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Institutional Delivery and Associated Factors in Karnali Province, Nepal

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Abstract

The area of institutional delivery is the core of the reduction of maternal and neonatal mortality, and the coverage in remote provinces of Nepal is not the same. This study evaluates the institutional delivery determinants in the Karnali Province based on nationally representative data.

The data were using Nepal Demographic and Health Survey (NDHS) 2021 Karnali subsample of women who have had a recent live birth (15 49 years). The survey logistic regression was adjusted by age, birth order, education, caste/ethnicity, religion, residence and wealth to institutional delivery (facility vs. home). Sampling weight was used (two strata; 60 PSUs; df=58). The results will be provided as adjusted odds ratios (AOR) with 95 percent confidence intervals (CI).

Older maternal age and schooling was positively correlated with institutional delivery, whereas higher parity was negatively correlated with institutional delivery. Age 30 -49 was significantly increased in odds compared to 20 years (AOR = 7.71; 95% CI: 2.1730.38). In comparison with lack of schooling, basic and high education (AOR = 3.23; 1.39-7.50 and 7.31; 2.60- 20.59) augmented utilization. AOR decreased with second (AOR = 0.33; 0.16–0.66) and third/higher births (AOR = 0.25; 0.11-0.55). The odds in the poorer quintile were greater than the poorest (AOR = 2.42; 1.13- 5.22). Religion, caste/ethnicity and rural residence were not big. The model was significant (F(15, 44)=3.41; p=0.0008).

Parity, age, economic position, and education determine the facility delivery in Karnali. Girls education, transport/financial support and increased facility preparedness are the most critical strategies that should be incorporated to increase safe and respectful childbirth in geographically disadvantaged conditions.

1. Introduction

One of the foundations of the push to decrease maternal and neonatal mortality and morbidity is institutional delivery childbirth that takes place in a healthcare facility and is overseen by trained professionals (World Health Organization [WHO], 2018). In 2022, approximately 81 percent of births were conducted in health institutions around the world, but discrepancies are clear across nations and social classes (UNICEF, 2023). Timely access to life-saving attention measures like skilled birth attendance, obstetric emergency management, and neonatal resuscitation is provided through institutional delivery (Campbell et al., 2016). The provision of a greater number of safe and well-equipped birthing facilities will be the critical factor in Sustainable Development Goal (SDG) 3.1, claiming to address the global maternal mortality rate to less than 70 deaths per 100,000 live births by 2030 (United Nations, 2023).

Policy reforms, incentive schemes, and entrenched community-based frameworks have seen improvements in maternal health in Nepal over the past decades (Ministry of Health and Population [MoHP], New ERA, and ICF, 2023a). The percentage of institutional delivery coverage increased to 79 in 2022 (MoHP et al., 2023b). However, there are still existing gaps between the provinces, economic classes, and social classes (Bhusal and Bhattarai, 2021; Neupane et al., 2021). Women in isolated and mountainous settings, specifically, the Karnali Province have been warned with their distance, lack of transportation, facility preparation, and cultural beliefs that promote home deliveries (Joshi et al., 2016; Thapa et al., 2023). The level of institutional delivery in Karnali remains lowest and this indicates ingrained geographic and socioeconomic inequalities (Karnali Province Ministry of Social Development, 2024).

In response to these, Nepal has come up with the Safe Motherhood and Newborn Health (SMNH) Roadmap 2030 and the Aama Programme, which provides free maternity care, referral assistance, and monetary benefits to encourage facility-based delivery (Family Welfare Division, 2020; NHSSP, 2020). Nevertheless, their effect is diminished in remote areas due to the issues of implementation, including the lack of human resources, poor referral systems, and inconsistent quality of care (NHSSP, 2020; Mehata et al., 2017). Determinants of institutional delivery identification is thus also critical in enhancing policy refinement and equitable service delivery.

NDHS and MICS, maternal education, age, parity, wealth, residence, and caste/ethnicity are also found to be crucial predictors (Bhusal and Bhattarai, 2021; Thapa et al., 2022; B. Thapa et al., 2023). Education increases health literacy and autonomy (Ghimire et al., 2023), whereas wealth reduces indirect costs even with free-care policy. On the other hand, the facility births can be discouraged by gendered decision-making and cultural norms (Khatri, 2024). These obstacles are enhanced in Karnali by rugged landscape, inadequate infrastructure, and caste-based differences (MoHP, 2023c; Neupane et al., 2021).

