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TREND AND DETERMINANTS OF EARLY POSTNATAL CARE IN NEPAL WITH A FOCUS ON WOMEN'S AUTONOMY

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Abstract

Nepal has made significant strides in improving maternal and child health, notably reducing mortality rates over recent decades. However, challenges persist in meeting the maternal and newborn health targets outlined in the Sustainable Development Goals. Postnatal care is essential for the survival and well-being of both mothers and newborns, yet there is limited research on this topic in Nepal. This study aims to assess trends in early postnatal care coverage and analyze the factors influencing service uptake focusing on women's autonomy. Using data from the Nepal Demographic and Health Surveys for 2011, 2016, and 2022, which included 10,991 mothers aged 15-49 with at least one live birth, the study revealed significant improvements in postnatal care coverage. The percentage of mothers receiving care within 48 hours increased from 43% in 2011 to 56% in 2016, reaching 72% in 2022. Despite this progress, 28% of mothers and newborns still lack timely postnatal care, which is crucial for their survival and well-being. Regression analysis indicated that women with greater decision-making autonomy are significantly more likely to receive postnatal care (adjusted OR 1.216, $P < 0.01$), even when accounting for socio-demographic factors. The study highlighted disparities in postnatal care coverage based on age, caste/ethnicity, education, occupation, province, urban-rural residence, wealth, and family size. These findings emphasize the need for targeted interventions to empower women and tailor maternal health programs to address the specific needs. Future research should focus on evaluating complete postnatal care coverage, assessing care quality, and exploring interventions to strengthen maternal health care.

Keywords: Postnatal care, women's autonomy**,** maternal health, determinants and Nepal

1. Introduction

Postnatal care, which encompasses the care and support provided to both the mother and newborn following childbirth up to 42 days, plays a vital role in ensuring the health and well-being of this vulnerable population. This is a critical time for women, newborn, health care providers and family members, as maternal and neonatal morbidity and mortality is very high during this period, which is mostly preventable with timely interventions (Organization, 2010). The provision of comprehensive postnatal care is a critical component of maternal and child health services, yet it often remains an overlooked aspect of healthcare systems, particularly in low-income countries (WHO, 2015). Maternal health is one of the priority programs of Government of Nepal and has been guaranteed by the Constitution of Nepal, the Right to Safe Motherhood and Reproductive Health Act 2018 and its Regulation 2020, Public Health Service Act 2018 and its Regulation 2020 (Government of Nepal, 2015) (Government of Nepal, 2018a) (Government of Nepal, 2018b) (GoN, 2020). Postnatal care services are a fundamental component of the continuum of maternal and newborn care program in Nepal and is a key to reduce maternal and neonatal mortality in the country and achieve the Sustainable

Development Goals (SDGs) (Annie Kearns, 2014). The recent maternal mortality study in Nepal showed that the postnatal period is a time of significant vulnerability with the risk of maternal mortality being highest during this time (Ministry of Health and Population & National Statistics Office, 2023). In Nepal, the utilization of postnatal care services remains suboptimal with twenty-eight percent of women not receiving any postnatal check within the first two days following the delivery of their most recent live birth or stillbirth in the two years prior to the survey. Among those who did receive a postnatal check within this critical period, only 20% underwent all three essential assessments in the first two days after birth. (Ministry of Health and Population, New ERA, & ICF International, 2022). Hence, it is imperative to assess the trend and identify the determinants of postnatal care while assessing its linkage with women's autonomy.

2. Literature review

The literature review was conducted based on the electronic and printed reports, books, and other relevant documents. The literature has also been collected by using online library such as JSTOR, HINARI, PubMed and google scholar. Literature review and citations are being managed via End note (20) program using APA 7th style. The key words used during literature review are maternal health service, postnatal care, women's autonomy, decision making, continuum of care, etc. Review findings are presented based on coverage of early postnatal care and its linkage with key study variables:

Coverage of early postnatal care: In Ethiopia, the pooled prevalence of early postnatal care was 28.51%, (Yimer, Sisay, et al., 2024) with several sub-national studies reporting even lower coverage, such as 20.6% in South Gondar (Yimer, Ferede, & Sisay, 2024) 25.8% in Hosanna Town and (Worku, Dheresa, Ali, & Lodebo, 2024) , and as low as 16.14% in other areas (Ashemo, Shiferaw, Biru, & Feyisa, 2023). Moreover, only 13.27% of women in Ethiopia received postnatal care within 42 days, with just 1.73% accessing care within the first 24 hours (Debie & Tesema, 2021). In comparison, early postnatal care utilization in Uganda was reported above 50% (Towongo, Ngome, Navaneetham, & Letamo, 2024) and (Ndugga, Namiyonga, & Sebuwufu, 2020) Afghanistan reported a 39.9% coverage rate (Rahmati, 2024), Yemen 45.2% (Haza'a et al., 2024), and Tanzania 36% (Adinani et al., 2024), though some areas in Tanzania reported a low rate of 15.9% (Serbanescu et al., 2023). Conversely, Ghana exhibited a high early postnatal care coverage of 88.7% (Asumah et al., 2023). In Nepal, various community-level studies reveal disparities in coverage. Urban areas reported high postnatal care access, with 98.1% of mothers having at least one visit, though only 34.4% adhered to postnatal care protocols (Thapa, Choudhary, Adhikari, & Thapa, 2023). Rural areas of Nepal showed lower coverage, with less than one in five women receiving early postnatal care (Dhakal et al., 2007).

