; women whose most recent birth was longer ago than the year they moved to the district.	3,300

2.2   Variables

2.2.1   Dependent variables

The study has three dependent variables. The first is current use of modern contraception. This variable is coded as a binary outcome for whether using modern contraception, including male sterilization, female sterilization, injectables, intrauterine devices (IUD), pill, implants, male condoms, lactational amenorrhea, and emergency contraception. Traditional and folkloric method users were classified as nonusers.

The second dependent variable is ANC visits for the last pregnancy in the five years before the survey. The World Health Organization (WHO) recommends that women attend at least four ANC visits as a necessary part of maternal health care (World Health Organization 1994). The number of ANC visits is coded as 'yes' for women with at least four ANC visits before their most recent (4+ ANC visits), and coded as 'no' if there were fewer than four visits.

The third dependent variable is place of delivery for the most recent birth in the last five years before the survey. It is categorized into the binary outcome 'health facility' and 'home/elsewhere'. The place of delivery is coded as 'yes' for health facility and 'no' for home/elsewhere.

2.2.2   Independent variables

The independent variables used in this study were selected based on the proposed conceptual framework. The migration-related variables are duration of stay and migration streams. The study also considered six background characteristics of the sampled women.

Migration variables: The 2016 NDHS asked the question: "How long have you been living continuously in the current place of residence?" Those women who answered "always" are treated as "non-migrants," while those women who reported "number of years lived in current place of residence" are considered as "migrants" if they changed place of residence across district boundaries. Women who reported themselves to be "visitors" were excluded from the analysis. Women who reported previous place of residence as 'abroad' are not included in the analysis. A further question was asked on previous place of residence before

moved to current place of residence. This information was used to generate six categories of migration streams: urban-to-urban (U-U), urban-to-rural (U-R), rural-to-urban (R-U), rural-to-rural (R-R), urban non-migrant, and rural non-migrant. A woman who reported previous place of residence as rural and current place of residence as urban is classified as a rural-to-urban migrant. Similarly, a woman who reported always lived in the current place is considered as non-migrant, either urban or rural. Duration of stay is classified on the basis of number of years lived in the current place. Duration of stay is classified in three categories: less than 5 years, 5-9 years, and more than 10 years.

Background variables: The background variables included in this study are women's age, education, caste/ethnicity, residence, occupation, and wealth quintile. Wealth quintile is a composite measure of household living standard. Data on household assets were collected in the NDHS. Household wealth index was constructed using household assets data, including ownership of a number of consumer items ranging from a television to a bicycle or car, and such housing characteristics as sources of drinking water, sanitation facilities, fuel used for cooking, room used for sleeping, types of materials used for flooring, and ownership of agricultural land (Ministry of Health, New ERA, and ICF 2017). Women's age is categorized into four groups—15-19, 20-29, 30-39, and 40-49. In the NDHS, caste/ethnicity has 11 categories. However, for a better explanation, we grouped the variable into five categories where Brahman/Chhetri included Hill Brahanan, Hill Chhetri and Terai Brahman/Chhetri; Dalit included Hill Dalit and Terai Dalit; Janajati included Newar, Hill Janajati and Terai Janajati; and Muslim included Muslim and others. The variable occupation has eight categories. This variable is grouped in three categories—not working, agriculture, and nonagriculture, where the nonagriculture group included professional/technical, clerical, sales/services, skilled manual, unskilled manual, and others.

2.3 Statistical Analysis

This study employed three levels of statistical analysis. First, descriptive statistical techniques were used at the univariate level to analyze selected background characteristics of study population of women age 15-49. Second, to examine the association between outcome variables and selected background variables of women age 15-49, chi-square tests were conducted at the bivariate level. Results are considered significant at $p<0.05$. Third, logistic regression procedures were employed to examine the effects of duration of stay and migration streams on the three outcome variables related to reproductive and maternal health services: modern contraceptive use, at least four ANC visits, and health facility delivery.

Adjusted logistic regression models were carried out to examine the association of duration of stay and migration streams with the reproductive and maternal health outcomes. This model also analyzes the effect of duration of stay and migration streams on the outcomes in the presence of the selected background characteristics—women's age, education, caste/ethnicity, residence, occupation, and wealth quintile. The results are presented in odds ratios (OR). All the analyses were performed using STATA version 15.1. The complex sample design of the NDHS was taken into consideration.

3 RESULTS

3.1 Background Characteristics of Study Population

Background characteristics of the study population of women age 15-49 are given in Table 2. The table shows that one-third of the women are age 20-29 and about one-quarter are age 30-39, while 21% are age 15-19, and 20% are age 40 and above. Regarding education, 33% of women have no education, 26% have completed secondary level of education, and 25% have attained at least a School Leaving Certificate (SLC) level of education. Janajati (37%) and Brahman/Chhetri (33%) are the dominant caste/ethnicity of the study population. Nearly two-thirds of women (63%) are urban residents. In considering occupation status, 32% of women are not working and about 48% are working in agriculture. The study population is more or less evenly distributed across the wealth quintiles, with 18% of women in the lowest quintile and 22% in the highest. In all, a majority of the study population is under age 30, educated, of Janajati or Brahman/Chhetri caste/ethnicity, urban, and engaged in agriculture.

Table 2   Background characteristics of the study population

Percent distribution of women age 15-49 by selected background characteristics, Nepal DHS 2016		
Background characteristics	**Percent**	**Total (N)**
Age group		
15-19	20.7	2413
20-29	33.4	3901
30-39	26.2	3062
40-49	19.6	2290
Education		
No education	32.8	3826
Primary	16.6	1938
Secondary	25.9	3026
SLC and above	24.7	2877
Ethnicity		
Brahman/Chhetri	33.0	3845
Terai caste	13.3	1552
Dalit	12.4	1444
Janajati	37.0	4317
Muslim	4.4	509
Residence		
Urban	63.3	7382
Rural	36.7	4285
Occupation		
Not working	31.5	3677
Nonagriculture	20.3	2374
Agriculture	48.1	5615
Wealth quintile		
Lowest	17.7	2063
Second	19.8	2312
Middle	19.9	2321
Fourth	21.0	2451
Highest	21.6	2519
Total	**100.0**	**11667**

3.2 Background Characteristics of Study Population by Duration of Stay

Table 3 presents the percentage distribution of women age 15-49 by socioeconomic and demographic characteristics according to duration of stay. The table and Figure 2 show that 67% of women have migrated at least once, while 33% are non-migrants. Thirty-five percent of women have been living at their current location for 10 years or more, 19% for less than 5 years, and 14% for 5-9 years.

By age, as Table 3 shows, 64% of women age 15-19 are non-migrants, while 26% of women in this age group have lived in their present location less than 5 years. Similarly, 31% of women age 20-29 have lived in their present location less than 5 years. In contrast, a majority of women age 30-39 and age 40-49 have 10+ years duration of stay.

Among women with no education, 58% have at least 10 years duration of stay, as is the case for 38% of women who attained a primary level of education. Among women who completed secondary education, 24% have less than 5 years duration of stay. Similarly, 29% of women who attained at least the SLC level have less than 5 years duration of stay. Among the caste/ethnic groups, 47% of women of the Tarai caste have 10+ years duration of stay, followed by Dalit, Muslim, Brahman/Chhetri, and Janajati. Over a third of both urban women (34%) and rural women (38%) have lived in the same place for at least 10 years. Among nonworking women, 28% have 10+ years duration of stay, as do 33% of women engaged in nonagricultural work, and 41% of women engaged in agriculture. A comparatively higher proportion of women in the lowest wealth quintile are non-migrants. A higher proportion of women in the second, middle, fourth, and highest wealth quintiles have been living in their current location 10+ years.

