

Research Article

Adverse Birth Outcomes associated with Antenatal Care among Mothers at Madhesh Province, Nepal: A Cross Sectional Study

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ABSTRACT

Background & Objectives: High-quality antenatal care (ANC) plays a vital role in reducing maternal and neonatal mortality rates and enhancing health results, especially in low-income

nations. Although various factors play a role in adverse birth outcomes, antenatal care (ANC) emerges as a crucial preventive measure. Therefore, this study was conducted to investigate factors that influence participation in antenatal care services and their association with adverse birth outcomes in Madhesh Province of Nepal.

Materials and Methods: A quantitative cross-sectional study was conducted among mothers who delivered their baby at health care facilities of Madhesh Pradesh from July 2020 to January 2021. A total of 104 participants selected for the study. Structured questionnaire was used and face to face interview was carried out to obtain information from participants. SPSS software was used for the data analysis and multiple logistic regression analysis was performed. A p value of less than 0.05 is considered statistically significant.

Results: Among 104 mother, 11 had an adverse birth outcome. Majority of pregnancy related characteristics and antenatal care during pregnancy were significantly associated with adverse birth outcomes. In terms of socioeconomic status, education (p=0.021) and occupation (p<0.0001) showed the significant association with adverse outcome in bivariate analysis. However, in multivariate analysis socio

demographic factors such as mothers' occupation ($p=0.004$) and antenatal care practice such as rest during pregnancy ($p=0.023$) remained statistically significant.

Conclusion: Finding suggests that mothers' occupation and rest during pregnancy were associated with adverse birth outcomes. Therefore, raising awareness through prenatal care educational programs may reduce the likelihood of adverse delivery outcomes.

Keywords: Adverse birth outcomes, Antenatal care, Madhesh province

INTRODUCTION

Every year, millions of infants globally encounter adverse birth outcomes (ABOs), including stillbirth, preterm birth, or low birth weight and Nepal is not exception [1]. Limited access to quality healthcare services, inadequate nutrition during pregnancy, and maternal infections, such as malaria, HIV/AIDS, and sexually transmitted infections, contribute to adverse birth outcomes [2,3]. Additionally, factors like lack of education and awareness, socioeconomic disparities and poverty, and teenage pregnancies also play significant roles [4,5]. Furthermore, exposure to environmental pollutants, limited availability of skilled birth attendants and emergency obstetric care, cultural practices, and inadequate prenatal screening further exacerbate the issue [6]. Adverse birth outcomes can lead to increased maternal morbidity and mortality, compromising the health and well-being of mothers [7]. For children, these outcomes often result in higher rates of neonatal mortality, developmental delays, and long-term health issues [8]. These results not only present immediate threats to infant health but also have enduring consequences for overall well-being and healthcare systems[9].

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In developed countries, expectant mothers have easier access to healthcare facilities and resources, allowing for regular prenatal check-ups, screenings, and timely interventions [4]. Antenatal care in developed countries often includes a multidisciplinary approach involving healthcare professionals such as obstetricians, midwives, nurses, and other specialists to ensure the health and well-being of both the mother and the unborn child [5]. Conversely, antenatal care in developing countries is contingent upon the accessibility of healthcare services, socioeconomic status, and cultural norms[10]. Similarly, certain regions may experience limited or inaccessible antenatal care, resulting in insufficient prenatal screenings, delayed initiation of care, and inadequate management of high-risk pregnancies[11]. Furthermore, inequalities in healthcare resources and infrastructure exacerbate the disparities in the quality and availability of antenatal care services across various areas[12].

High-quality antenatal care (ANC) plays a vital role in reducing maternal and neonatal mortality rates and enhancing health results, especially in low-income nations[1]. Additionally, these outcomes impose considerable emotional, financial, and healthcare burdens on families, underscoring the urgent need for targeted preventive strategies and supportive services[10]. Although various factors play a role in ABOs, antenatal care (ANC) emerges as a crucial preventive measure. ANC services play a critical role in promoting maternal and child health by providing essential interventions and monitoring during pregnancy. However, despite the recognized importance of ANC, disparities in participation rates persist globally, particularly in regions with limited

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access to healthcare services such as the Madhesh Province of Nepal. By understanding these factors, tailored interventions can be developed to enhance the health of mothers and children in the specified area. Therefore, this study was conducted to investigate factors that influence participation in antenatal care services and their association with adverse birth outcomes in Madhesh Province of Nepal.

MATERIALS AND METHODS

A quantitative cross-sectional study was conducted among mothers who delivered their baby at health care facilities from July 2020 to January 2021. The study participants included in the study were resident of Madhesh Province. Women who had any form of delivery spontaneous, vaginal, or cesarean delivery throughout the study period were eligible to participate. Women with pre-existing co-morbid diseases such as hypertension or diabetes, as well as those suffering from any sort of mental illness, were excluded since their condition required more ANC visits than was required. The sample size was calculated by using the formula: $n = z^2pq/e^2$, with standard normal deviation (z) of 1.96 correspondents 95% confidence level and a 7% margin of error. The sample size was estimated to be 97 and 68, respectively, by taking into account adverse birth outcomes of 14.5% preterm delivery [13] and 9.8% low birth weight [14]. This study, however, considered a larger sample size of 97 mothers. Furthermore, a 10% non response rate was included, resulting in a final sample size of 107 participants after rounding off the decimal point. We could not get complete information from 3 participants, and hence 104 participants were included in the analysis.

