

Adverse Birth Outcomes among Hospital Deliveries in Pokhara Metropolitan

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ABSTRACT

Introduction: Birth outcomes are a category of measures that describe health at birth. Adverse birth outcomes are other than normal live births, which majorly include preterm birth, stillbirth, and low birth weight. These are major causes of neonatal morbidity, mortality, and long-term physical and psychological issues. This study aimed to determine the proportion and identify the associated factors of adverse birth outcomes among hospital deliveries at Pokhara Metropolitan.

Methods: A cross-sectional analytical study was conducted in the selected hospitals of Pokhara Metropolitan among 258 admitted women in the maternity ward who had received delivery services within three days of delivery. Birth records of the newborn babies of the same respective mothers were taken and verified from hospital records. Initially, descriptive analysis was done to calculate the frequencies and then a chi-square test was done to identify the associated factors of adverse birth outcomes.

Results: Out of 258 participants, 20.9 % of adverse birth outcomes were identified. Factors increasing the risk of adverse birth outcomes include poor knowledge of pregnancy or delivery complications, inadequate nutrition, lack of family support, previous adverse birth outcomes, history of miscarriage, tobacco use, and gestational age.

Conclusions: The prevalence of the overall adverse birth outcome was more than one-fifth which is a public health concern. Adverse pregnancy outcome reduction strategies should consider early identification and management of the preconception risk factors. The preconception care should include educating all eligible or reproductive-aged couples about preconception care/ health. Creating awareness about family planning methods, types and efficacy for women of reproductive health is mandatory.

Keywords: Adverse birth outcomes; hospital deliveries; low birth weight; Nepal; preterm birth; stillbirth.

INTRODUCTION

Pregnancy and childbirth are typically joyful experiences, but adverse birth outcomes can significantly impact families and child development. In developing nations, stillbirth, low birth weight (LBW), and preterm birth are the most common adverse outcomes. (1) In Nepal, the LBW prevalence is relatively high, ranging from 14% to 32%, as documented by various hospital and community-based studies. (2) Moreover, stillbirth accounts for about half of all such deaths, with approximately 4 million

reported annually, 97% of which occur in developing countries. (3)

Maternal and child health is a top priority for the government of Nepal to improve birth outcomes. Despite the strategies of Safe Motherhood policy for maternity care at various levels such as provision for 24-hour emergency obstetric care, risk screening, and empowerment, adverse birth outcomes persist in Nepal.

This research aimed to determine the proportion and identify the associated factors of adverse birth outcomes among hospital deliveries at Pokhara Metropolitan.

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METHODS

A cross-sectional study was conducted to determine the proportion and associated factors of adverse birth outcomes among hospital deliveries in Pokhara Metropolitan. The study included 258 women admitted to maternity wards within three days of delivery at the three selected hospitals in Pokhara. Birth records of their newborns were verified from hospital records. The study took place from June to December 2019. Ethical approval was obtained from the Institutional Review Committee (IRC) of Pokhara University (Ref. no. 85/076/077), and the respective regional hospital granted permission for data collection. Written informed consent was obtained from each participant. To maintain confidentiality, participants were assigned unique identity numbers. The sample size was calculated using the formula;

$$n = Z^2pq/d^2$$

Where,

$$Z = 1.96$$

p(proportion) = Average 20% adverse birth outcomes in Nepal [The proportion of adverse birth outcomes in government health institutions of south Ethiopia is 18.3%, (4) in Gondar University Hospital, Northeast Ethiopia is 23%, (5) and (22.6% in Suhul Hospital Shire Tigray, Ethiopia. (6)]So the value is 0.2

$$q = (1 - p) = (1 - 0.2) = 0.8$$

d = desirable error 0.05 (5% margin of error)

Then, using the infinite population formula,

$$n = Z^2pq/d^2$$

$$n = 0.614656/0.0025$$

$$n = 245.86$$

Hence, n= 246

Now,

Sample size after analyzing non-response rate,

$$Nf = 100/100-Nr = 100/100-5 = 1.05$$

Final sample size,

$$n = Nf * n = 1.01 * 246 = 258.3$$

Therefore, the sample size was 258.

For this study, a consecutive sampling technique was used to select hospitals for data collection. Initially, hospitals in Pokhara Valley with 24-hour maternity services and the highest patient flow were listed, including government and private hospitals. Three hospitals, namely, Manipal Teaching Hospital, Gandaki Medical College, and Matri Shishu Miteri Hospital were randomly selected. Participants were recruited based on the proportion of patient flow; more participants were taken from hospitals with higher delivery rates

and fewer from those with lower rates. Women who were unavailable during data collection or unwilling to participate were excluded.