Figure 2   **Percentage distribution of women age 15-49 by duration of stay, Nepal DHS 2016**
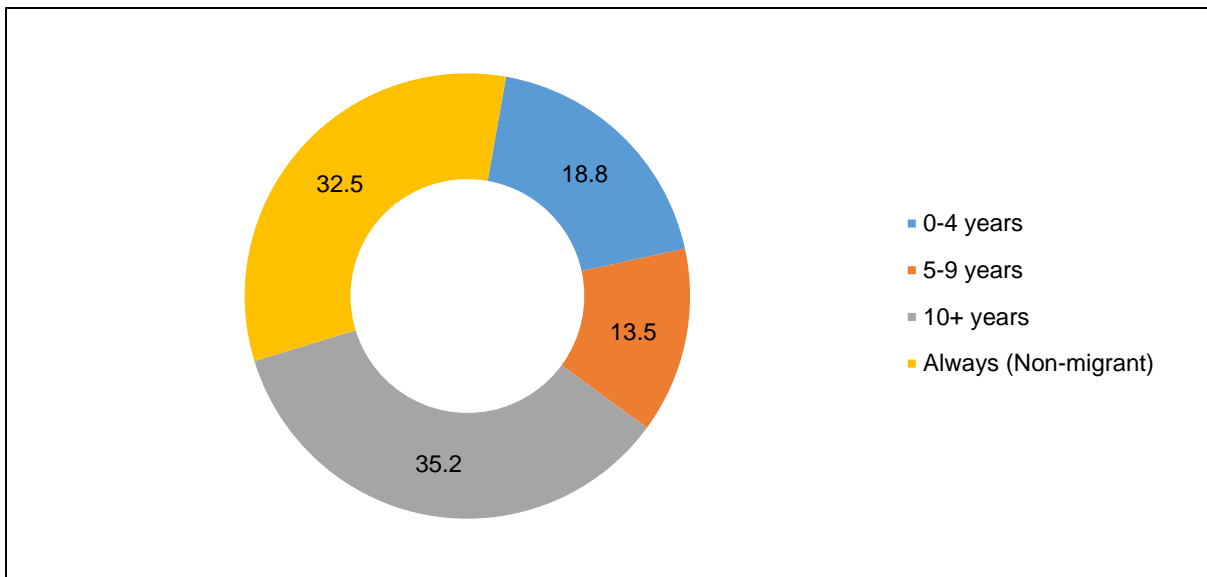
Table 3   Duration of stay

Percent distribution of women age 15-49 by selected background characteristics and duration of stay, Nepal DHS 2016

Background characteristics	Duration of stay				
	0-4 years	5-9 years	10+ years	Always (Non-migrants)	p-value
Age group					
15-19	25.9	3.9	5.7	64.4	<0.001
20-29	31.1	26.3	15.4	27.1	
30-39	8.0	11.2	59.2	21.6	
40-49	4.5	4.9	68.1	22.5	
Education					
No education	8.0	9.3	57.9	24.8	<0.001
Primary	17.0	17.2	37.8	28.1	
Secondary	23.9	14.3	20.9	40.8	
SLC and above	28.9	15.7	18.5	37.0	
Ethnicity					
Brahman/Chhetri	20.5	15.4	35.1	29.0	<0.001
Terai caste	15.8	15.4	47.4	21.4	
Dalit	19.0	12.4	38.1	30.5	
Janajati	18.5	12.0	30.0	39.5	
Muslim	16.2	9.2	36.0	38.7	
Residence					
Urban	20.6	14.3	33.9	31.2	<0.001
Rural	15.6	12.1	37.6	34.7	
Occupation					
Not working	25.5	15.7	27.8	30.9	<0.001
Nonagriculture	22.8	15.5	33.1	28.6	
Agriculture	12.6	11.2	41.0	35.2	
Wealth quintile					
Lowest	12.2	9.0	32.7	46.2	<0.001
Second	15.3	11.7	36.8	36.2	
Middle	16.8	14.1	38.4	30.7	
Fourth	26.2	14.3	33.9	25.6	
Highest	21.9	17.5	34.4	26.1	
Total	**18.8**	**13.5**	**35.2**	**32.5**	
N	2189	1576	4111	3791	

3.3   Background Characteristics of Study Population by Migration Streams

Table 4 presents the percentage distribution of women according to migration streams by selected background characteristics. Overall, as the table and Figure 3 show, rural-to-urban and rural-to-rural are the dominant migration streams of women in Nepal. About one-third of women are rural-to-urban migrants, 22% are rural-to-rural migrants, 10% are urban-to-urban migrants, and only 2% are urban-to-urban migrants. Twenty percent of women are urban non-migrants and 13% are rural non-migrants.

As Table 4 shows, among women age 15-19 the highest proportions are urban non-migrants and rural non-migrants, while only 19% are rural-to-urban migrants. Among women age 20-29, 30-39, and 40-49, the highest proportions are rural-to-urban migrants, followed by rural-to-rural migrants. Rural-to-urban migrants tend to have higher percentages at each level of education compared with either urban-to-urban migrants or urban non-migrants. The proportion of women who completed primary, secondary, and SLC and above levels of education account for 36%, 31%, and 33% respectively among all rural-to-urban migrants. Women who attained secondary education and SLC and above education show the highest percentages of rural-to-urban migrants and urban non-migrants.

Figure 3   Percentage distribution of women age 15-49 by migration streams, Nepal DHS 2016
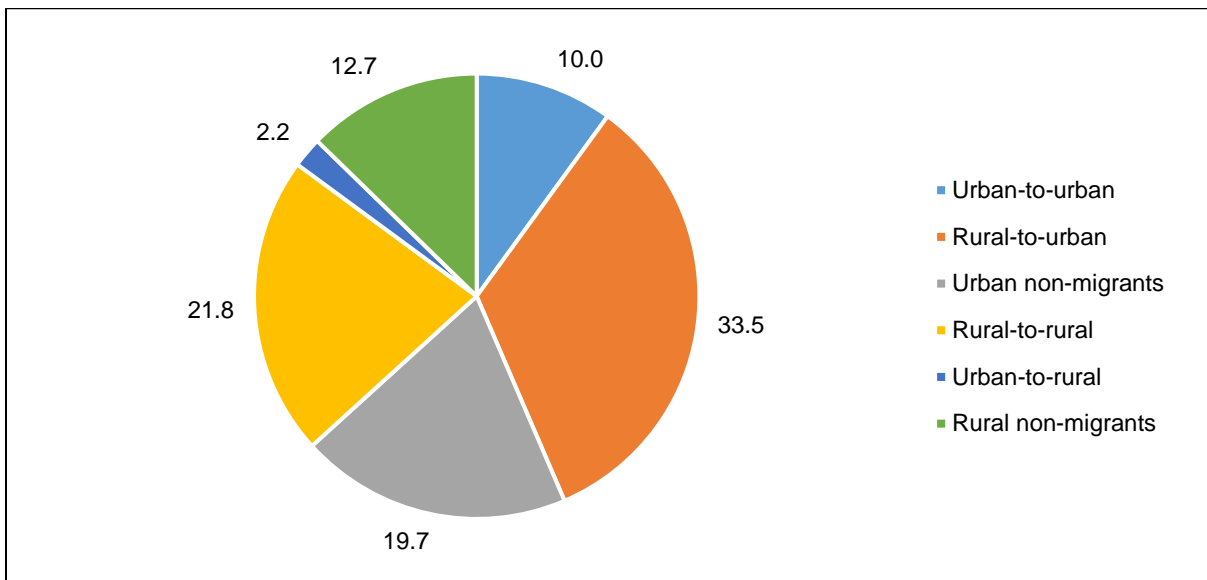
The distribution of women by caste/ethnicity reveals that the highest proportions of women in each caste/ethnicity are rural-to-urban migrants, followed by rural-to-rural migrants. Among nonworking women, 34% are rural-to-urban migrants. Among women engaged in nonagricultural occupations, 36% are rural-to-urban migrants, followed by 22% urban non-migrants and 21% urban-to-urban migrants. Similarly, among women engaged in agricultural occupations, 33% are rural-to-urban migrants and 27% are rural-to-rural migrants. By wealth quintiles, among women in the highest wealth quintile the largest percentages are rural-to-urban migrants, urban-to-urban migrants, and urban non-migrants. In contrast, among women in the lowest wealth quintile the largest percentages are rural-to-rural migrants, followed by rural non-migrants.