Sample was selected systematically from a sampling frame designed for this study, with a random start and a constant sampling interval. Sampling frame was prepared from the birth records maintained at a couple of tertiary care teaching hospitals: one privately managed Janaki Health Care and Teaching Hospital and another public health facility, i.e. Madhesh Province's provincial hospital, now known as Madhesh Institute of Health Sciences. These two hospitals function as referral hospitals, receiving patients for delivery care from their catchment areas, which include districts Dhanusha, Mahottari, Sarlahi, Siraha, and Sindhuli. The required number of samples were chosen, and the individuals' detailed addresses were retrieved from hospital records. Afterwards, each patient who was chosen underwent a home visit. Structured questionnaire was used. Face to face interview was carried out and hospital report card was observed to obtain information of study participants.

Pre-testing was done. In this study, adverse birth outcomes were defined as low birth weight (<2500g) and preterm delivery (<37 weeks of gestation [15], while factors examined were socioeconomic status and prenatal care usage by women. Collected data was entered in excel sheet and then transferred to SPSS v.21 for the analysis. Frequency and percentages were presented. The chi square test was used to assess the relationship between socio-demographic characteristics, antenatal care usage, and adverse birth outcomes. Variables with $p < 0.05$ in bivariate analysis were imported into multiple logistic regression with backward conditional approach. The odds ratio and 95% confidence interval were reported, and a p value of less than 0.05 signifies statistically significant. Ethical

approval for the study was obtained from Institutional Review Committee of PURC (Ref. number: 114/076/077). Informed consent of the participants was taken. Confidentiality and anonymity was maintained.

RESULTS

Among 104 mother included in the study, 11 had an adverse birth outcome, whereas 93 had a normal birth of their baby. Among adverse birth outcomes, three were low birth weight (LBW), three were preterm, and five were both LBW and preterm (Figure 1).

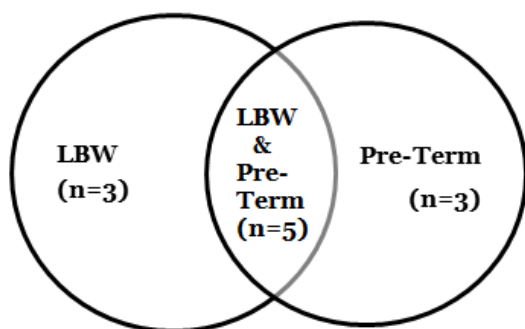


Figure-1. Adverse Birth Outcomes (n=11)

Table 1 shows the association of socio demographic characteristics of the participants with adverse birth outcomes. Higher proportion of adverse outcome was observed among mothers aged less than 20 years (20.0% versus 9.6%), relatively disadvantaged ethnic group (11.6% versus 5.6%), illiterate (17.6% versus 3.8%), involved in daily waged labor (40.0% versus 5.6%) and living in joint family (13.7% versus 3.2%). However, only educational status (p=0.021) and occupation (p<0.0001) was significantly associated with adverse birth outcome.

Table 2 shows the association of pregnancy related characteristics and antenatal care during pregnancy among participants with adverse birth outcomes. Higher proportion of adverse outcome was observed among mothers had first pregnancy in age less than 20 years (18.4% versus 3.6%), became pregnant more than three time (27.3% versus 4.4% and 8.1%), not received antenatal care (33.3% versus 17.2% and 4.9%), not consumed additional food during pregnancy (21.4% versus 6.6%), had not taken rest

Table 1: Socio-demographic characteristics of the participants by adverse birth outcomes.

Characteristics	Total	Outcomes of new born		OR (95%CI)	p-value
		Adverse n=11 (%)	No Adverse n=93 (%)		
Age Group					
< 20 years	10	2(20.0)	8(80.0)	2.36(0.43-12.46)	0.308
>> 20 years	94	9(9.6)	85(90.4)	1.00 (Reference)	
Ethnicity					
Relatively Disadvantaged	86	10(11.6)	76(88.4)	2.23 (0.26-18.66)	0.457
Relatively Advantaged	18	1(5.6)	17(94.4)	1.00 (Reference)	
Educational status					
Illiterate	51	9(17.6)	42(82.4)	5.46 (1.11-26.68)	0.021
Literate	53	2(3.8)	51(96.2)	1.00 (Reference)	
Occupation					
Daily waged labor	15	6(40.0)	9(60.0)	11.20 (2.84-20.41)	<0.001
Service/Business/ Homemaker	89	5(5.6)	84(94.4)	1.00 (Reference)	
Family type					
Joint	31	10(13.7)	63(86.3)	4.76 (0.58-38.92)	0.145
Nuclear	73	1(3.2)	30(96.8)	1.00 (Reference)	

during pregnancy (31.6% versus 5.9%), had not immunized with Td during pregnancy (36.4% versus 7.5%), and not consumed IFA during pregnancy (18.8% versus 9.1%). All pregnancy related characteristics and antenatal care during pregnancy were significantly associated with adverse birth

outcomes except consumption of IFA during pregnancy (p=0.475).