This study thus examines issues that affect institutional delivery in women of reproductive age in Karnali Province based on 2021 NDHS data. It looks at determinants of maternal age, parity, education, caste/ethnicity, religion, residence and household wealth. The results of the study are expected to complement evidence-based interventions to promote equitable and safe motherhood within the provincial and country-wide frameworks, including the Aama Programme and SMNH Roadmap.

2. Methods

This study used secondary data from the NDHS 2021 conducted by the MoHP, New ERA, and ICF. The analysis included women aged 15–49 years who resided in Karnali Province and had at least one live birth in the five years preceding the survey. The dependent variable was institutional delivery, defined as delivery at a health facility = 1, and home = 0. Independent variables included maternal age, birth order, education, caste/ethnicity, religion, residence, and household wealth index. The cross-sectional analytical design used weighted data for analysis to ensure representativeness. Descriptive statistics and bivariate analyses (χ^2 tests) examined institutional delivery and its associations with the explanatory variables. All variables with a p-value of ≤ 0.20 in the bivariate analysis were selected for a multivariable logistic regression model. The results were presented as AOR with 95% CI.

3. Result

Institutional delivery refers to giving birth in a health facility, such as a hospital or clinic, under the care of trained professionals. This offers timely medical support and emergency care, which helps reduce risks for both the mother and her baby. Encouraging institutional delivery is imperative to improve maternal and newborn health results.

Age: The chances of institutional delivery vary according to the mother's age. While teenage mothers are at much greater risk and need medical supervision during childbirth, older mothers above 35 are also more susceptible to various complications that make a facility-based delivery necessary. Promoting institutional delivery across all age groups helps in mitigating the risks and ensures safety for both the mother and the newborn.

Table 1: Distribution of respondents by Age

Age	No(%)	Yes(%)	Total (N)	Total(%)
<20	10.3	17.4	33	15.4
20-24	34.6	38.9	81	37.7
25-29	34.2	25.0	60	27.7
30-49	20.8	18.8	42	19.4
Total(N)	**62.1**	**153.9**	**216**	
Total(%)	**100.0**	**100.0**		**100.0**

Source: MOHP, 2022

Table 1, most of the respondents were aged 20–24 years, comprising 37.7% of the sample, followed by 27.7% aged 25–29 years and 19.4% in the age category of 30–49 years. About 15.4% of the respondents had <20 years of age. Institutional delivery was more common among younger women below 20 years of age, at 17.4%, and those aged 20–24 years, at 38.9%, than among women aged 25–29 years and 30–49 years. This means that institutional delivery tended to be higher among younger mothers.

Religion: Religion can explain a person's choice of place for delivery. Whereas some religious groups promote facility-based delivery for safety, others prefer home birth based on their traditional or cultural upbringing. Offering culturally sensitive healthcare services that respect these religious beliefs and promote the benefits of institutional delivery will go a long way toward improving maternal and newborn health results.

Table 2: Distribution of respondents by Religion

Religion	No(%)	Yes(%)	Total (N)	Total(%)
Hindu	93.1	96.2	206	95.3
Other religion	6.9	3.8	10	4.7
Total(N)	**62.1**	**153.9**	**216**	
Total(%)	**100.0**	**100.0**		**100.0**

Source: MOHP, 2022

Table 2 explains that 95.3% of respondents identified themselves as Hindu while 4.7% were from other religions; 96.2% of Hindu women delivered their babies in the institution while 3.8% were from other religions. This means that the religious factor has the least variation in institutional delivery behavior among respondents, given the dominance of one religious group.

Birth order: Birth order is influential in the choices on institutional delivery; first-time mothers are more likely to deliver in facilities, whereas multiparous women may prefer home births. The promotion of institutional delivery for all births enhances maternal and newborn safety.