Women's autonomy: A study conducted in Tanzania reported higher odds of early PNC use among autonomous women (aOR 1.56) (Serbanescu et al., 2023). Similarly, a study in Nepal demonstrated that women involved in household decision-making were more likely to utilize maternal health services (OR 1.42) compared to those who lacked autonomy (Adhikari, 2016). A national survey in Nepal revealed that women with high autonomy had a 33% greater likelihood of receiving PNC care (aOR 1.33) (Mondal, Karmakar, & Banerjee, 2020) Additionally, a study conducted in Rautahat, Nepal, also documented a positive association between autonomy and PNC visits ($p=0.045$) (Shah et al., 2021). These findings underscore the critical role of women's autonomy in enhancing maternal health service utilization.

Age: In Uganda, women aged 20-29 and 30-39 were more likely to use postnatal care services (aOR 1.2) (Towongo et al., 2024). Similarly, in Afghanistan, mothers aged 30-39 and 20-29

were 1.6 and 1.5 times more likely compared to those under 20. (Rahmati, 2024) In Ghana, mothers aged 25-39 were about seven times more likely to seek postnatal care than younger mothers (aOR 7.41). (Asumah et al., 2023) In Ethiopia, women aged 25-35 (aOR 1.55) were more likely to receive adequate postnatal care. (Ashemo et al., 2023) However, in an earlier study in Nepal, postnatal care prevalence did not significantly vary across age groups (p 0.21). (Dhakal et al., 2007)

Education: A positive association has already been demonstrated between educational attainment and the uptake of postnatal care. For example, in Ghana, high school or higher educated mothers were more likely to use postnatal care compared to those without formal education (aOR 3.65) (Asumah et al., 2023). Similarly, secondary or higher education significantly increased the likelihood of utilizing postnatal care in Ethiopia (aOR 2.23) (Ashemo et al., 2023) and Afganisthan (aOR 2.4) (Rahmati, 2024) and Uganda (aOR 1.45) (Ndugga et al., 2020). Research in Nepal showed that higher levels of education among women significantly increased the likelihood of receiving postnatal care (Pradhan et al., 2019) (Dhakal et al., 2007) (Khanal, Adhikari, Karkee, & Gavidia, 2014), Moreover, in Nepal, women with husbands educated to the secondary level are significantly more likely to receive postnatal care compared to those with illiterate husbands. (Dhakal et al., 2007).

Wealth: Study conducted in Nepal revealed middle and rich wealth quintiles being significantly more likely to receive immediate postnatal care **(Khanal et al., 2014).** Similarly, in Ethiopia, wealth status was found to be a significant factor in postnatal care **(Worku et al., 2024).** In contrast, a study done in Uganda found that women in the poorer (aOR 0.76), middle (aOR 0.69), and richer (aOR 0.66) wealth quintiles were less likely to attend early postnatal care. (Ndugga et al., 2020)

Ethnicity: A cross-sectional study conducted in Baglung, Nepal revealed that women from Brahmin/Chhetri (aOR 3.18) and Janajati (aOR 2.87), were more likely to receive complete postnatal care compared to Dalits (Chhetri, Shah, & Rajbanshi, 2020). Additionally, research by Dhakal also indicated that women from the Tamang ethnic group being less likely to access postnatal care than Brahmin/Chhetri (Dhakal et al., 2007).

Place of residence: Yimer et al. reported that mothers in urban areas were five times more likely to have early postnatal visits (Yimer, Ferede, et al., 2024). Similarly, urban mothers were found significantly more likely to receive immediate postnatal care in Nepal (Khanal et al., 2014). However, Ugandan study found no significant association between place of residence and postnatal care (Ndugga et al., 2020) while research in Tanzania showed rural women to have 9% lower prevalence of early postnatal care. (Adinani et al., 2024)

Occupation: A study in Baglung found that women whose husbands had formal jobs were more likely to receive complete postnatal care (aOR 3.49) (Chhetri et al., 2020). Similarly, Dhakal et al. reported that housewives were over seven times more likely than women engaged in farming, and women with husbands in formal-sector jobs were more likely to attend postnatal care (OR 3.23). (Dhakal et al., 2007) Additionally, research by Ndugga et al. indicated that unemployed women had lower odds of attending early postnatal care than women employed in the agricultural sector. (Ndugga et al., 2020)

Wanted birth: A cross-sectional study in Ethiopia identified wanted pregnancies as a statistically significant factor influencing early postnatal care usage (aOR 4.17)(Yosef et al., 2023).

