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Factor associated with delay in institutional delivery among mothers having under-2-year child in Badimalika Municipality, Bajura, Nepal: a cross-sectional study

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Abstract

Introduction: Delay in institutional delivery refers to the time interval from the first onset of labor to the start of receiving the first health care. Delays in deciding to seek care, identifying and reaching medical facilities, and receiving adequate and appropriate treatment are three significant factors that contribute to maternal morbidity and mortality. This study aims to find the factors associated with institutional delays.

Method: A cross-sectional study was conducted among mothers with children under 2 years old in Badimalika Municipality Bajura. Three wards (ward no. 7, 8 and 9) were selected purposively out of nine. The probability proportion size method was used to select study participants from each ward. A total of 230 mothers with under 2 children were selected. Face-to-face interviews were used to collect the data. Descriptive statistics and the chi-square tests were used to identify the factors associated with maternal delays.

Result: The magnitudes of the first, second, and third maternal delays were 159(69.1%), 58(25.20%), and 60(26.10%), respectively. The first delay was significantly associated with unemployed women, birth preparedness, and mothers' education level. Distance to a health facility and means of transportation were significantly associated with the second delay. The absence of obstetric drugs, a skilled health provider, and the need for referral were significantly associated with the third delay in institutional delivery.

Conclusion: The magnitude of the first, second, and third maternal delays was high, which indicates that most mothers were not receiving institutional delivery services at the recommended time. Maternal socio-economic, accessibility, and healthcare system factors affected the three delays in this study.

Keywords: Childbirth, Delay, Delivery, Nepal, Obstetrics

INTRODUCTION

Delays in institutional delivery services significantly contribute to maternal mortality, with over 800 women dying daily from pregnancy and delivery complications worldwide.[1] Each year, 303,000 women die from pregnancy and childbirth-related causes, mostly in low- and middle-income countries, especially in sub-Saharan Africa and South Asia.[2]

Nepal has significantly reduced maternal mortality ratio (MMR) from 539 in 1996 to 151 in 2021.[3] Despite this progress, accelerated efforts are needed to meet the Sustainable Development Goal (SDG) targets by 2030, which aim for MMR below 70 per 100,000 live births.[3] Maternal mortality reduction remains a priority, and the World Health Organization (WHO) issued strategies to end preventable maternal deaths under SDG.[4]

The three-delays model developed by Thaddeus and Maine is the most common framework for evaluating the circumstances surrounding maternal death.[5] These are delays in seeking care, reaching a healthcare facility, and receiving care at the healthcare facility. Documenting delays is crucial to tailor interventions and reduce preventable maternal deaths effectively.[2]

Due to a lack of evidence, the study investigates the extent of delays in using institutional delivery services among mothers in rural Bajura, Nepal.

This study aims to identify the types of delays responsible for delays in institutional delivery, which may help in solving the cause of the delay

METHOD

A cross-sectional study was conducted among mothers with children under 2 years old at Badimalika municipality, Bajura. It was conducted from Sep to Oct 2024 after getting ethical approval letter from the Institutional Review Committee (IRC) of Nobel College, Kathmandu with Ref. no. 081/82/53. The data were collected only from mothers who delivered within public health facilities.

The sample size for the study was calculated using Fisher's formula for a finite population. Given that the total population (N) of mothers with children under two years was 439,[3] and the confidence interval was set at 95%, with an allowable error (e) of 0.05, the minimum required sample size (n) was determined as follows:

$$(n)= \frac{N}{1+N(e)^2} = \frac{439}{1+439(0.05)^2} = 209$$

To account for non-response, the sample size was adjusted by a non-response rate of 10%, resulting in a final sample size of 230.

Three wards were selected purposively out of nine wards. The Probability proportion size method was used to select study participants from each ward Population data from wards 7, 8 and 9 of Badimalika municipality were obtained from ministry of health and population and the probability of selecting respondents from each wards was proportional to its population size. With in each selected wards the respondents were selected using simple random sampling methods. Mothers were informed about the study through local leaders, health workers especially FCHV (female community health Volunteer). Researchers visited the selected ward PHC-ORC(primary health care outreach clinic), mothers group meetings and community to collect data from mothers. The source of data for the study was primary data.