Table 4   Migration streams

Percent distribution of eligible women age 15-49 by selected background characteristics and migration streams, Nepal DHS 2016

	Migration streams						
	Current urban residents			Current rural residents			
Characteristics	U-U	R-U	Urban non-migrants	R-R	U-R	Rural non-migrants	p-value
Age group							
15-19	6.3	18.6	37.9	9.6	1.1	26.5	<0.001
20-29	10.8	34.7	17.3	24.6	2.7	9.9	
30-39	10.4	40.1	12.9	25.3	2.6	8.7	
40-49	12.0	38.4	14.0	24.9	2.1	8.5	
Education							
No education	4.9	34.7	13.0	33.9	1.7	11.8	<0.001
Primary	7.4	36.3	15.1	25.4	2.9	13.0	
Secondary	10.3	31.0	24.1	15.7	2.2	16.8	
SLC and above	18.2	32.7	27.3	9.6	2.5	9.6	
Ethnicity							
Brahman/Chhetri	13.4	38.4	17.7	17.3	1.8	11.4	<0.001
Terai caste	4.7	30.1	10.5	39.8	4.0	10.9	
Dalit	6.6	35.0	21.1	25.8	2.1	9.5	
Janajati	10.2	31.2	24.6	17.3	2.0	14.9	
Muslim	9.0	23.1	19.1	26.9	2.4	19.5	
Occupation							
Not working	12.9	33.6	20.1	20.1	2.6	10.8	<0.001
Nonagriculture	20.9	35.5	22.0	12.2	2.8	6.5	
Agriculture	3.5	32.7	18.5	26.9	1.7	16.7	
Wealth quintile							
Lowest	0.8	19.2	17.8	32.5	1.2	28.4	<0.001
Second	2.9	33.5	21.2	24.7	2.7	15.0	
Middle	3.4	34.7	17.2	28.8	2.5	13.5	
Fourth	13.7	36.6	17.5	21.2	2.9	8.2	
Highest	26.5	41.2	24.6	4.4	1.8	1.6	
Total	**10.0**	**33.5**	**19.7**	**21.8**	**2.2**	**12.7**	
N	1166	3912	2304	2539	259	1487	

3.4   Descriptive Analysis of Modern Contraceptive Use, Antenatal Care Visits, and Place of Delivery by Duration of Stay, Migration Streams, and Background Characteristics

Table 5 presents the associations of modern contraceptive use, ANC visits, and place of delivery with duration of stay, migration streams, and other background characteristics. Five of the eight variables—duration of stay, women's age, education, caste/ethnicity, and occupation—are significantly associated with modern contraceptive use. Migration streams, residence, and wealth quintile do not have statistically significant associations with modern contraceptive use. The table shows that use of modern contraception is positively associated with the duration of stay. The percentage use of modern contraception increases with increasing duration of stay (Figure 4). Twenty-five percent of women who moved within the past five

years are using modern contraceptives compared with 55% of women who moved 10+ years ago. There are no significant associations between migration streams and the use of modern contraception. Urban non-migrant women have the highest level of contraceptive use, followed by urban-to-urban migrant women (Figure 5). The use of modern contraception ranges from 41% among urban-to-rural migrants to 48% among urban non-migrants.

Women age 40-49 have the highest percentage of modern contraceptive use (57%), and women age 15-19 have lowest percentage (16%). Regarding education, 53% of women with no education are currently using modern contraception, followed by women with a primary education (43%). The use of modern contraceptives has an inverse relationship with women's level of education. This could be due to the high level of sterilization among less-educated women. Looking at caste/ethnicity, Janajati women have the highest proportion of modern contraceptive use (48%). In contrast, Muslim women (30%) and Brahman/Chhetri women (41%) have relatively low levels of modern contraceptive use. There are significant associations between women's occupation and modern contraceptive use. Levels of modern contraceptive use are higher among working women than nonworking women. Women engaged in an agriculture occupation have a comparatively high level of modern contraceptive use (48%), while non-working women have the lowest level (37%). There are no significant differences in use of modern contraception by wealth quintile or by place of residence.

Eight variables showed a highly significant (p<0.001) association with at least four ANC visits in the chi-square test. Table 5 shows that the highest proportions of attending at least four ANC visits are among women who moved within the past 5 years, and lowest among women who moved 10+ years ago (Figure 4). Overall, 71% of women made at least four ANC visits for the most recent birth. A high proportion of urban-to-urban migrant women (90%) made at least four ANC visits, while the lowest proportion was among rural non-migrant women (61%) (Figure 5).

Table 5　　Current use of modern contraception, antenatal care, and place of delivery

Percentage of eligible women age 15-49 using modern contraception, who had at least four visits for antenatal care, and delivered their most recent birth in the five years preceding the survey in a health facility, according to duration of residence and migration stream categories and selected background characteristics, Nepal DHS 2016

Background characteristics	Modern contraceptive use			4+ ANC visits			Health facility		
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value
Duration of stay									
0-4 years	25.2	[22.3-28.3]	< 0.001	82.1	[78.8-85.0]	< 0.001	76.2	[72.7-79.4]	< 0.001
5-9 years	37.1	[34.0-40.3]		72.7	[69.1-76.0]		58.8	[53.9-63.4]	
10+ years	55.0	[52.7-57.3]		60.8	[56.5-64.9]		43.3	[38.9-47.8]	
Non-migrants	46.4	[43.2-49.7]		68.7	[63.5-73.4]		51.6	[45.5-57.7]	
Migration streams									
Urban-to-urban	45.6	[41.7-49.6]	0.059	89.9	[83.4-94.1]	< 0.001	87.5	[80.3-92.4]	< 0.001
Urban-to-rural	40.7	[33.8-48.0]		71.9	[58.5-82.2]		66.5	[52.6-78.0]	
Rural-to-urban	44.7	[42.1-47.3]		76.4	[72.8-79.6]		67.8	[63.1-72.1]	
Rural-to-rural	40.9	[37.8-44.1]		62.4	[57.7-66.9]		42.7	[38.1-47.4]	
Urban non-migrants	48.4	[43.9-52.9]		76.0	[70.4-80.9]		64.0	[55.5-71.6]	
Rural non-migrants	43.7	[39.4-48.1]		61.0	[52.5-68.8]		38.6	[30.4-47.4]	

Continued…

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Table 5—*Continued*

Background characteristics	Modern contraceptive use			4+ ANC visits			Health facility		
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value
Age									
15-19	15.7	[12.4-19.7]	< 0.001	77.8	[71.4-83.1]	< 0.001	69.7	[62.2-76.3]	< 0.001
20-29	32.6	[30.3-34.9]		72.8	[70.0-75.4]		59.2	[55.6-62.8]	
30-39	52.6	[49.9-55.4]		67.1	[62.5-71.4]		52.1	[47.0-57.0]	
40-49	57.3	[54.3-60.1]		45.6	[35.5-56.0]		31.3	[21.6-43.0]	
Education									
No education	53.4	[50.8-56.0]	< 0.001	52.6	[48.0-57.2]	< 0.001	35.1	[31.0-39.5]	< 0.001
Primary	43.4	[40.3-46.5]		64.8	[60.2-69.2]		47.9	[42.9-52.9]	
Secondary	34.8	[32.3-37.3]		79.6	[76.4-82.5]		68.9	[64.6-72.9]	
SLC and above	35.3	[32.4-38.2]		92.8	[90.4-94.7]		84.6	[80.9-87.7]	
Caste/ethnicity									
Brahman/Chhetri	41.3	[39.1-43.5]	< 0.001	81.0	[77.1-84.3]	< 0.001	69.6	[64.5-74.2]	< 0.001
Terai caste	45.1	[41.6-48.8]		61.4	[54.3-68.1]		43.9	[37.4-50.7]	
Dalit	44.2	[40.4-48.1]		63.1	[57.1-68.7]		46.7	[40.6-52.9]	
Janajati	47.6	[44.7-50.5]		72.6	[68.1-76.6]		60.4	[54.9-65.6]	
Muslim	29.5	[22.8-37.2]		56.5	[41.9-70.1]		42.2	[30.3-55.1]	
Residence									
Urban	45.5	[43.6-47.5]	0.024	78.3	[75.3-81.0]	< 0.001	69.9	[65.7-73.8]	< 0.001
Rural	41.5	[38.6-44.4]		62.6	[58.2-66.8]		43.0	[38.4-47.7]	
Occupation									
Not working	36.5	[34.0-39.0]	< 0.001	69.9	[65.4-74.0]	0.001	61.4	[57.0-65.5]	< 0.001
Nonagriculture	46.3	[43.7-48.9]		81.3	[75.8-85.7]		75.2	[68.3-81.1]	
Agriculture	47.5	[45.0-50.0]		69.0	[65.8-72.0]		49.7	[45.9-53.5]	
Wealth quintile									
Lowest	42.6	[39.2-45.9]	0.538	56.9	[51.8-61.8]	< 0.001	35.0	[29.6-40.8]	< 0.001
Second	45.8	[42.8-48.9]		67.7	[63.1-72.1]		46.8	[42.0-51.5]	
Middle	44.8	[41.7-48.0]		70.3	[64.7-75.3]		58.6	[53.6-63.5]	
Fourth	43.0	[40.0-46.2]		77.9	[73.5-81.8]		70.8	[65.9-75.3]	
Highest	43.6	[40.7-46.6]		90.4	[85.9-93.6]		89.9	[85.0-93.4]	
Total	**44.0**	**[42.4-45.6]**		**71.1**	**[68.5-73.6]**		**57.6**	**[54.4-60.7]**	

The study found that younger women are more likely to make at least four ANC visits compared with older women. About three-quarters (78%) of women age 15-19 made at least four ANC visits for their most recent birth compared with less than half (46%) of women age 40-49. There are significant associations between women's education and ANC visits. As education level increases, the percentage of women making at least four ANC visits increases. About half (53%) of women with no education made at least four ANC visits compared with 93% of women who attained SLC and above education. Regarding caste/ethnicity, Brahman/Chhetri women have the highest proportion making at least four ANC visits, followed by Janajati, Dalit, and Terai caste women. Muslim women have the lowest proportion, making at least four ANC visits (57%). A large proportion of women who live in urban areas (78%) and women engaged in a nonagricultural occupation (81%) reported at least four ANC visits. The proportion of women with at least four ANC visits ranges from 57% in the lowest wealth quintile to 90% in the highest wealth quintile.