Parity/gravida: Previous research in Nepal shows that women with three or more children were significantly less likely to receive postnatal care (OR 0.16) (Dhakal et al., 2007) Conversely,

Yosef et al. found that women with more than four pregnancies (gravida >4) were more likely (aOR 2.90). (Yosef et al., 2023). Additionally, a study in Ethiopia reported having two to four children was a strong predictor of adequate postnatal care (aOR 0.62) (Ashemo et al., 2023) while Yimer et al. noted that mothers with more than four children were also more likely to seek postnatal care (aOR 2.25) (Yimer, Ferede, et al., 2024).

3. Statement of the problem

Nepal has progressive laws and policies on sexual and reproductive health and rights, including for increasing access to safe abortion services. Nepal has made substantial progress on maternal and child health over the decades. Maternal mortality ratio in Nepal has decreased from 539 in 1996 to be 151 per 100000 live births in 2022 (Ministry of Health and Population & National Statistics Office, 2023). The most recent Nepal demographic and health survey (NDHS) have shown notable improvements in most maternal health service utilization indicators (Ministry of Health and Population et al., 2022). However, we still have relatively high maternal mortality compared with many other countries and there are still gaps in service utilization especially on postnatal care. A significant proportion of population are still unreached by sexual and reproductive health and rights related services in Nepal (Puri, Wagle, Rios, & Dhungel, 2020). There are huge challenges to reduce the MMR to 70 and newborn mortality to 12 as stipulated in the sustainable development goals (United Nations Foundation, 2020). Several maternal health programs have been implemented in Nepal, including the skilled birth attendance at delivery, free institutional delivery, incentives to attend antenatal care, institutional delivery and postnatal visit, among others. Importance of postnatal care has been well documented as crucial for maternal and newborn's survival and health (Ministry of Health and Population, 2020).

It is widely asserted that increased gender equality is a prerequisite for achieving improvements in maternal health (Fawole & Adeoye, 2015) but there are very few studies which focus on women's autonomy in the use of maternal healthcare services (Furuta & Salway, 2006). Looking at the timing of maternal mortality, the majority of the deaths are happening at the health facility level indicating delay in decision making to use the services (Ministry of Health and Population & National Statistics Office, 2023). In Nepal, research on postnatal care and its determinants is limited, particularly regarding women's autonomy. Understanding and addressing the barriers for service uptake is vital to improving maternal and neonatal health outcomes (Annie Kearns, 2014). Considering these challenges, the study tried to assess the trend of early postnatal care and analyze its linkages with women's autonomy and other associated factors in Nepal.

4. Research objectives

The objectives of the study were to assess the trend of early postnatal care in Nepal over 2011, 2016 and 2022 survey period and to analyze the linkage of women's autonomy and associated factors with early postnatal care.

5. Methodology

Study design and sources of data

This was a descriptive cross-sectional study was based on secondary data from three consecutive Nepal Demographic and Health Surveys conducted respectively in 2011, 2016 and 2022. Study population was 11,027 women of Nepal aged 15-49 years who have at least one

live birth in last five years preceding the survey in the case of 2011 (4079 mothers) and 2016 (4006 mothers) while those having live births in 3 years preceding the survey in the 2022 (2942 mothers). Samples were selected based on two-stage, stratified, nationally representative sample. Total sample included in the analysis was 10991 mothers, including 4148, 3998 and 2845 respectively in 2011, 2016 and 2022 surveys. Data use authorization was obtained from DHS program on November 2023.

Study variables

Having received a postnatal check-up during first two days after childbirth, named as the "Early postnatal Care" was the outcome variable for the study. Although three PNC visits are recommended, as a minimum, this study analyzed the coverage of at least one postnatal care as a minimum starting point.

Women's autonomy in sexual and reproductive health (SRH) decision-making, based on SDG 5.6.1, was the independent variable. Women aged 15-49 were considered autonomous if they could refuse sex, decide on contraception, and make decisions about their own healthcare. For this study, women answering "yes" to all three criteria were categorized as autonomous, while those with one or more "no" responses were classified as non-autonomous.

Age, religion, caste/ethnicity, education and occupation of couple, place of residence (urban/rural and province), economic status, parity, birth intention and family size were the extraneous variables included in the analysis.

Method of data analysis

STATA15 was used for recoding of the variables and data analysis. This study employed three levels of statistical analysis, the descriptive statistical technique, bi-variate analysis to assess the association using chi-square tests and logistic regression to identify the relationship between the indicators of women's autonomy and the use of postnatal care services; controlling for potential confounders. The results were presented in terms of percentage, adjusted odds ratio (OR) and level of significance ($p < 0.05$, < 0.01 and < 0.001).

6. Results and discussion

Table 1 presents the socio-demographic characteristics of respondents across three surveys. The majority of women were aged 20-34 years, with over 80% identifying as Hindu. Ethnic distribution showed nearly one-third were Janajati, followed by Brahmin/Chhetri, Madheshi, and Dalit groups. Educational attainment among women improved significantly, with those lacking education dropping from 44% in 2011 to 20% in 2022, while basic education rose to 62%. Similarly, husbands' education levels also improved, with those lacking education decreasing from 22% to 10% during the same period. Rural residency dropped sharply from nearly 90% in 2011 to one-third in 2022, with the highest respondents from Madhesh province. Around two-thirds of women had families with four or more members, and nearly 40% reported their most recent birth was their first. Non-intended births decreased from 15% in 2011 to 6% in 2022.