The study used a semi-structured questionnaire to gather information on the study variable. The dependent variables include the three delays. First maternal delay is the time interval between recognition of labor and the decision to seek institutional delivery service. Time taken ≥1 hr to make the decision to seek care is considered a delay, and less than an hour is considered no delay. Second maternal delay is the time interval from starting to reach health facilities after making a decision. Time taken ≥1 hr to reach facilities is considered a delay, and less than an hour is regarded as no delay. Third, maternal delay is the time interval between reaching the facility and receiving delivery care. Time taken ≥1 hr to receive delivery service is considered a delay, and less than an hour is regarded as no delay.

The independent variables were socioeconomic factors, obstetric health factors, healthcare system factors, and accessibility of facility factors.

The data were collected using a face-to-face interview and a semi-structured questionnaire, partly adapted from relevant published literature.[1, 6, 7, 8] The questionnaire was prepared in English. The English version was translated into Nepali, entered in Kobo Collect v 2024.1.3, and back-translated into English. The questionnaire was pre-tested on 5 % of respondents in ward no. 9 of Badi Malika municipality. The supervisor supervised and coordinated the overall data collection activity. The collected data were reviewed and checked for completeness and relevance before the data analysis.

The collected data was exported from the Kobo toolbox into MS Excel and imported into IBM SPSS (statistical package for social science) version 22 for analysis. Descriptive statistical methods such as percentage and frequency were used to express the data. A chi-square test was performed to see if there was a relationship between the dependent and independent variables. The level of significance was declared at a p-value less than 0.05.

Informed consent was obtained from each participant in the study. The consent was taken by the researcher before the interviews.

RESULT

The study included 230 respondents. The socio-demographic characteristics of the study population are shown in Table 1.

Table 1. Socio-demographic factor of the study population

Variable	Characteristics	*f* (%)
Age of Mother	15-20	29(12.6%)
	21-30	177(77.0%)
	31=<	24(10.4%)
Ethnicity	Brahmin	33(14.3%)
	Chhetri	129(56.1%)
	Dalit	56(24.3%)
	Jana-jati	12(5.2%)
Religion	Hindu	208(90.4%)
	Buddha	11(4.8%)
	Christian	11(4.8%)
Mother Education	Cannot read and write	22(9.6%)
	Primary level	42(18.3%)
	Secondary level	135(58.7%)
	Higher level	31(13.5%)
Mother Occupation	Housewife	86(37.4%)
	Student	9(3.9%)
	Daily Labor	6(2.6%)
	Farmer	93(40.4%)
	Employed	13(5.7%)
	Business	23(10.0%)
Husband Education	Cannot read and write	11(4.8%)
	Primary level	38(16.5%)
	Secondary level	148(64.3%)
	Higher level	33(14.3%)
Husband Occupation	House wife	3(1.3%)
	Student	5(2.2%)
	Daily labor	57(24.8%)
	Farmer	78(33.9%)
	Employed	48(20.9%)
	Business	29(12.6%)
	Foreign	10(4.3%)

Regarding their pregnancy history, 91(39.6%) were experiencing their first pregnancy (primigravida), 127(55.2%) had been pregnant multiple times (multigravida). The obstetrics history of the study population is given in Table 2.

Regarding financial decision-making, most decisions were made by husbands 151(65.7%). Regarding accessibility to healthcare facilities, 154(67.4%) of mothers lived less than 5 kilometers from the nearest health facility. Nearly half of the mothers, 111(48.3%), traveled by foot to reach healthcare facilities. Public transportation was entirely unavailable for all participants 230(100.0%). Table 3 shows details of decision-making.

Table 2. Obstetric history of study population

Variable	Characteristics	f (%)
Gravida	Primigravida	91(39.6%)
	Multi gravida	127(55.2%)
	Grand gravida	12(5.2%)
Parity	Primi parous	96(41.7%)
	Multi parous	124(53.9%)
	Grand parous	10(4.3%)
ANC follow up	Yes	230(100%)
Frequency of ANC follow up	>4	24(10.4%)
	4=<	20689.6%)
Place for ANC visit	Health post	69(30.0%)
	Private clinic	7(3.0%)
	Hospital	154(67.0%)
Planned Pregnancy	Yes	164(71.3%)
	No	66(28.7%)
Birth preparedness	No	92(40.0%)
	Yes	138(60.0%)
Time taken to decide to seek medical care after finding labor pain	Less than one hour	71(30.9%)
	One hour or more than one hour	159(69.1%)