Table 3: Distribution of respondents by birth order

Birth order	No(%)	Yes(%)	Total (N)	Total(%)
First	19.1	45.0	81	37.6
Second	36.3	28.4	66	30.7
Third or higher	44.6	26.6	69	31.8
Total(N)	**62.1**	**153.9**	**216**	
Total(%)	**100.0**	**100.0**		**100.0**

Source: MOHP, 2022

Table 3, the majority were first-time mothers (37.6%); this was followed by second births at 30.7% and third or higher births at 31.8%. The highest institutional delivery was associated with first births at 45.0%, although decreased with increasing birth order: 28.4% for second births and 26.6% for third or higher births. This indicates that the probability of institutional delivery decreases with an increase in birth order.

Caste/Ethnicity: Caste and ethnicity are strong determinants of access to institutional delivery. Women from lower castes or minority groups often face discrimination and barriers to care, leading to lower rates of facility-based births. This calls for the promotion of equity and culturally sensitive care to ensure that all women have equal access to safe institutional delivery and improved maternal and newborn health.

Table 4: Distribution of respondents by Caste/ethnicity

Ethnicity	No(%)	Yes(%)	Total (N)	Total(%)
Dalit	41.3	27.6	68	31.5
Janjati	7.9	10.6	21	9.8
Brahmin/Chhetri	50.8	61.8	127	58.7
Total(N)	**62.1**	**153.9**	**216**	
Total(%)	**100.0**	**100.0**		**100.0**

Source: MOHP, 2022

Table 4 shows that the majority (58.7%) of the respondents belonged to the Brahmin/Chhetri group, followed by Dalit (31.5%) and Janjati (9.8%). The proportion of institutional delivery was

highest among Brahmin/Chhetri women (61.8%) and lowest among Dalit women (27.6%). This reflects that caste and ethnicity play an important role, and women from higher castes are more likely to utilize institutional delivery services.

Education attainment: Education greatly influences decisions on seeking institutional delivery. Better-educated women realize the benefits and may prefer facility deliveries, whereas less-educated women may suffer from knowledge or access barriers. Increased awareness at all levels of education can lead to enhanced institutional delivery and better health results for mothers and newborns.

Table 5: Distribution of respondents by educational attainment

Educational attainment	No(%)	Yes(%)	Total (N)	Total(%)
No Education	32.3	10.6	36	16.8
Basic Education	60.4	65.5	138	64.0
Higher Education	7.4	23.9	41	19.2
Total(N)	**62.1**	**153.9**	**216**	
Total(%)	**100.0**	**100.0**		**100.0**

Source: MOHP, 2022

Table 5 reflects that the majority of the respondents had basic education, 64.0%, while 19.2% had higher education and 16.8% had no education. Institutional delivery was highest among women with higher education, at 23.9%, and lowest in the group with no education, at 10.6%. This pattern shows that as education level increases, the likelihood of institutional delivery also increases.

Place of delivery: The place of residence strongly influences institutional delivery. The likelihood of urban women delivering in health facilities increases because of improved access and services, while rural women are often hindered by distance and limitation of services. Strengthening healthcare infrastructure and improving access, especially in rural settings, is required for ensuring safe deliveries among all women.

Table 6: Distribution of respondents by place of residence

Type of place of residence	No(%)	Yes(%)	Total (N)	Total(%)
Urban	43.6	48.9	102	47.4
Rural	56.4	51.1	114	52.6
Total(N)	**62.1**	**153.9**	**216**	
Total(%)	**100.0**	**100.0**		**100.0**

Source: MOHP, 2022

Table 6 indicates that 64.0% of the respondents had basic education, higher education comprised 19.2%, and those with no education were 16.8%. Institutional delivery was more common among

women with higher education (23.9%) and least common among those with no education (10.6%). This shows a positive relationship between educational attainment and the likelihood of institutional delivery.

Wealth quantile: Economic status strongly affects institutional delivery. Women in higher wealth quintiles are more likely to give birth in health facilities because of better affordability and access, while poorer women face financial barriers to utilization. Reduction of economic inequalities ensures affordable and accessible institutional delivery for all income groups, which is the most appropriate strategy for improved maternal and newborn health results.