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Table1. Percent and frequency distribution of women aged 15- 49 years who have given live births in last five/three years by selected characteristics, Nepal, in 2011, 2016 and 2022

Variable	2011 (n=4148)*		2016 (n=3998)*		2022 (n=2845)*	
	Number	Percent	Number	Percent	Number	Percent
Age of women						
15-19 years	333	8.0	334	8.4	239	8.4
20-34 years	3309	79.8	3304	82.7	2409	84.7
35-49 years	507	12.2	359	9.0	197	6.9
Caste/Ethnicity						
Dalit	683	16.5	545	13.6	503	17.7
Muslim	236	5.7	253	6.3	181	6.4
Janjati	1523	36.7	1303	32.6	899	31.6
Madhesi	414	10.0	724	18.1	519	18.3
Brahmin/Chhetri	1283	30.9	1159	29.0	740	26.0
Others	10	0.3	13	0.3	2	0.1
Religion						
Hindu	3444	83.0	3421	85.6	2377	83.6
Other	704	17.0	577	14.4	468	16.4
Level of education						
No education	1822	43.9	1257	31.4	556	19.6
Basic (up to grade 8)	1700	41.0	1786	44.7	1761	61.9
Higher (>8 grade)	627	15.1	955	23.9	528	18.6
Level of education (Husband)						
No education	906	22.0	563	14.2	283	10.2
Basic (up to grade 8)	2164	52.4	2125	53.7	1363	49.2
Higher (>8 grade)	1056	25.6	1272	32.1	1124	40.6
Occupation						
Agriculture	94	2.3	1838	46.0	98	3.5
Other	2905	70.0	611	15.3	1659	58.3
Not working	1150	27.7	1549	38.7	1087	38.2
Occupation (Husband)						
Agriculture	680	16.4	721	18.2	763	27.1
Other	3468	83.6	3152	79.5	1998	70.8
Not working	0	0.0	92	2.3	62	2.2
Wealth Quintiles						
Lowest	979	23.6	822	20.6	651	22.9
Lower	899	21.7	839	21.0	604	21.2
Middle	873	21.0	863	21.6	589	20.7
Higher	748	18.0	830	20.8	551	19.4
Highest	649	15.7	21	16.1	450	15.8
Household size						
≤4	1276	30.8	1265	31.6	900	31.6
>4	2872	69.2	2733	68.4	1945	68.4
Residence						
Urban	418	10.1	2223	55.6	1866	65.6
Rural	3730	89.9	1775	44.4	979	34.4
Province						
Koshi	910	21.9	686	17.2	504	17.7

Variable	2011 (n=4148)*		2016 (n=3998)*		2022 (n=2845)*	
	Number	Percent	Number	Percent	Number	Percent
Madhesh	810	19.5	963	24.1	734	25.8
Bagmati	572	13.8	691	17.3	468	16.4
Gandaki	479	11.6	337	8.4	180	6.3
Lumbini	668	16.1	720	18.0	481	16.9
Karnali	269	6.5	255	6.4	216	7.6
Sudur Paschim	440	10.6	346	8.7	262	9.2
Birth order						
First birth	1302	31.4	1498	37.5	1149	40.4
Second birth	1162	28.0	1207	30.2	994	34.9
Third birth	733	17.7	626	15.7	408	14.4
Fourth/more birth	952	22.9	667	16.7	294	10.3
Intended birth						
Wanted then	3017	72.7	3198	80.0	2253	79.2
Wanted later	499	12.0	472	11.8	422	14.8
No more	632	15.3	328	8.2	170	6.0

Source: Nepal Demographic and Health Surveys 2011, 2016 and 2022 data.
* Total number for husband's education and occupation varies in some cases due to the response rate.

Results from bivariate analysis

Table 2 depicts the percentage of mothers, combined for three surveys, who received early postnatal care by basic socio-demographic characteristics. Early postnatal care was 43% in 2011 which increased to 56% in 2016 and further to 72% in 2022. In aggregate, over three surveys, a little more than half of the mothers (55%) received early postnatal care. Early postnatal care surpasses coverage rates reported in Ethiopia, Tanzania, Afghanistan and Yemen (Yimer, Ferede, et al., 2024) (Ashemo et al., 2023) (Debie & Tesema, 2021) (Towongo et al., 2024) (Ndugga et al., 2020) (Rahmati, 2024) (Haza'a et al., 2024) (Adinani et al., 2024) (Serbanescu et al., 2023). Conversely, Ghana exhibited a high early postnatal care coverage (Asumah et al., 2023).

Comparing the early postnatal care by women's autonomy, coverage was significantly higher among autonomous women (66%) compared to women who were not autonomous (51%). Looking into other socio-demographic variables, postnatal care coverage was significantly different among different groups considered for analysis including the age, ethnicity, religion, education and occupation of couple, economic status, place of residence, birth order and intention. Specifically, younger women, those belonging to Bhramin/Chhetri ethnic group, those with higher education, non-working, small family size, those residing in urban, Bagmati and Gandaki province, those in higher wealth category, mothers whose births were intended; and those with first and second birth order have comparatively higher early postnatal care coverage compared to other categories.