Figure 4   **Percentage of eligible women age 15-49 using modern contraception, who had at least four antenatal care visits, and delivered their most recent birth in the 5 years preceding the survey in health facility, by duration of residence, Nepal DHS 2016**
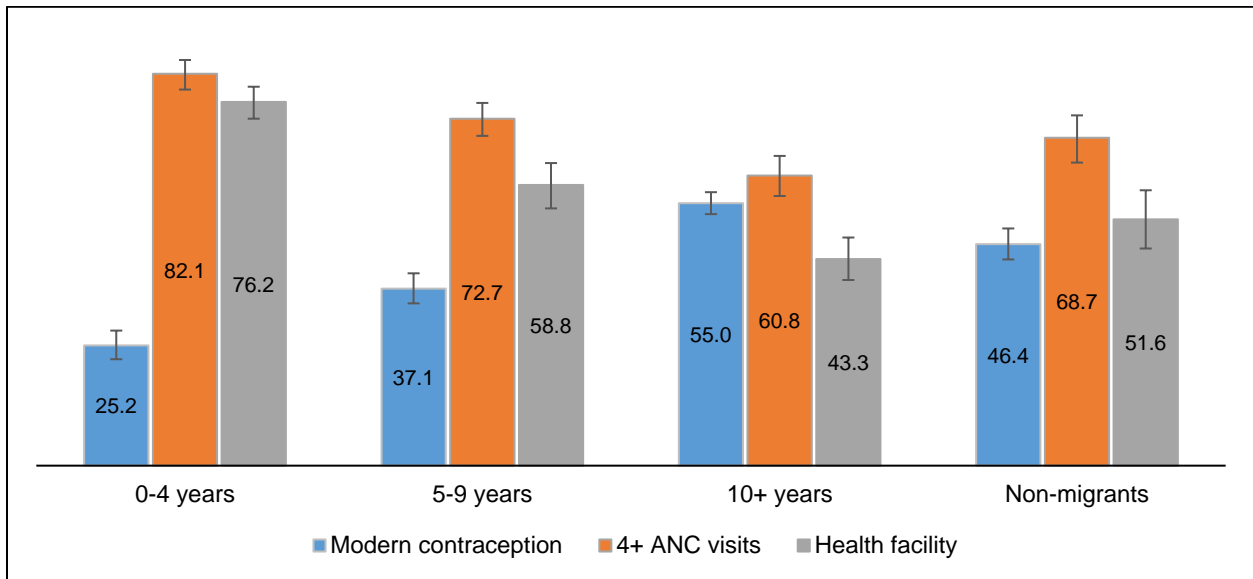
Bivariate analysis shows that eight variables are highly significant (<0.001) for the association with delivery in a health facility. Use of a health facility for the most recent birth is higher among women who moved within the past five years, and lower among women who moved 10+ years ago (Figure 4). By migration streams, 88% of urban-to-urban migrant women delivered in a health facility, over twice the level of rural non-migrants, at 39% (Figure 5).

Figure 5   **Percentage of eligible women age 15-49 using modern contraception, who had at least four antenatal care visits, and delivered their most recent birth in the five years preceding the survey in a health facility, by migration streams, Nepal DHS 2016**
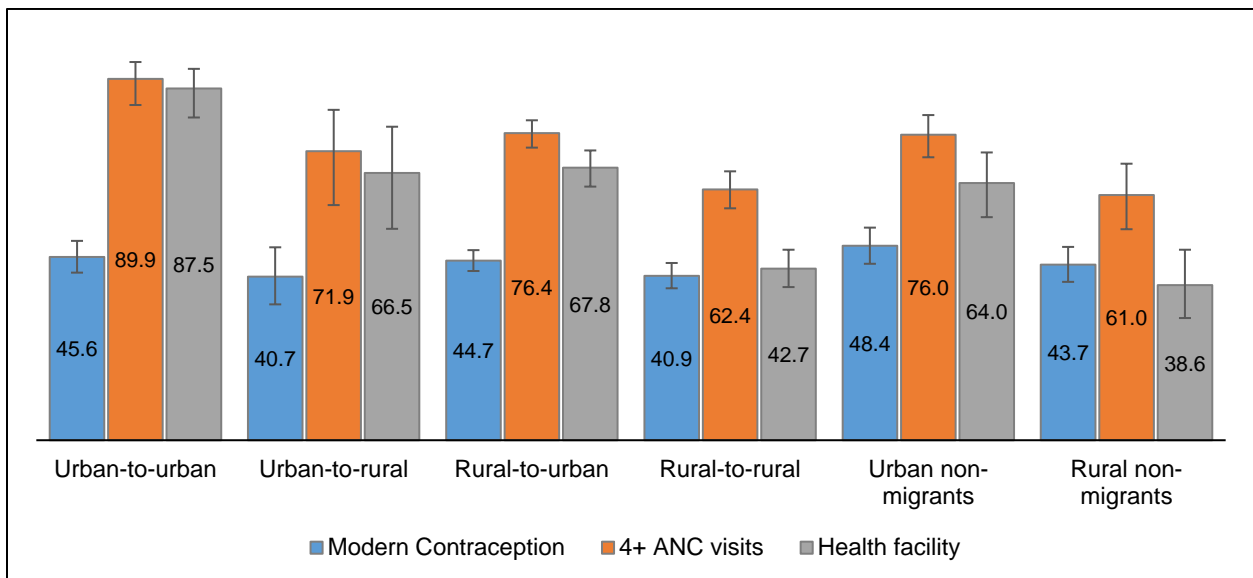
Overall, 58% of women delivered in a health facility. Table 5 shows that younger women are more likely to deliver in a health facility than older women. Seventy percent of women age 15-19 delivered in a health facility compared with 31% of women age 40-49. There is a positive association between women's education and health facility delivery. Women with primary education have the lowest percentage of health facility delivery (48%), whereas women with SLC and above education have the highest percentage (85%). Considering caste/ethnicity, Brahman/Chhetri women have the highest percentage of delivery in a health facility (70%), followed by Janajati (60%). Muslim women have the lowest percentage of health facility delivery (42%). Seventy percent of urban women delivered in a health facility compared with 43% of rural women. Women engaged in a nonagricultural occupation have the highest percentage of delivery in a health facility. By wealth quintile, health facility delivery ranges from 35% in the lowest wealth quintile to 90% in the highest quintile.

3.5   The Effect of Duration of Stay on Modern Contraceptive Use, Antenatal Care Visits, and Place of Delivery

The logistic regression that tests the effect of duration of stay on contraceptive use, ANC visits, and place of delivery is presented in the following sections. The outcome variables are binary, therefore binary logistic regression is used. Adjusted odds are obtained through binary logistic regression of duration of stay in current place of residence, including other background variables with outcome variables (modern contraceptive use, at least four ANC visits, and health facility delivery). The background variables included in the model are women's age, education attainment, caste/ethnicity, place of residence, occupation, and wealth quintile.

3.5.1   The effect of duration of stay on modern contraceptive use

Table 6 presents our examination of the effect of duration of stay on modern contraceptive use. It shows that duration of stay has a significant effect on the use of modern contraception among internal migrant women. The results also show a significant association of age, education, caste/ethnicity (Muslim), residence, occupation, and wealth quintile on modern contraceptive use. After controlling the other variables, the analysis shows that women who moved within the past five years have significantly lower odds of modern contraceptive use (OR=0.59, p<0.001) compared with non-migrant women. Women who moved to their current place 10+ years ago have the highest odds of modern contraceptive use (OR=1.15). A demographic factor, women's age, has significant effects on the likelihood of using modern contraception. Compared with women age 15-19, women age 20-29, 30-39, and 40-49 have, respectively, 1.93 times, 3.22 times, and 3.44 times higher odds of using modern contraception.