Table 7: Distribution of respondents by wealth index

Wealth index	No(%)	Yes(%)	Total (N)	Total(%)
Poorest	87.1	63.0	151	69.9
Poorer	8.4	15.2	29	13.3
Middle	0.0	7.9	12	5.7
Richer	4.5	6.1	12	5.7
Richest	0.0	7.8	12	5.5
Total(N)	**62.1**	**153.9**	**216**	
Total(%)	**100.0**	**100.0**		**100.0**

Source: MOHP, 2022

Table 7 shows that the majority of the respondents, 69.9%, had belonged to the poorest wealth group, followed by poorer, middle, richer, and richest categories, at 13.3%, 5.7%, 5.7%, and 5.5%, respectively. This is also evident in the low level of institutional delivery, which was 63.0%, 6.1%, and 7.8% among the poorest, richer, and richest groups, respectively, although it increased with economic status. Such a pattern indicates wealth as one of the major determinants of service utilization.

Institutional delivery in maternal health services: Logistic regression analysis was done to find the variables which are associated with institutional delivery in maternal health services in Karnali Province. The total number of observations in the survey is 448 from 60 PSUs within 2 strata.

Table 8: Distribution of factors associated institutional delivery

Institutional Delivery	Odds ratio	std. err.	T	P>|t|	[95 conf. interval]	
Age						
20-24	1.052753	0.475305	0.11	0.91	0.4264152	2.599083
25-29	1.251695	0.578461	0.49	0.629	0.4962972	3.156857
30-49	7.712715	5.053979	4.07	1.099	2.165163	30.37987
Birth order						

Second	0.328541	0.114427	-3.2	0.002	0.1636103	0.6597323
third or higher	0.251522	0.09846	-3.53	0.001	0.1148862	0.5506614
Religion						
Other religion	0.456237	0.308098	-1.16	0.25	0.1180667	1.763008
Caste/ Ethnicity						
Janjati	1.185863	0.612329	0.33	0.742	0.4218392	3.333666
Brahmin/Chhetri	0.968306	0.339323	-0.09	0.927	0.4801445	1.952781
Educational attainment						
Basic Education	3.226997	1.359158	2.78	0.007	1.38883	7.498046
Higher Education	7.310561	3.781784	3.85	0	2.595614	20.59023
Rural	1.549661	0.524706	1.29	0.201	0.7868375	3.052026
Wealth quantile						
Poorer	2.42495	0.928148	2.31	0.024	1.127108	5.217233
Richer	1.786047	1.094824	0.95	0.348	0.5236024	6.092342
Richest	1.786047	1.094824	0.95	0.348	0.5236024	6.092342
_cons	0.90299	0.440401	-0.21	0.835	0.3401695	2.397012

The results of regression analysis confirmed the model's statistical significance, using the notation ($F(15, 44) = 3.41$, $p = 0.0008$, $df = 58$), which means that the variables taken together could induce institutional delivery among women in Karnali Province. Women that belonged to the age group of 30-49 years were found to have a very high probability of giving birth in a hospital as compared to the others (OR = 7.71, 95% CI: 2.17–30.38), while this was not the case for the younger ones. The birth order negatively influenced the likelihood of delivery by showing that women having second babies (OR = 0.33, 95% CI: 0.16–0.66) and those having third or more babies (OR = 0.25, 95% CI: 0.11–0.55) were less likely to deliver in hospitals. Education turned out to be a strong factor, with the ones educated up to the basic level (OR = 3.23, 95% CI: 1.39–7.50) and higher education (OR = 7.31, 95% CI: 2.60–20.59) being significantly more inclined towards hospital delivery. The status of wealth also had an effect on the use of the health facility, as the women from the poorer section were more likely (OR = 2.42, 95% CI: 1.13–5.22) to deliver in institutions while there was no significant difference between the other wealth categories of the richer and richest ones. Religion, caste/ethnicity, and residence were not among the significant predictors. To sum up, the results point out that age, birth order, education, and economic status are the major determining factors for the probability of institutional delivery in Karnali Province.

4. Discussion

The study discussed the factors of institutional delivery among women in Karnali Province in Nepal based on the Nepal Demographic and Health Survey (NDHS) 2021. Analysis revealed that

maternal age, parity, education and household wealth were found to be significant predictors of institutional delivery, with religion, caste/ethnicity and residence not being significantly related. These findings highlight the persistence of the role of socio-economic and demographic differences in the use of maternal health services in one of the most remote and underserved provinces in Nepal.