Table 2. Percent distribution of women aged 15-49 years with a live birth in preceding years by use of early postnatal care in 2011, 2016 and 2022

Variable	Frequency (n=10991)	Attended PNC (n=6097)	P value	Variable	Frequency (n=10991)	Attended PNC (n=6097)	P value
Women Autonomy				**Husband's occupation**			

Women not autonomous	7708	50.78	<0.001	Not working	153	60.25	<0.001
Women autonomous	3283	66.48		Agriculture	2165	52.73	
Survey year				Other work	8618	55.97	
2011	4148	43.16	<0.001	**Household size**			
2016	3998	56.39		≤4	3441	62.80	<0.001
2022	2845	72.14		5 or more	7550	52.13	
Age of women				**Wealth index**			
15-19 years	906	58.24	<0.001	Poorest	2451	34.12	<0.001
20-34	9022	56.83		Poorer	2343	45.52	
35-49	1063	41.57		Middle	2325	55.67	
Caste/Ethnicity				Richer	2129	67.14	
Brahmin/Chhetri	3182	64.42	<0.05	Richest	1743	84.38	
Dalit	1731	46.93		**Residence**			
Janjati	3726	54.84		Urban	4507	69.29	<0.05
Madhesi	1656	50.35		Rural	6484	45.87	
Muslim	670	50.34		**Province**			
Other	26	78.71		Koshi	2099	59.51	<0.001
Religion				Madhesh	2507	45.72	
Hindu	9243	56.32	<0.001	Bagmati	1731	64.32	
Other	1748	51.00		Gandaki	997	60.35	
Level of education				Lumbini	1869	56.88	
No education	3635	34.49	<0.001	Karnali	740	43.68	
Basic	5247	59.29		Sudur Paschim	1049	57.29	
Higher	2109	82.15		**Intended birth**			
Husband's education				Wanted then	8468	57.78	<0.001
No education	1752	32.14	<0.001	Wanted later	1392	59.59	
Basic	5652	51.58		No more	1131	33.15	
Higher	3452	73.72		**Birth order**			

Occupation				First birth	3949	70.45	<0.001
Not working	3786	62.60	<0.001	Second birth	3362	58.47	
Agriculture	2030	51.48		Third birth	1768	43.59	
Other work	5175	51.82		Fourth or more	1912	30.26	
Total	10991	55.47		**Total**	10991	55.47	

Result of multivariate analysis. After the bivariate analysis, the subsequent analysis discusses the findings from multivariate analysis (Table 3). Two random-effects logit regression models were fitted to identify determinants for women to receive early postnatal care.

Table 3 Multivariate analysis

Variable	**Model 1(Unadjusted OR)**	**Model 2 (Adjusted OR)**
Women's autonomy (Reference: No autonomy)		
Autonomy	1.922 ***(CI, 1.721-2.147)	1.216 **(CI, 1.075 - 1.375)
Survey year (Reference: 2011)		
2016		1.376** (CI, 1.114-1.699)
2022		3.153***(CI, 2.585-3.847)
Age of women (Reference: 15-19 years)		
20-34		1.054 (CI, 0.868-1.280)
35-49		1.411* (CI,1.074-1.853)
Caste/Ethnicity (Reference: Brahmin/Chhetri)		
Dalit		0.963 (CI, 0.803-1.154)
Janjati		0.854 (CI, 0.724-1.007)
Madhesi		0.771* (CI, 0.600-0.992)
Muslim		1.17 (CI, 0.796-1.719)
Other		1.035 (CI, 0.290-3.695)
Religion (Reference: Hindu)		
Other than Hindu		0.821 (CI, 0.670-1.006)
Level of education (Reference: No education)		
Basic		1.294*** (CI, 1.135-1.477)
Higher		2.220*** (CI, 1.808-2.726)
Husband's education (Reference: No education)		
Basic		1.123 (CI, 0.962-1.312)
Higher		1.275* (CI, 1.047-1.553)

Occupation (Reference: Not working)		
Agriculture		1.016 (CI, 0.859-1.201)
Other work		0.831* (CI, 0.716-0.964)
Husband's occupation (Reference: Not working)		
Agriculture		1.875** (CI, 1.183-2.972)
Other work		1.895** (CI, 1.208-2.974)
Household size (Reference: Four or less)		
5 or more		0.793*** (CI, 0.699-0.899)
Wealth index (Reference: Poorest)		
Poorer		1.666*** (CI, 1.422-1.952)
Middle		2.614*** (CI, 2.161-3.163)
Richer		3.517*** (CI, 2.846-4.346)
Richest		6.565*** (CI, 5.063-8.513)
Residence (Reference: Urban)		
Rural		0.840* (CI, 0.724-0.973)
Province (Reference: Koshi)		
Madhesh		0.634*** (CI, 0.497-0.808)
Bagmati		0.885 (CI, 0.696-1.126)
Gandaki		1.009 (CI, 0.776-1.312)
Lumbini		0.862 (CI, 0.694-1.069)
Karnali		0.893 (CI, 0.693-1.152)
Sudur Paschim		1.324* (CI, 1.037-1.690)
Intended birth (Reference: Wanted then)		
Wanted later		0.885 (CI, 0.748-1.048)
No more		0.799* (CI, 0.656-0.973)
Birth order (Reference: First birth)		
Second birth		0.594*** (CI, 0.519-0.680)
Third birth		0.513*** (CI, 0.438-0.602)
Fourth or more		0.409*** (CI, 0.333-0.502)
Number of Observation	**11027**	**10906**