Women who attained a primary, secondary, or SLC and above level of education have statistically significant lower odds of modern contraceptive use (OR=0.80, p<0.05; OR=0.66, p<0.001; and OR=0.69, p<0.001 respectively). Modern contraceptive use varies by women's caste/ethnicity. Brahman/Chhetri women are less likely (OR=0.89) to use modern contraception than Dalit women. The odds of modern contraceptive use are 53% lower among Muslim women (OR=0.47, p<0.001) compared with Dalit women. When compared with Dalit women, Janajati and Terai caste women are more likely than Brahman/Chhetri women to use modern contraception. Women who reside in an urban area have 1.22 times higher odds of using modern contraceptives than women who reside in a rural area. A significant association exists between occupation and modern contraceptive use. Women who engage in a nonagricultural occupation have 1.28

times higher odds of using modern contraceptives compared with nonworking women. Similarly, odds of modern contraceptive use are significantly higher among women engaged in an agricultural occupation (OR=1.25, p<0.01). Odds of current use of modern contraceptives are 1.24 times higher (p<0.05) among women in the middle wealth quintile and 1.25 times higher (p<0.05) among women in the fourth wealth quintile compared with women in the lowest wealth quintile.

Table 6   Duration of stay and use of modern contraception, antenatal care visits, and place of delivery

Odds ratio showing association between duration of stay and modern contraceptive use, ANC visits, and delivery in a health facility among women age 15-49, Nepal DHS 2016

Background characteristics	Modern contraceptive use		4+ ANC visits		Health facility	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Duration of stay						
Non-migrants	1.00		1.00		1.00	
0-4 years	0.59***	0.49 - 0.72	1.34*	1.00 - 1.78	2.06***	1.51 - 2.81
5-9 years	0.83	0.69 - 1.00	0.95	0.72 - 1.25	1.02	0.76 - 1.37
10+ years	1.15	0.98 - 1.35	0.85	0.66 - 1.09	0.86	0.64 - 1.15
Age						
15-19	1.00		1.00		1.00	
20-29	1.93***	1.45 - 2.57	0.81	0.55 - 1.21	0.68	0.46 - 1.01
30-39	3.22***	2.28 - 4.55	0.85	0.53 - 1.36	0.74	0.46 - 1.18
40-49	3.44***	2.44 - 4.84	0.57	0.32 - 1.02	0.61	0.30 - 1.23
Education						
No education	1.00		1.00		1.00	
Primary	0.80**	0.68 - 0.94	1.45**	1.13 - 1.87	1.39*	1.08 - 1.80
Secondary	0.66***	0.56 - 0.79	2.26***	1.73 - 2.96	2.13***	1.62 - 2.80
SLC and above	0.69***	0.56 - 0.85	5.33***	3.47 - 8.19	2.98***	2.08 - 4.27
Caste/Ethnicity						
Dalit	1.00		1.00		1.00	
Brahman/Chhetri	0.89	0.73 - 1.08	1.51*	1.07 - 2.14	1.74**	1.19 - 2.55
Terai caste	1.03	0.81 - 1.31	0.73	0.47 - 1.12	0.52**	0.35 - 0.77
Janajati	1.13	0.93 - 1.36	1.05	0.76 - 1.46	1.16	0.82 - 1.62
Muslim	0.47***	0.31 - 0.70	0.67	0.36 - 1.26	0.52*	0.29 - 0.92
Residence						
Rural	1.00		1.00		1.00	
Urban	1.22*	1.04 - 1.44	1.37*	1.06 - 1.77	1.86***	1.43 - 2.43
Occupation						
Not working	1.00		1.00		1.00	
Nonagriculture	1.28**	1.09 - 1.51	1.11	0.79 - 1.56	1.12	0.80 - 1.57
Agriculture	1.25**	1.06 - 1.48	1.41**	1.09 - 1.82	1.03	0.82 - 1.30
Wealth quintile						
Lowest	1.00		1.00		1.00	
Second	1.20	1.00 - 1.44	1.48**	1.12 - 1.96	1.44*	1.06 - 1.95
Middle	1.24*	1.01 - 1.51	2.21***	1.58 - 3.10	3.47***	2.41 - 4.98
Fourth	1.25*	1.01 - 1.54	2.83***	1.97 - 4.07	4.89***	3.36 - 7.13
Highest	1.22	0.96 - 1.56	3.89***	2.30 - 6.59	9.84***	5.56 - 17.41
N	**8937**		**3300**		**3300**	

* p<0.05, ** p<0.01, *** p<0.001

3.5.2 The effect of duration of stay on antenatal care visits

Adjusted logistic regression analysis shows that duration of stay (0-4 years), education, caste/ethnicity (Brahman/Chhetri), residence, occupation (nonagriculture), and wealth quintile have a significant contribution on at least four ANC visits. As Table 6 shows, women who moved within the past five years have statistically significantly higher odds of making at least four ANC visits compared with non-migrant women (OR=1.34, p<0.05). Women who moved 5-9 years or 10+ years ago have lower odds of making at least four ANC visits (OR=0.95 and OR=0.85) compared with non-migrant women. The odds of attending ANC are significantly higher among women with any level of education compared with women who have no education. Women who attained SLC or above level of education have 5.33 times higher odds of attending at least four ANC visits compared with women who have no education (p<0.001). The odds of attending ANC are significantly higher among Brahman/Chhetri women (OR=1.51, p<0.05) compared with Dalit women, women living in an urban area (OR=1.37, p<0.05) compared with rural women, and women engaged in an agricultural occupation (OR=1.41, p<0.01) compared with non-working women. Women in the highest wealth quintile have 3.89 times higher odds of attending at least four ANC visits compared with women in the lowest wealth quintile (p<0.001).

3.5.3 The effect of duration of stay on place of delivery

Table 6 also presents the results of the binary logistic regression conducted for place of delivery and duration of stay with other selected background variables. The results show a significant association between place of delivery and duration of stay (0-4 years), education, caste/ethnicity (Brahman/Chhetri, Terai caste, and Muslim), residence, and wealth quintile (middle, fourth, and highest). Women who moved within the past years have significantly higher odds of delivering in a health facility (OR=2.06, p<0.001) compared with non-migrant women. Compared with uneducated women, the odds of facility delivery are significantly higher among women with SLC and above education (OR=2.98, p<0.001), secondary education (OR=2.13, p<0.001), and primary education (OR=1.39, p<0.05). The higher the level of education, the more likely women are to deliver in a health facility. By caste/ethnicity, the odds of facility delivery are higher among Brahman/Chhetri women (OR=1.74, p<0.01) and lower among women of the Terai caste (OR=0.52, p<0.01) and Muslim women (OR=0.52, p<0.05) compared with the reference group, Dalit. Considering place of residence, women living in urban areas are more likely to deliver in a health facility than women in rural areas. Women in the highest wealth quintile have 9.84 times higher odds of delivering in a health facility compared with women in the lowest wealth quintile. The likelihood of delivering in a health facility increases as the level of household wealth increases.

3.6 The Effect of Migration Stream on Modern Contraceptive Use, Antenatal Care Visits, and Place of Delivery

The following sections present results of logistic regression that tests the effect of migration stream on modern contraceptive use, ANC visits, and place of delivery. Adjusted odds are obtained through binary logistic regression of migration streams including other selected background variables with the outcome variables: modern contraceptive use, at least four ANC visits, and place of delivery.

3.6.1 The effect of migration stream on modern contraceptive use

In Table 7 the results of adjusted logistic regression show that migration streams (urban-to-urban and urban non-migrants), age of women, education, caste/ethnicity (Muslim), occupation, and wealth quintile (second and middle) have significant associations with modern contraceptive use. The odds of modern contraceptive use are higher among urban-to-urban migrants (OR=1.37, p<0.05) and urban non-migrants (OR=1.29, p<0.05) compared with rural-to-rural migrants (Figure 6). Urban-to-rural migrants, rural-to-urban migrants, and rural non-migrants appear more likely to use modern contraception compared with rural-to-rural migrants. However, odds of modern contraceptive use are not statistically significant for these migration streams.