Table 3. Accessibility and decision-making

Variable	Characteristics	*f* (%)
Financial decision maker	self	56(24.3%)
	Husband	151(65.7%)
	Other family member	23(10.0%)
Distance to nearest health facility	<5 Km	155(67.4%)
	5-10 Km	67(29.1%)
	10< km	8(3.5%)
Means of transportation used	By foot	111(48.3%)
	By private vehicle	38(16.5%)
	By Ambulance	9(3.9%)
	By Stretcher	72(31.3%)
Public transportation availability	NO	230(100.0%)
Time taken to reach a health facility	Less than one hour	172(74.8%)
	One hour or more than one hour	58(25.2%)

Among the study mothers, 51(22.2%) encountered the absence of health workers during their visits. The admission process was generally efficient, with only 8(3.5%) reporting a lengthy process. The availability of obstetric drugs was mainly adequate, with 213(92.6%) of mothers confirming their availability.

Among the study mothers, 39(17.0%) required a referral to another facility. The mode of delivery and timing of delivery are shown in Table 4.

It was observed that mothers aged 31 and above experienced the highest delay (79.2%), but this was not statistically significant (χ^2 = 1.578, p = 0.454). Ethnicity and religion did not significantly impact delays. However, the mother's education level showed a significant association, with 95.5% of those without formal education experiencing delays (χ^2=7.899, p = 0.005).

Table 4. Health system factor among the study mothers.

Variable	Characteristics	*f* (%)
Absence of health worker	Yes	51(22.2%)
	No	179(77.8%)
Lengthy admission process	Yes	8(3.5%)
	No	222(96.5%)
Absence of Obstetric drug	Yes	17(7.4%)
	No	213(92.6%)
Referral needed	Yes	39(17.0%)
	No	191(83.0%)
Mode of delivery	Normal vaginal delivery	174(75.7%)
	Cesarean section	32(13.9%)
	Assisted delivery (Vacuum/forceps)	24(10.4%)
Time taken to get delivery service after reaching the health facility	Less than one hour	170(73.9%)
	One hour or more than one hour	60(26.1%)
Reason for delay in seeking care for institutional delivery	Lack of awareness	178(77.39%)
	poverty	166(72.17%)
	long distance to the health facility	161(70%)
	Poor road condition	167(72.1%)
	Lack of transportation facility	189(82.17%)
	Religious beliefs	101(43.91%)

Employment status also significantly influenced delays, with 76.9% of employed mothers not facing delays (χ^2 = 13.694, p = 0.000). Factors like the husband's education, gravida status, parity, pregnancy planning, and financial decision-making did not significantly correlate with the first delay.

Factors associated with the second delay among the study mothers is shown in the table 6.

It was found that mothers who required referrals faced significantly higher delays 21(53.8%) (χ^2 = 18.768, p = 0.000). The absence of a skilled health provider led to increased delays 24(41.7%) (χ^2 = 14.946, p = 0.000). The other factors associated with the third delay are shown in Table 7.

DISCUSSION

This study found that the magnitude of the first, second, and third maternal delays was 159(69.1%), 58(25.2%), and 60(26.1%), respectively. Mothers' education level, occupation, and birth preparedness were significantly associated with the first delay. Distance to health facilities and means of transportation were significantly associated with the second delay. The availability of obstetric drugs, skilled health providers, and needed referrals were found to be significantly associated with the third delay in institutional delivery.

The magnitude of the first maternal delay in utilizing institutional delivery services was 69.1%. This study's findings were higher than those of the analysis done in Yem special district, Southern Ethiopia (44.2%), South Gondar zone hospitals, Ethiopia (42%), and Public Health Facilities in Dawuro Zone, Southern Ethiopia(36.3%). [9, 10, 11] However, the finding of this study is lower than the study findings in Pakistan (71%),[12] and Bangladesh (69.3%)[13]This might be due to the differences in the time of the studies conducted, the population differences, the methodological differences, the lack of a health extension program, and the way people live.

The result of this study showed that the first maternal delay in the utilization of institutional delivery service was significantly influenced by the mother's occupation (χ^2 = 13.694, p = 0.000). Unemployed mothers were more likely to have a first maternal delay in the utilization of institutional delivery service than employed mothers. This study aligns with the studies in the Gamo Zone and Hadiya Zone, Southern Ethiopia.[8, 14] One possible explanation is that women are not involved in income-generating activities, which can cause them to depend on other incomes and consequently influence their timely decision to receive institutional delivery services.[8] Also, employed mothers are more educated and empowered than unemployed mothers.