*p<0·05; **p<0·01; ***p<0·001. *Source: NDHS 2011, 2016 and 2022 dataset.*

Model I: Unadjusted odds ratio for early postnatal care by women's autonomy

In the first model, women's autonomy had positive and highly statistically significant effect on early postnatal care. The regression result showed that the unadjusted odds of receiving

postnatal care for autonomous women was almost double compared to non-autonomous women (unadjusted OR 1.922, P<0.001).

Model II: Odds ratio for early postnatal care by controlling possible socio-demographic variables

The regression result depicted that after adjusting for potential confounding effect of socio-demographic variables, the early postnatal care was still significantly higher among autonomous women compared to non-autonomous women (aOR 1.216, P <0.01). These findings were consistent with the previous studies conducted in Tanzania (Serbanescu et al., 2023), and Nepal (Adhikari, 2016) (Mondal et al., 2020) (Shah et al., 2021). These findings underscore the critical role of women's autonomy in enhancing maternal health service utilization.

Similarly, regression result showed good progress while analyzing the trend of receiving early postnatal care in 2016 and 2022 when comparing with the base year 2011 while controlling for women's autonomy and other socio demographic variables included in the study (aOR 1.376, P <0.01 for 2016 and aOR 3.153, P <0.001 for 2022).

Most of the socio demographic variables included in the study had statistically significant effects on receiving postnatal care. Women aged 35-49 years were 1.4 times more likely than 15-19 years to receive postnatal care (aOR 1.411, P <0.05), a trend consistent with previous research in Afghanistan, Uganda, Ghana, Ethiopia, and Chitwan, Nepal. (Towongo et al., 2024) (Rahmati, 2024) (Asumah et al., 2023) (Ashemo et al., 2023). Likewise, women belonging to Madheshi ethnic group were 0.8 times less likely than Bhramin /chhetri to receive postnatal care (aOR 0.771, P <0.05). This finding aligns with the differentials observed in previous sub-national level studies conducted in Nepal (Chhetri et al., 2020) (Dhakal et al., 2007).

Educated women were significantly more likely to receive early postnatal care than non-educated women (aOR for basic education 1.294, P <0.001 and aOR for higher education 2.220, P <0.001). Likewise, women having highly educated husbands had more likelihood to obtain early postnatal care compared to wives of non-educated husbands (aOR 1.275, P <0.05). These findings align with previous research conducted in Ghana, Ethiopia, Afghanistan, Uganda, and Nepal (Asumah et al., 2023). (Ashemo et al., 2023) (Rahmati, 2024) (Ndugga et al., 2020) (Pradhan et al., 2019) (Dhakal et al., 2007) (Khanal et al., 2014)

Interestingly, early postnatal care was significantly lower among women working in non-agriculture sector compared to not working women (a OR 0.831, P<0.05). However, considering the husband's occupation, PNC service uptake was higher for women whose husband's were working (aOR for agricultural work 1.875, P<0.01 and aOR for other work 1.895, P<0.01) which coincides in some ways with the findings from other studies conducted in Nepal (Chhetri et al., 2020) (Dhakal et al., 2007). It needs further research to see the explanations behind the low postnatal service uptake among working women, which is different than other health service.

Analyzing the PNC by province, those from Madhesh province were significantly less likely (aOR 0.634, P<0.001) while those from Sudurpaschim province were more likely than those residing in Koshi province to receive postnatal care (aOR 1.324, P<0.05).

Women staying in rural areas were 0.8 times less likely to receive PNC compared to women residing in urban areas (aOR 0.840, P<0.05). This is consistent with the previous findings from Nepal and elsewhere (Yimer, Ferede, et al., 2024) (Khanal et al., 2014) (Adinani et al., 2024).

Comparing the service uptake by family size, women with family size of five or more members were significantly less likely to receive postnatal care compared to women with four or less family members (aOR 0.793, P<0.001). Similarly, the wealth was found to have strong association with the uptake of early postnatal care with the odds increasing with the level of wealth (aOR for poorer group 1.666, P <0.001; aOR for middle group 2.614, P <0.001; aOR for richer 3.517, P <0.001; and aOR for richest 6.565, P <0.001). This is consistent with the findings from studies in Nepal (Khanal et al., 2014) and Ethiopia (Worku et al., 2024).