Age of the mothers was relevant in deciding on institutional delivery. Women aged between 30-49 years were also more likely to be delivering through health institutions as opposed to younger women, which is perhaps because they were more knowledgeable with regards to the complications arising during childbirth as well as their experience with the healthcare systems. The same results have been observed in Ethiopian (Mekonnen et al., 2023) and Bangladesh (Rahman et al., 2020) research. Conversely, teen mothers and young mothers tend to experience hindrances like lack of autonomy, stigmatization, and care accessibility (Subedi et al., 2021). Empowerment and strengthening of adolescent reproductive health education programs would enhance institutional delivery among this vulnerable group.

Institutional delivery had a negative relationship with parity. Women who had second or higher births had a lower likelihood of giving birth in health facilities, which was similar to those of Nepal (Khanal et al., 2020) and Pakistan (Agha and Carton, 2011). The trend can be caused by a greater level of confidence and a feeling that individuals are more familiar with the process of childbirth, along with financial limitations in bigger families (Devkota, 2024). Thus, the very idea of health promotion messages should be focused on the fact that every pregnancy has its own risks, and it is better to have institutional birth, irrespective of the birth order.

One of the strongest determinants was the educational attainment. Females who received higher education had more than sevenfold the chances of choosing institutional delivery over unschooled ones. This is in line with the research conducted in India (Singh et al., 2021) and Nepal (Acharya et al., 2023), where education is shown to increase health literacy, autonomy, and informed decision-making. Education helps in establishing a good rapport with health care providers and faith in health care systems (Sapkota and Adhikari, 2022). Therefore, an education policy that favors female education will indirectly support the health of mothers and newborns.

The consumer affluence also had a significant impact on service consumption. Financial access is important as poorer households had a greater likelihood of delivering in health institutions compared to the poorest group of women. Although there is the Aama Programme of the government that provides free delivery care, indirect expenses, including transportation and food, are also the key barriers (Khatun et al., 2022). These barriers especially in the remote mountain locations can be reduced by expanding transport subsidies and community savings programs.

Even though religion and caste/ethnicity were not statistically significant, this could be a sign of a positive change towards the elimination of historical inequities through the policies based on equity and targeting the communities with Female Community Health Volunteers (FCHVs). Nevertheless, the research indicates they still experience subtle discrimination and mistrust (Regmi et al., 2018), which should be minded at all times in terms of culturally sensitive care. In the same manner, there were no major differences between rural and urban areas, which is the opposite of national studies before (Maharjan et al., 2022). The reduction of the gap is probably due to better infrastructure and rural health investments, but still there are geographical barriers.

To sum it up, the research illustrates that maternal age, education, parity and economic status are the important determinants of institutional delivery at the Karnali Province. Enhancing education, tackling economic disparities, and enhancing rural health infrastructure, including context-specific ones (e.g., transport vouchers and culture-specific advice) can speed up the process of universal institutional delivery and maternal mortality decline in Nepal.

5. Conclusion

This study concludes that the institution delivery within the Karnali Province is largely determined by maternal age, education, birth order and household wealth. Women aged between 30-49 years, those with secondary or higher education, and female of more economically better endowed households were more likely to deliver in health institutions and higher-parity women were less likely to do so. The results underscore the existence of long-term socio-economic disparities and barriers to maternal health service in the most remote province in Nepal. Despite the efforts of the Aama Programme by the government and the roadmap of Safe Motherhood and Newborn Health 2030 to raise the number of institutional deliveries in the country, institutional and contextual factors, which include inaccessibility, an issue of transport, and poverty, are key constraints in the context of Karnali.

In order to actualize universal coverage of quality birth attendance and maternal mortality reduction as in SDG 3.1, policies must emphasize education among women and girls, increase transportation and financial support systems, and improve health facility preparedness in geographically depressed communities. Service utilization can be advanced by community-based education, culturally sensitive counseling and empowerment of female health workers. Building quality and equity in maternal care delivery will provide an assurance, which means that every woman will be able to receive safe and dignified birth services in Nepal irrespective of the geographic location or socio-economic status.

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