Similarly, birth preparedness was one of the other factors associated with the first maternal delay in utilizing institutional delivery services. Women with no birth preparedness for institutional delivery services were more likely to have a first maternal delay than those who were well prepared for birth and its complications. A study conducted in Bangladesh, Yem special district, Southern Ethiopia, and Gamo zone Ethiopia supported this finding.[10, 8, 15]This could be due to well-prepared women who are aware of the importance of making a timely decision to receive delivery service and know where or when to seek care.

This study also revealed that those with no formal education were more likely to experience the first delay than those with formal education. The study aligns with the study done in Makwanpur district, Nepal,[16] and Karachi, Pakistan.[12]

This study findings showed that the magnitude of second maternal delay in institutional delivery service utilization was 25.2%. This finding is lower than findings from studies in Gamo Zone Ethiopia (44%),[8] urban Bangladesh (38%),[15] Yem Special Woreda, Southwest Ethiopia (66%).[10] The difference might be due to the inaccessibility of health facilities, the setting of the place of study, the unavailability of roads, inadequate Ambulance service, and women's economic status.

Table 5. Factor associated with the first delay among the study mothers

Variable	Characteristic	First Delay		Chi-square	P- value
		Not delayed	Delayed		
Mother's age	15-20	8(27.6%)	21(72.4%)	1.578	0.454
	21-30	58(32.8%)	119(67.2%)		
	31≤	5(20.8%)	19(79.2%)		
Ethnicity	Brahmin	9(27.3%)	24(72.7%)	2.272	0.518
	Chhetri	45(34.9%)	84(65.1)		
	Dalit	14(25%)	42(75%)		
	Janajati	3(25%)	9(75%)		
Religion	Hindu	64(30.8%)	144(69.2%)	0.223	0.894
	Buddha	3(27.3%)	8(72.8%)		
	Christian	4(36.4%)	7(63.6%)		
Mother's education	No formal education	1(4.5%)	21(95.5%)	7.899	**0.005**
	Formal education	70(33.7%)	138(66.3%)		
Mother's occupation	Unemployed	61(28.1%)	156(79.9%)	13.694	**0.001**
	Employed	10(76.9%)	3(23.1%)		
Husband's Education	No formal education	1(9.1%)	10(90.9%)	2.568	0.109
	Formal education	70(32%)	149(68%)		
Birth preparedness	No	14(15.2%)	78(84.8%)	17.603	**0.0001**
	Yes	57(41.3%)	81(58.7%)		
Gravida	Primigravida	27(29.7%)	64(70.3%)	0.101	0.750
	Multi gravida	44(31.3%)	95(68.7%)		
Parity	Primiparous	28(29.2%)	68(70.8%)	0.224	0.636
	Multiparous	43(32.1%)	91(67.9%)		
Planned pregnancy	Yes	49(29.9%)	115(70.1%)	0.263	0.608
	No	22(33.3%)	44(66.7%)		
Financial decision maker	Self	22(39.3%)	34(60.7%)	2.457	0.117
	Others	49(28.2%)	125(71.8%)		

Table 6. Factors associated with the second delay among the study mothers

Variable	Characteristic	Second delay		Chi-square	P value
		Not delayed	Delayed		
Gravida	Primigravida	64(70.3%)	27(29.7%)	1.583	0.208
	Multi gravida	108(77.7%)	31(22.3%)		
Parity	Primiparous	66(68.8%)	30(31.2%)	3.180	0.075
	Multiparous	106(79.1%)	28(20.9%)		
Distance of nearby health institution	<5 Km	149(89.7%)	16(10.3%)	60.632	**0.0001**
	5-10 Km	32(47.8%)	35(52.2%)		
	>10Km	1(12.5%)	7(87.5%)		
Means of transportation used	By foot	97(87.4%)	14(12.6%)	22.428	**0.0001**
	By private vehicle	28(73.7%)	10(26.3%)		
	By Ambulance	7(77.78%)	2(22.2%)		
	By stretcher	43(59.3%)	29(40.7%)		
Financial Decision maker	Self	46(82.1%)	10(17.9%)	2.126	0.145
	Others	126(72.4%)	48(27.6%)		
Mother's occupation	Unemployed	161(74.2%)	56(25.8%)	0.706	0.401
	Employed	11(84.6%)	2 (15.4%)		