As expected, married women age 40-49 have substantially higher odds of using modern contraception compared with women age 15-19. Women who attained SLC and above level of education have significantly lower odds of modern contraceptive use (OR=0.62, p<0.001) compared with uneducated women. The odds of modern contraceptive use are 37% lower for women who attained a secondary level of education, and 22% lower for women with a primary level of education compared with women who have no education. Regarding caste/ethnicity, the odds of modern contraceptive use are 52% lower for Muslim women compared with Dalit women. The odds of using modern contraceptives are 12% higher for Dalit women compared with Brahman/Chhetri women. Women engaged in agriculture or nonagricultural occupations have significantly higher odds of modern contraceptive use compared with nonworking women. Women in the second and middle wealth quintiles have significantly higher odds of using modern contraception (OR=1.20, p<0.05 and OR=1.24, p<0.05 respectively) compared with women in the lowest wealth quintile.

Table 7   Migration streams and use of modern contraception, antenatal care visits, and place of delivery

Odds ratio showing association between migration streams and modern contraceptive use, ANC visits, and delivery in a health facility among women age 15-49, Nepal DHS 2016

Background characteristics	Modern contraceptive use		4+ ANC visits		Health facility	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Migration streams						
Rural-to-rural	1.00		1.00		1.00	
Urban-to-urban	1.37*	1.06 - 1.77	1.89*	1.02 - 3.50	2.74**	1.46 - 5.11
Urban-to-rural	1.11	0.81 - 1.53	1.04	0.58 - 1.88	1.96*	1.12 - 3.42
Rural-to-urban	1.20	1.00 - 1.45	1.35*	1.02 - 1.78	1.92***	1.43 - 2.58
Urban non-migrants	1.29*	1.02 - 1.64	1.40	0.97 - 2.01	1.60*	1.09 - 2.33
Rural non-migrants	1.12	0.94 - 1.34	1.03	0.74 - 1.42	0.94	0.66 - 1.33
Age						
15-19	1.00		1.00		1.00	
20-29	2.33***	1.75 - 3.11	0.67*	0.47 - 0.97	0.47***	0.32 - 0.69
30-39	4.77***	3.40 - 6.69	0.64*	0.41 - 0.99	0.42***	0.27 - 0.66
40-49	5.24***	3.77 - 7.28	0.43**	0.24 - 0.75	0.35**	0.17 - 0.70
Education						
No education	1.00		1.00		1.00	
Primary	0.78**	0.67 - 0.91	1.47**	1.14 - 1.89	1.40*	1.07 - 1.82
Secondary	0.63***	0.53 - 0.74	2.36***	1.81 - 3.08	2.29***	1.75 - 3.01
SLC and above	0.62***	0.51 - 0.76	5.74***	3.72 - 8.85	3.38***	2.37 - 4.82

Continued…

Table 7—*Continued*

Background characteristics	Modern contraceptive use		4+ ANC visits		Delivered in health facility	
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI
Caste/ethnicity						
Dalit	1.00		1.00		1.00	
Brahman/Chhetri	0.88	0.72 - 1.07	1.54*	1.09 - 2.17	1.78**	1.22 - 2.61
Terai caste	1.09	0.86 - 1.38	0.72	0.47 - 1.11	0.50***	0.34 - 0.75
Janajati	1.09	0.91 - 1.32	1.08	0.78 - 1.49	1.21	0.86 - 1.70
Muslim	0.48***	0.32 - 0.71	0.68	0.37 - 1.26	0.52*	0.30 - 0.92
Occupation						
Not working	1.00		1.00		1.00	
Nonagriculture	1.30**	1.11 - 1.53	1.06	0.76 - 1.49	1.04	0.75 - 1.45
Agriculture	1.32**	1.12 - 1.56	1.36*	1.06 - 1.76	0.97	0.77 - 1.21
Wealth quintile						
Lowest	1.00		1.00		1.00	
Second	1.20*	1.00 - 1.44	1.47**	1.11 - 1.94	1.41*	1.04 - 1.91
Middle	1.24*	1.01 - 1.52	2.19***	1.57 - 3.07	3.35***	2.32 - 4.82
Fourth	1.20	0.97 - 1.48	2.81***	1.94 - 4.06	4.73***	3.22 - 6.95
Highest	1.19	0.92 - 1.53	3.64***	2.21 - 6.00	8.69***	4.86 - 15.52
N	**8937**		**3300**		**3300**	

* p<0.05, ** p<0.01, *** p<0.001

Figure 6   Adjusted odds ratio of modern contraceptive use and 95% confidence interval by migration streams
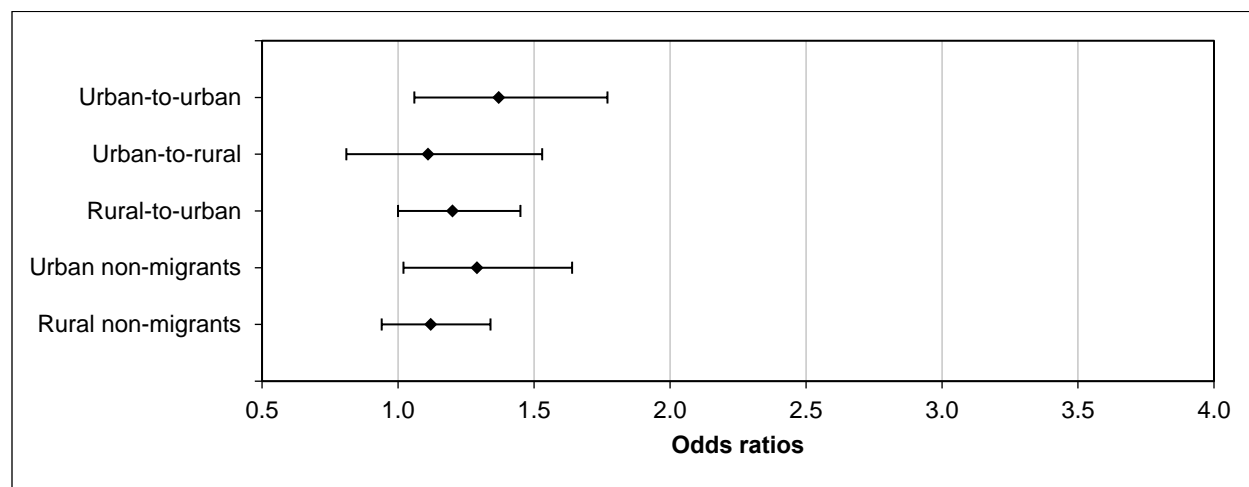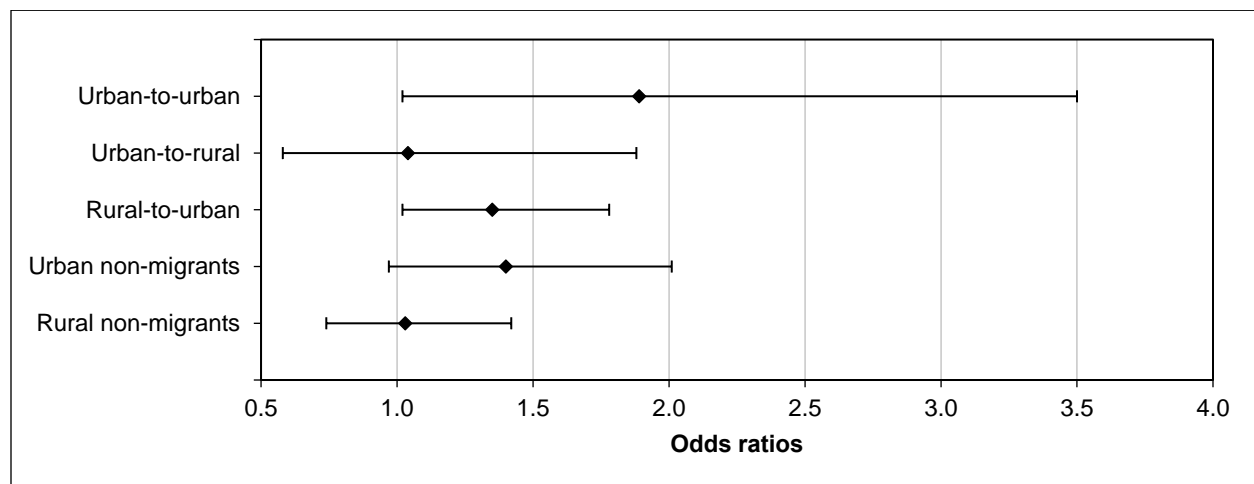

Note: Based on Table 7
Rural-to-rural migration is reference.