Likewise, mothers whose births were not intended were significantly less likely to obtain early postnatal care (adjusted OR 0.799, P<0.05), which is consistent with findings from Ethiopia (Yosef et al., 2023). While comparing the postnatal care by birth order, women with second or higher births have comparatively lower early postnatal care coverage compared to first birth (aOR for second birth 0.594, P<0.001; aOR for third birth 0.513, P <0.001 and aOR for fourth or higher order birth 0.409, P <0.001). This is somehow consistent with the previous findings from Nepal (Dhakal et al., 2007)

7. Conclusion

This study highlights significant progress in postnatal care services in Nepal over the years. The proportion of mothers receiving postnatal care within 48 hours of delivery increased from 43% in 2011 to 56% in 2016 and further to 72% in 2022. However, 28% of mothers and newborns still do not receive care during this critical period for their survival and well-being. Regression analysis indicates that women with greater autonomy in decision making are significantly more likely to receive postnatal care, even after accounting for other socio-demographic factors. The study also found that postnatal care coverage varies significantly across socio-demographic groups, including age, caste/ethnicity, education level, occupation, province, urban-rural residence, wealth, and family size. Based on the findings, ongoing efforts should focus on empowering women and enhancing their autonomy. Additionally, maternal health programs should be tailored to target groups with lower service uptake to reduce inequalities and achieve maternal health targets, rather than adopting a one-size-fits-all approach. Further research is needed to assess trends in complete postnatal care coverage according to protocol, evaluate the quality of care, and test feasible programmatic approaches to enhance the continuum of maternal health care.

8. References

Adhikari, R. (2016). Effect of Women's autonomy on maternal health service utilization in Nepal: a cross sectional study. *BMC Women's Health, 16*(1), 26. doi:10.1186/s12905-016-0305-7

Adinani, H., Amour, C., Msuya, S., Anthony, C. S., Mitao, M., Mwita, W., & Renju, J. (2024). Prevalence and factors associated with early postnatal care utilization among women of reproductive age in Tanzania: analysis of Tanzania demographic health survey 2015/16. *Pan Afr Med J, 47*, 163. doi:10.11604/pamj.2024.47.163.34368

Annie Kearns, S. O., Jacquelyn Caglia, Özge Tunçalp, Ana Langer. (2014). *Postnatal Care in Nepal: Components of care, implementation challenges, and success factors*. Retrieved from https://www.hsph.harvard.edu/wp-content/uploads/sites/2413/2014/09/HSPH-Nepal6.pdf

Ashemo, M. Y., Shiferaw, D., Biru, B., & Feyisa, B. R. (2023). Prevalence and determinants of adequate postnatal care in Ethiopia: evidence from 2019 Ethiopia mini demographic

and health survey. *BMC Pregnancy Childbirth, 23*(1), 834. doi:10.1186/s12884-023-06147-7

Asumah, M. N., Abubakari, A., Abdulai, A. M., Nukpezah, R. N., Adomako-Boateng, F., Faridu, A. W., . . . Kabir, R. (2023). Sociodemographic and Maternal Determinants of Postnatal Care Utilization: A Cross-Sectional Study. *SAGE Open Nurs, 9*, 23779608231206759. doi:10.1177/23779608231206759

Chhetri, S., Shah, R., & Rajbanshi, L. (2020). Factors Associated with Utilization of Complete Postnatal Care Service in Baglung Municipality, Nepal. *Int J Reprod Med, 2020*, 2892751. doi:10.1155/2020/2892751

Debie, A., & Tesema, G. A. (2021). Time to early initiation of postnatal care service utilization and its predictors among women who gave births in the last 2 years in Ethiopia: a shared frailty model. *Archives of Public Health, 79*(1), 51. doi:10.1186/s13690-021-00575-7

Dhakal, S., Chapman, G. N., Simkhada, P. P., van Teijlingen, E. R., Stephens, J., & Raja, A. E. (2007). Utilisation of postnatal care among rural women in Nepal. *BMC Pregnancy Childbirth, 7*, 19. doi:10.1186/1471-2393-7-19

Fawole, O. I., & Adeoye, I. A. (2015). Women's status within the household as a determinant of maternal health care use in Nigeria. *Afr Health Sci, 15*(1), 217-225. doi:10.4314/ahs.v15i1.28

Furuta, M., & Salway, S. (2006). Women's position within the household as a determinant of maternal health care use in Nepal. *Int Fam Plan Perspect, 32*(1), 17-27. doi:10.1363/3201706

Public Health Service Regulation, 2020, (2020).

Constituion of Nepal, (2015).

Public Health Service Act, 2018, (2018a).

Safe Motherhood and Reproductive Health Rights Act, 2018, (2018b).