Table 7. Factor associated with the third delay among the study mothers

Variable	Characteristic	Third delay		Chi-square	P value
		Not delayed	Delayed		
Referral needed	Yes	18(46.2%)	21(53.8%)	18.768	**0.001**
	No	152(76.6%)	39(20.4%)		
Absence of skilled health provider	Yes	27(52.9%)	24(41.7%)	14.946	**0.001**
	No	143(79.9%)	36(20.1%)		
Absence of obstetric drugs	Yes	9(52.9%)	8(47.1%)	4.187	**0.041**
	No	161(75.6%)	52(24.4%)		
Mode of delivery	Normal vaginal delivery	134(77%)	40(23%)	6.059	**0.048**
	Cesarean section	18(56.3%)	14(43.7%)		
	Assisted delivery (forceps /vacuum)	18(75%)	6(25%)		

The study also revealed that second maternal delay in utilizing institutional delivery services was higher among mothers living more than 5 km from nearby health centers than those living within 5 km. This result is consistent with the study of the Gamo zone in southern Ethiopia[8] In Hadiya zone, Southern Ethiopia.[7] This might be because the longer physical distance to caregiving health centers may require more relatives to accompany the mother and prolong reaching a health facility. This implies that women have difficulty obtaining transportation services, which may require more relatives to accompany them and walk on foot for a long time. This, in turn, can cause women to face obstetric complications, consequently influencing timely reach to a nearby health facility to receive institutional delivery service.[17]

Mothers who used other means of transportation were more likely to delay than those who used ambulances and foot. This finding was similar to the study's in the Hadiya Zone, Southern Ethiopia.[7] This might be due to inadequate ambulance services, transportation difficulties, or a lack of money for accessing institutional delivery services.

This study's results showed that the mother's gravida significantly did not influence the second maternal delay in utilizing institutional delivery services.

This study showed that the magnitude of the third delay in the utilization of institutional delivery service was found to be 26.1%. Which was lower than the study findings in Bahir Dar, Ethiopia 30.7%,[6] in Yem special district, 34.7%,[10] and in the Hadiya zone, the Southern region was 32.6%[7] but this is higher than the study findings in Jordan, which were 17.1%.[18]

The absence of skilled health providers was associated with the third maternal delay in utilizing institutional delivery services. The study revealed that mothers who did not get skilled health providers were more likely to experience a third maternal delay in utilizing institutional delivery services than mothers who had a qualified healthcare provider. This result aligns with the study done in the Hadiya Zone[13] and Gamo Zone (southern Ethiopia).[8] This can be explained in different ways, as the health workers were overwhelmingly deficient due to the absence of continuing education programs and adequate formal learning, poor access to updated educational resources, staff motivation issues, and a lack of financial resources, rewards, and accountability.

The mothers who needed a referral to utilize institutional delivery were more likely to experience a third delay, which is inconsistent with a relevant study done in Jorden, 18 gamo zone southern Ethiopia.[8] This might be due to a lack of proper transportation facilities for referral, financial resources, or access to an equipped health facility for delivery.

The mode was another factor associated with a third maternal delay in the utilization of institutional delivery services. This study showed that mothers who gave birth by C/S were at higher risk of delaying the utilization of institutional delivery services than mothers who gave birth with normal vaginas.

Efforts should focus on improving maternal education, promoting birth preparedness, enhancing transportation access, equipping healthcare facilities with skilled staff, and ensuring an efficient local referral system.

The study's sample size is limited to Badimalika municipality, which might not represent all women who give birth in Nepal.

CONCLUSION

This study showed that the magnitude of first, second, and third maternal delays in utilizing institutional delivery services in the study area was high, indicating that most mothers did not use institutional delivery services in the recommended time range.

The mother's occupation, birth preparedness and complication readiness, and education levels were associated with the first maternal delay. Besides, distance to reach healthcare facilities, means of transportation used, and transportation service difficulties were factors related to maternal second delay. Furthermore, the absence of skilled health providers, multiple referrals needed, and mode of delivery were factors associated with the third maternal delay in utilizing institutional delivery service.

DECLARATIONS

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Conflict of Interest
None

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Ethical Clearance
Ethical clearance was taken from Nobel College, Kathmandu with Ref. No. 081/82/53.

Consent of the Study
Informed consent was taken from the study participants.

Consent for Publication
All the author/s and participants consented to the publication of the findings

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