3.6.2   The effect of migration stream on antenatal care visits

Concerning the effect of migration streams on ANC visits, Table 7 shows that urban-to-urban migrant women have statistically significant higher odds of ANC visits (OR=1.89, p<0.05), as do rural-to-urban migrant women (OR=1.35, p<0.05), compared with rural-to-rural migrant women. Considering other

background variables, there are statistically significant associations between women's age, education, and wealth quintile and attending at least four ANC visits. Women age 40-49, 30-39, and 20-29 have statistically significant lower odds of ANC visits (OR=0.43, p<0.01; OR=0.64, p<0.05; and OR=0.67, p<0.05 respectively) compared with young women age 15-19. The odds of receiving ANC are significantly higher among women with SLC and above education (OR=5.74, p<0.001), secondary education (OR=2.36, p<0.001), and primary education (OR=1.47, p<0.01) compared with women with no education. Brahman/Chhetri women have 1.54 times higher odds of attending at least four ANC visits compared with Dalit women. Women engaged in agriculture have significantly higher odds of ANC visits compared with nonworking women (OR=1.36, p<0.05). There is also a statistically strong association between wealth quintile and ANC visits. Women in the highest wealth quintile are 3.64 times more likely to make at least four ANC visits compared with women in the lowest wealth quintile.

Figure 7   **Adjusted odds ratio of four or more antenatal care visits and 95% confidence interval by migration streams**

Note: Based on Table 7
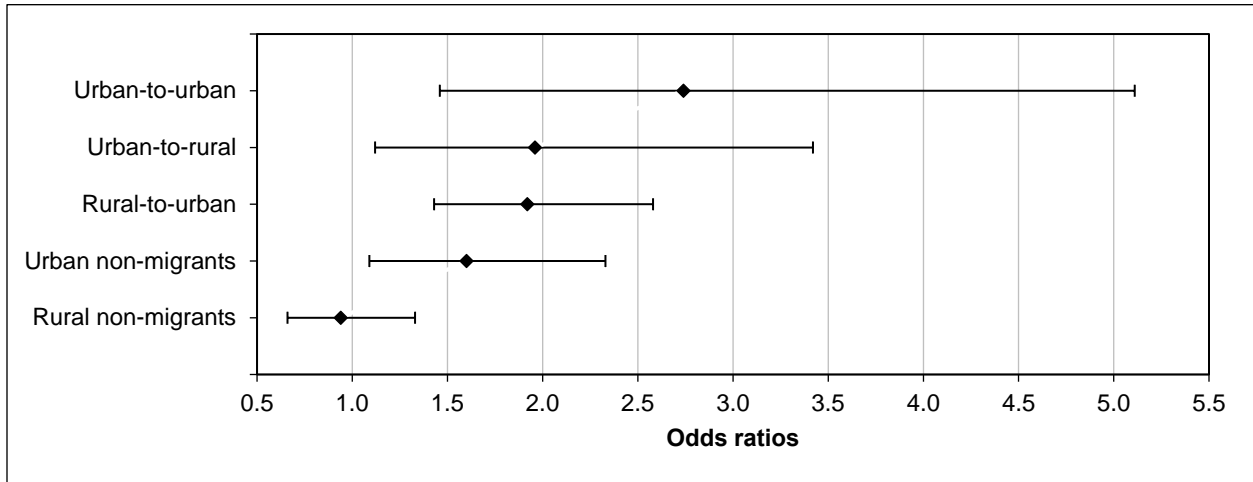Rural-to-rural migration is reference.

3.6.3   The effect of migration stream on place of delivery

Table 7 also shows that migration streams have a statistically significant association with place of delivery. Urban-to-urban migrants, rural-to-urban migrants, urban-to-rural migrants, and urban non-migrants have statistically significant higher odds of facility delivery (OR=2.74, p<0.01; OR=1.92, p<0.001; OR=1.96, p<0.05 and OR=1.60, p<0.05 respectively) compared with rural-to-rural migrant women. Rural non-migrants have lower odds of health facility delivery (OR=0.94) compared with rural-to-rural migrant women (Figure 8). Women age 20-29, 30-39 and 40-49 have significantly lower odds (OR=0.47, p<0.001; OR=0.42, p<0.001, and OR=0.35, p<0.01 respectively) compared with women age 15-19. More-educated women are more likely to deliver in a health facility compared with less-educated women. The odds of health facility delivery are significantly higher among women who attained a SLC and above level of education compared with women who have no education (OR=3.38, p<0.001).

Brahman/Chhetri women are significantly more likely (OR=1.78, p<0.01) to deliver in a health facility than Dalit women. The odds of health facility delivery are significantly lower among Terai caste and Muslim women (OR=0.50, p<0.001 and OR=0.52, p<0.05) compared with Dalit women. There is a significant

association between wealth quintile and health facility delivery. Women in the highest wealth quintile have 8.69 times higher odds of delivering in a health facility compared with women in the lowest wealth quintile. A statistically significant association does not exist between women's occupational status and health facility delivery.

Figure 8   Adjusted odds ratio of delivering in health facility and 95% confidence interval by migration streams

Note: Based on Table 7
Rural to rural migration is reference.

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4   DISCUSSION

The overall objective of the study is to investigate the effects of internal migration on the use of reproductive and maternal health outcomes in Nepal. The analysis has been drawn from the datasets of 2016 Nepal Demographic and Health Survey. Previous Nepal DHS surveys, except NDHS 2011, reported number of years lived in current place of residence, previous place of residence before moved, and current place of residence. Further analysis did not focus on the use of reproductive and maternal health services, as in the present study. However, two previous studies, Staveteig, et al. (2018) and Khanal (2013), focused on spousal migration and contraceptive use, which did not cover the effects of internal migration on the use of reproductive and maternal health services. Therefore, it is rational to analyze the effect of internal migration on the use of reproductive health and maternal health services in Nepal, and to focus policy attention on the effects of internal migration.

The Nepal Health Sector Strategy 2016-2021 aims to expand equitable access to high-quality family planning services, increase the availability of modern family planning methods, and satisfy the demand for family planning (Ministry of Health 2017). National Population Policy 2015 also emphasizes the expansion of family planning services at the local level for population management (Ministry of Health and Population 2015).

The prevalence of contraceptive use has increased substantially over the past decade, from 29% in 1996 (Macro International Inc. 2007) to 53% in 2016 (Ministry of Health, New ERA, and ICF 2017). Our study shows that the use of modern contraception varies with the socioeconomic, demographic, and migration status of women. It shows that the duration of stay is positively associated with modern contraceptive use. Modern contraceptive use is significantly lower for all women who moved within the past five years. Long duration of stay is associated with more exposure to and contact with reproductive health services (Smith and Qian 2010). Therefore, the longer the duration of stay in the current place of residence, the more likely the use of modern contraception. Recent migrant women lack a social network and are not familiar with how to access reproductive health services in their new place of residence. Women who moved within the past five years are less likely to use modern contraception compared with non-migrant women. Many recent migrant women could be currently married and thus less likely to use contraception. This result is in line with previous studies in Guatemala (Lindstrom and Hernandez 2006) and Mozambique (Cau 2016). The adjusted results also indicate that women's age, education, and occupation are factors associated with use of modern contraception.

The use of modern contraceptive methods is highest among urban non-migrants, followed by urban-to-urban migrant women. This variation in results could be due to selectivity of migration. Bivariate analysis indicates that migration streams are not significantly associated with use of modern contraception. A study in Kenya reveals that rural-to-urban migrants and urban non-migrants are more likely to use modern contraceptive than rural non-migrants (Ochako et al. 2016). When all other factors are taken into consideration, urban non-migrants and urban-to-urban migrants are more likely to use modern contraception compared with rural-to-rural migrants. The odds of using modern contraception are higher among urban-to-urban migrant women, rural-to-urban migrant women, and urban non-migrant women compared with rural non-migrant women. The multivariate analysis indicated that women's age and

occupation status have a strong association with modern contraceptive use. This finding is consistent with previous studies (Mishra, Mishra, and Dixit 2014).

Women's age has a positive association with modern contraceptive use. Younger women are less likely to use modern contraceptives, while older women are more likely. This finding is consistent with previous studies in Nepal (Mishra 2010), Kenya (Ochako et al. 2016), and Myanmar (Sudhinaraset et al. 2016). A study from rural Nepal shows that women age 45-49 are less likely to use modern contraception, and women age 25-34 are more likely to use modern contraception compared with women age 15-24 (Wang et al. 2013). Older women are more likely to be currently married, to have more children, and to desire no more children, which can be considered a possible explanation for these results.