Results of multiple logistic regression for the association of socio economic status and antenatal care during pregnancy with adverse birth outcomes is shown in Table 3. After

Table 2: Pregnancy related characteristics and antenatal care during pregnancy among participants by adverse birth outcomes

Characteristics	Total	Outcomes of new born		OR (95%CI)	p-value
		Adverse n=11 (%)	No Adverse n=93 (%)		
Age at first pregnancy					
< 20 years	49	9(18.4)	40(81.6)	5.96 (1.22-29.12)	0.015
>> 20 years	55	2(3.6)	53(96.4)	1.00 (Reference)	
No. of pregnancies					
1-2 pregnancy	37	3(8.1)	34(91.9)	0.23 (0.05-1.06)	0.060
2-3 pregnancy	45	2(4.4)	43(95.6)	0.12 (0.02-0.67)	0.016
> 3 pregnancy	22	6(27.3)	16(72.7)	1.00 (Reference)	
Number of Antenatal Care Received					
No Antenatal Care	6	2(33.3)	4(66.7)	9.66 (1.23-75.55)	0.031
1-3 Antenatal Care	37	6(16.2)	31(83.8)	3.74 (0.87-15.99)	0.075
>> 3 Antenatal Care	61	3(4.9)	58(95.1)	1.00 (Reference)	
Additional food Consumed during pregnancy					
No	28	6(21.4)	22(78.6)	3.87 (1.07-13.92)	0.001
Yes	76	5(6.6)	71(93.4)	1.00 (Reference)	
Rest during pregnancy					
Not taken	19	6(31.6)	13(68.4)	7.38 (1.96-27.74)	0.004
Taken	85	5(5.9)	80(94.1)	1.00 (Reference)	
TD immunization during pregnancy					
No	11	4(36.4)	7(63.6)	7.02 (1.64-29.93)	0.015
Yes	93	7(7.5)	86(92.5)	1.00 (Reference)	
Consumption of IFA during pregnancy					
Not consumed	16	3(18.8)	13(81.3)	2.30 (0.54-9.84)	0.475
Consumed	88	8(9.1)	80(90.9)	1.00 (Reference)	

Table-3: Socio economic status and antenatal care during pregnancy associated with adverse birth outcomes by multiple logistic regression.

Factors	Category	AOR	95% CI	p-value
Occupation	Daily waged labor	8.467	1.98-36.20	0.004
	Service/Business/ Homemaker	1.00	Reference	-
Rest during pregnancy	Not taken	5.331	1.26-22.54	0.023
	Taken	1.00	Reference	-

adjusting socio demographic factors, only mothers' occupation and rest during pregnancy remained statistically significant. Mothers who involved in daily waged labor were eight times more likely to encounter an adverse birth outcome in comparison to mothers who involved in service or business or were homemaker (adjusted OR= 8.467, 95%CI = 1.98-36.20, p=0.004). Furthermore, mothers who did not take rest during pregnancy had a five-fold increased risk of experiencing an adverse birth outcome in comparison to mothers who took rest (adjusted OR= 5.331, 95%CI = 1.26-22.54, p=0.023).

DISCUSSION

Our findings bring into line with a growing body of research across diverse contexts, demonstrating a positive association between engagement in daily waged labor and the occurrence of adverse birth outcomes (ABOs). This mirrors previous studies that identified elevated risks amongst manual laborers [16]. Supporting this, an Iranian study established a link between unfavorable work conditions and ABOs [17]. Similarly, in Japan, researchers observed a consistently elevated standardized ratio of low birth weight among manual workers over a 15-year period (2000-2015), significantly higher than other occupational groups [18]. Additionally, studies have documented an increased risk of preterm birth among workers in the food industry [19].

Mothers who worked continuously without rest during pregnancy showed a significantly higher risk of adverse birth outcomes, with a five-fold increase compared to those who prioritized rest. This finding is consistent with previous research, which has shown an association between prolonged standing or

walking in the first trimester and higher rates of total preterm birth [20]. Likewise, the study uncovered that engaging in physical labor elevates the likelihood of preterm birth [21].

The study has several limitations: First, the study was based on sampling frame obtained only from two hospitals that serve patients from neighboring districts rather than all eight districts, therefore it may lack representative of Madhesh Province. Second, the other ABOs like stillbirth, obstructed labor etc. were not considered which may have influenced the findings. Third, the investigation was done within a constrained time frame.

CONCLUSION

Finding of the study suggests that mothers' occupation and rest during pregnancy were associated and identified as major factors for adverse birth outcomes, raising concerns about the influence of physical and occupational pressure on mother's health throughout pregnancy. The findings highlight the essence of prioritizing maternal well-being in the context of types of work and work load during pregnancy. Flexible work arrangements, reducing work load during pregnancy, and raising awareness through prenatal care educational programs may reduce the likelihood of adverse delivery outcomes.

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