Haza'a, A. A., Odhah, M. A., Al-Ahdal, S. A., Abol-Gaith, F. M., Ismail, N. A., Al-Awar, M. S., . . . Kaid, M. M. (2024). Utilisation of postnatal care services among maternal in Maeen District - Sana'a City, Yemen. *BMC Pregnancy Childbirth, 24*(1), 422. doi:10.1186/s12884-024-06617-6

Khanal, V., Adhikari, M., Karkee, R., & Gavidia, T. (2014). Factors associated with the utilisation of postnatal care services among the mothers of Nepal: analysis of Nepal demographic and health survey 2011. *BMC Womens Health, 14*, 19. doi:10.1186/1472-6874-14-19

Ministry of Health and Population. (2020). *Nepal Safe Motherhood and Newborn Health Road Map 2030*. Kathmandu, Nepal

Ministry of Health and Population, & National Statistics Office. (2023). *National Population and Housing Census 2021: Nepal Maternal Mortality Study 2021*. Retrieved from Kathmandu, Nepal

Ministry of Health and Population, New ERA, & ICF International. (2022). *Nepal Demographic and Health Survey 2022*. Retrieved from Kathmandu, Nepal:

Mondal, D., Karmakar, S., & Banerjee, A. (2020). Women's autonomy and utilization of maternal healthcare in India: Evidence from a recent national survey. *PloS one, 15*(12), e0243553. doi:10.1371/journal.pone.0243553

Ndugga, P., Namiyonga, N. K., & Sebuwufu, D. (2020). Determinants of early postnatal care attendance: analysis of the 2016 Uganda demographic and health survey. *BMC Pregnancy Childbirth, 20*(1), 163. doi:10.1186/s12884-020-02866-3

Organization, W. H. (2010). *WHO technical consultation on postpartum and postnatal care*. Retrieved from https://www.who.int/publications/i/item/WHO-MPS-10.03

Pradhan, S., van Teijlingen, E., Simkhada, P. P., Dhungel, A., Silwal, R. C., Fanning, P., & Wasti, S. P. (2019). Factors Affecting the Uptake of Institutional Delivery, Antenatal

and Postnatal Care in Nawalparasi District, Nepal. *Kathmandu Univ Med J (KUMJ), 17*(67), 206-211. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/33305749

Puri, M., Wagle, K., Rios, V., & Dhungel, Y. (2020). *Impacts of Protecting Life in Global Health Assistance Policy in Nepal in Its Third Year of Implementation*. Retrieved from Kathmandu, Nepal:

Rahmati, A. (2024). Factors associated with postnatal care utilization in Afghanistan. *BMC Womens Health, 24*(1), 463. doi:10.1186/s12905-024-03318-2

Serbanescu, F., Abeysekara, P., Ruiz, A., Schmitz, M., Dominico, S., Hsia, J., & Stupp, P. (2023). Individual, Community, and Health Facility Predictors of Postnatal Care Utilization in Rural Tanzania: A Multilevel Analysis. *Glob Health Sci Pract, 11*(4). doi:10.9745/GHSP-D-22-00502

Shah, S., Yadav, N., Shah, R., Bhatta, R., Karki, R., Chaudhary, A., . . . Gupta, R. (2021). Women's autonomy and maternal health service utilization among the women's having less than two years age children in Rautahat district, Nepal. *International Journal of Scientific Reports, 7*, 427. doi:10.18203/issn.2454-2156.IntJSciRep20213256

Thapa, S., Choudhary, P., Adhikari, R., & Thapa, K. (2023). Factors Associated with Utilization of Postnatal Care Services. *J Nepal Health Res Counc, 20*(4), 886-892. doi:10.33314/jnhrc.v20i4.4236

Towongo, M. F., Ngome, E., Navaneetham, K., & Letamo, G. (2024). Individual and community-level factors associated with women's utilization of postnatal care services in Uganda, 2016: a multilevel and spatial analysis. *BMC Health Serv Res, 24*(1), 185. doi:10.1186/s12913-024-10636-6

United Nations Foundation. (2020). Sustainable Development Goals Retrieved from https://unfoundation.org/what-we-do/issues/sustainable-development-goals/?gclid=EAIaIQobChMIiPPPu_2E7gIV08EWBR0XWgMVEAAYASAAEgK8Z_D_BwE

WHO, U., MCHIP. (2015). Postnatal Care for Mothers and Newborns - Highlights from the World Health Organization 2013 Guidelines In.

Worku, S., Dheresa, M., Ali, T., & Lodebo, M. (2024). Early Postnatal Care Utilization and Associated Factors Among Women Who Give Birth in the Last Six Weeks in Hosanna Town, Southern Ethiopia, 2022. *J Pregnancy, 2024*, 1474213. doi:10.1155/2024/1474213

Yimer, T. S., Ferede, W. Y., & Sisay, F. A. (2024). Utilization of early postnatal care services and associated factors among mothers who gave birth in the last 12 months in South Gondar Zone District, Amhara Regional State, Ethiopia. *J Health Popul Nutr, 43*(1), 26. doi:10.1186/s41043-024-00524-4

Yimer, T. S., Sisay, F. A., Belay, H. G., Mihretie, G. N., Dagnaw, E. H., & Ferede, W. Y. (2024). Early Post-natal Care Services Utilization and its associated factors among mothers Systemic Review and Meta-Analysis. *Heliyon, 10*(1), e23760. doi:10.1016/j.heliyon.2023.e23760

Yosef, Y., Demissie, M., Abeje, S., Walle, F., Geze, S., Beyene, A., & Shifa, M. (2023). Prevalence of early postnatal care services usage and associated factors among postnatal women of Wolkite town, Gurage zone, Southern Ethiopia: a community-based cross-sectional study. *BMJ Open, 13*(1), e061326. doi:10.1136/bmjopen-2022-061326