Women's education is the most important predictor of contraceptive use. A study conducted in Kenya showed that education has positive effects on the use of contraception (Omandi and Ayiemba 2003). This study found that the relationship between female education and use of modern contraception is not linear. Educated women may have a greater capacity of decision making regarding choice and use of contraceptive methods. They are more aware of the side effects of modern contraceptive use. Previous studies showed that more educated women were significantly less likely to use contraceptives than uneducated women (Karki and Agrawal 2008).

Caste/ethnicity background has been identified as one of the important factors affecting use of contraceptive methods (Bennett, Dahal, and Govindasamy 2008; Sharma, KC, and Ghimire 2011; Mishra 2010). Our study showed the ethnic variation in use of modern contraception. It is argued that the ethnic variation in contraceptive use is due to religious faith, values, and cultural norms. The study showed that women's place of residence has no significant association with use of modern contraceptives. Differences exist in the use of modern contraception by women's occupation. Women who are working, whether in agriculture or nonagricultural sectors, have higher use of modern contraception than women who are not working. This result is consistent with a previous study (Sharma, KC and Ghimire 2011). The possible reason could be that women who are working are more likely to be educated and to have more awareness of reproductive health. The association between modern contraceptive use and wealth quintile is not significant, and there are no significant differences in use of modern contraception between wealth quintiles.

The government of Nepal has given prime attention to ensuring access to antenatal care for women of reproductive age (Ministry of Health and Population, New ERA, and ICF 2012). The bivariate results revealed that duration of stay, migration streams, and other background variables are significantly associated with ANC visits. The analysis shows that attending ANC visits decreases with an increase of duration of stay in current place of residence. Women who migrated within the past five years are more likely to make at least four ANC visits. This result supports that migrants are self-selected and that selection factors play an important role in the use of maternal health services (Amankwaa, Bavon and Nkansah 2003). Previous studies have shown that older women are less likely to attend four ANC visits than younger women, that there is a positive association between education and ANC visits, that a positive relationship exists between wealth quintile and ANC visits, and that women residing in urban areas are more advantaged in terms of ANC (Dahiru and Oche 2015, Joshi et al. 2014). The result of this study shows a similar trend. This study also finds that Brahman/Chhetri women are more likely to have at least four ANC visits. However, previous studies showed that women of Janajati and Newar ethnicity were more likely to attend at least four ANC visits (Pandey et al. 2013). Women in the low wealth quintile are less likely to have at

least four ANC visits, which is consistent with a previous study (Joshi et al. 2014) but inconsistent with the finding of other studies in Nepal (Mehata et al. 2017).

The results of multivariate analysis show that, compared with non-migrant women, women who migrated within the past five years have higher odds of making at least four ANC visits. For women who migrated more than five years ago, there are no statistically significant differences in making four ANC visits compared with non-migrant women. The possible explanation for this result is that migration is a selective process. Marriage is the single most important reason for female internal migration in Nepal (Suwal 2014). Therefore, women whose duration of residence is less than five years tend to be younger. They are aware of consequences of pregnancy and childbirth. The study found that education and wealth quintile have a significant association with making at least four ANC visits. Thus, duration of stay seems to be an important predictor of ANC visits after considering all factors that influence the likelihood of attending ANC.

The logistic regression results show that urban-to-urban migrant women and rural-to-urban migrant women are more likely to make four ANC visits than rural-to-rural migrant women. Previous studies from Peru showed that rural migrant women were less likely to make ANC visits than urban non-migrant women (Subaiya 2007). The analysis further points out that women's age, education, and wealth quintile are strongly associated with ANC visits, after considering all other factors.

Maternal health is a prime concern in the National Health Policy in Nepal. The Government of Nepal has implemented various strategies to improve maternal and child health. Place of delivery determines the welfare of mother and babies. Increasing the percentage of births delivered in health facilities reduces maternal death due to complications of pregnancy and childbirth. Fifty-seven percent of women deliver in a health facility at the national level in Nepal (Ministry of Health, New ERA, and ICF 2017). The study reveals that migrant women are more likely to deliver in a health facility compared with non-migrant women. This finding is consistent with a study in Myanmar (Sudhinaraset et al. 2016). The choice of place to deliver is also influenced by duration of stay. Like ANC visits, women who moved to their current place of residence within the past five years are more likely to deliver in a health facility. This might be due to selectivity of migrants. The choice of place of delivery varies with the differing demographic and socioeconomic characteristics of migrant women. The results of adjusted odds ratio analysis indicate that women's education, caste/ethnicity, place of residence, and wealth quintile play a strong role in the odds of delivering in a health facility. This finding is consistent with previous studies in Kenya (Kitui, Lewis, and Davey 2013), Nigeria (Dahiru and Oche 2015), Ghana (Dickson, Adde, and Amu 2016), and Nepal (Mehata et al. 2017). However, in our study, women's age and occupation are not found to be statistically significant in their association with health facility delivery.

Results of adjusted logistic regression suggest that internal migration flow is an important factor that strongly affects delivery in a health facility. The results further show that some control variables—women's age, education, caste/ethnicity, and wealth quintile—are significant predictors of health facility delivery.

The study demonstrates that women who are more likely to deliver in a health facility are urban-to-urban migrants or rural-to-rural migrants, have attained higher education, are of Brahman/Chhetri, and are wealthier. Women who are age 20-49 of Terai caste or are Muslim are significantly less likely to deliver in a health facility.

The effects of internal migration on the use of reproductive and maternal health services have been studied by comparison of six categories of internal migration flows. This study confirms that urban-to-urban migrant women and urban non-migrant women are more likely to use modern contraceptives compared with rural-to-rural migrant women. Urban-to-urban migrant women and rural-to-urban migrant women are more likely to receive four ANC visits compared with rural-to-rural migrants. Similarly, urban-to-urban, urban-to-rural, rural-to-urban, and urban non-migrant women are more likely to deliver in a health facility compared with rural-to-rural migrant women. The results of this study indicate that recent migrant women are more likely to attend four ANC visits and to deliver in a health facility. This could be because women in their first pregnancy might be more careful or anxious about problems of pregnancy and childbirth due to their inexperience of pregnancy and delivery.

5   CONCLUSION

The movement of people within and between countries is a complex phenomenon with different implications. It is difficult to generalize the impact of migration on the use of reproductive and maternal health service due to limited availability of data.

The study indicates that duration of stay and migration streams are significantly but differentially associated with use of modern contraceptives, at least four ANC visits, and health facility delivery. Migration variables play a central role, which has direct and indirect consequences on socioeconomic and demographic characteristics of women that affect the use of reproductive and maternal health services. Migrant women who moved within the last 5 years are less likely to use modern contraceptives and are more likely to make at least four ANC visits, and deliver in a health facility.

This study also showed that women who migrate between urban areas and women who are urban non-migrants are more likely to use modern contraception. In relation to ANC visits, women who migrate to an urban area are more likely to make at least four ANC visits. Women are more likely to deliver in a health facility if they migrated to an urban area or if they are urban non-migrants. In general, the primary conclusion of this study is that women who migrate to an urban area as well as urban non-migrants are more likely to use reproductive and maternal health services compared with rural non-migrants and women who migrate to a rural area. While we might imagine that urban residence would confer an advantage regardless of origin, it appears that the new environment does not significantly affect the outcomes of previous rural residence, suggesting either greater disadvantage within the urban environment or persistence of previous behavior regardless of residence.

Among the different socioeconomic and demographic factors, the study identified women's age, education, and occupational status as strongly associated with use of modern contraceptives. Women's education and wealth quintile are strongly associated with ANC visits. Women's education, caste/ethnicity, place of residence, and wealth quintile are associated with health facility delivery. Urban women, women age 20-29 or 40-49, women engaged in agriculture or a non-agricultural occupation, and women in the middle or fourth wealth quintile are more likely to use modern contraceptives. Muslim women and women who have attained primary, secondary, or SLC and above level of education are less likely to use modern contraceptives.

Women who are urban-to-urban migrants or rural-to-urban migrants, women who are educated, Brahman/Chhetri women, women engaged in agriculture, and women in the highest wealth quintile are more likely to attend at least four ANC visits. The study also shows that women who are urban-to-urban, urban-to-rural, rural-to-urban migrants or urban non-migrants, have attained higher education, are Brahman/Chhetri, and are in the highest wealth quintile are more likely to deliver in a health facility. Women who are in the Terai caste or Muslim, are rural non-migrants, and are engaged in agriculture are less likely to deliver in a health facility. This study has various implications for policymakers, program implementers, and stakeholders that could help to improve women's reproductive and maternal health services in Nepal. The differentials of use of reproductive and maternal health services by internal migration status should be considered when designing programs to improve women's access to reproductive and maternal health services.

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