Data were collected through face-to-face interview using semi-structured questionnaires. The questionnaires developed as the primary data collection tool captured information on birth outcomes, adverse birth outcomes, antenatal attendance, time to reach health institutions, birth order, birth interval, and more. The questionnaire was designed following a thorough literature review and a comprehensive discussion with the supervisor. The reliability and validity of the tools were ensured by pretesting the questionnaire on 10% of the estimated sample size. Data entry was performed using EpiData version 4.2 to prevent errors beyond set limits, with 10% of the entered data manually rechecked to enhance validity and reliability. Data were analyzed using SPSS version 21. Descriptive analysis was conducted to determine frequencies, percentages, means, and standard deviations and to identify the proportion of adverse birth outcomes. A chi-square test was used to test the association between dependent and independent variables.

RESULTS

Figure 1 shows 20.9 % of adverse birth outcomes among the respondents.

Figure 1. Birth outcomes of newborn (n=258)

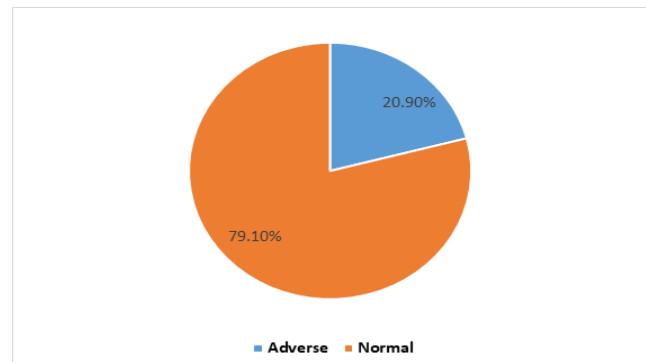


Table 1 shows significant statistical association between adverse birth outcomes and partner's education, knowledge of pregnancy or delivery complications, feel safe in society, feel safe in home, violence from partner, ANC visits and number of consumed iron tablets with P<0.05. Likewise, consumption of nutritious food compared to the normal days, rest during pregnancy, support of family members, start of consuming iron tablets in months, and complications during pregnancy were strongly associated with adverse birth outcomes with P<0.001. Furthermore, the birth outcomes of the previous baby, history of miscarriage, and consumption of tobacco showed significant statistical association with P<0.05

Table 1 Associated factors of overall adverse birth outcomes

Variables	Adverse Birth Outcomes		x ²	p-value	OR (95% of CI)
	Yes	No			
Participants education					
Illiterate and informal	4(66.7)	2(33.3)	0.019 (Fisher's)	0.019*	8.080 (1.439-45.366)
Basic and above	50(19.8)	202(80.2)			
Knowledge of pregnancy or delivery complications					
Yes	24(16.2)	124(83.8)	4.661	0.031*	1.938 (1.057-3.551)
No	30(27.3)	80(72.7)			
Consumption of nutritious food than the normal days					
Yes	38(16.3)	195(83.7)	31.029	<0.001**	9.123 (3.756-22.160)
No	16(64.0)	9(36.0)			
Rest during pregnancy					
Yes	45(18.4)	199(81.6)	0.000 (Fisher's)	<0.001**	7.960 (2.546-24.891)
No	9(64.3)	5(35.7)			
Support of family members					
Yes	38(16.2)	196(83.8)	33.447	<0.001**	10.316 (4.123-25.809)
No	16(66.7)	8(33.3)			
Feel safe in home					
Yes	50(19.8)	202(80.2)	0.019 (Fisher's)	0.019*	8.080 (1.439-45.366)
No	4(66.7)	2(33.3)			
Feel safe in society					
Yes	50 (19.8)	202 (80.2)	0.019 (Fisher's)	0.019*	8.080 (1.439-45.366)
No	4(66.7)	2(33.3)			
Violence from partner					
Yes	3(75.0)	1(25.0)	0.030 (Fisher's)	0.030*	0.084 (0.009-0.822)
Yes	3(75.0)	1(25.0)			
Time of ANC					
1-3 times	8(66.7)	4(33.3)	0.001 (Fisher's)	0.001*	8.696 (2.511-30.117)
4 times and above	46(18.7)	200(81.3)			
Start of consuming iron tablets					
1st and 2nd months	20(40.8)	29(59.2)	14.454	<0.001**	3.550 (1.802-6.992)
After 1st trimester and above	34(16.3)	175(83.7)			
Number of iron tablets					
Less than 169 tablets	37(28.7)	92(71.3)	9.368	0.002*	2.650 (1.401-5.010)
170 tablets and above	17(13.2)	112(86.8)			
Complication during pregnancy					
Yes	16(69.6)	7(30.4)	0.000 (Fisher's)	<0.001**	0.084 (0.033-0.219)
No	38(16.2)	197(83.8)			
Birth outcome of previous baby					
Normal	30(21.1)	112(78.9)	0.002 (Fisher's)	0.002*	0.134 (0.038-0.475)
Adverse birth outcome	8(66.7)	4(33.3)			
History of Miscarriage					
Yes	11(45.8)	13(54.2)	9.916	0.002*	0.266 (0.112-0.634)
No	43(18.4)	191(81.6)			

Variables	Adverse Birth Outcomes		x ²	p-value	OR (95% of CI)
	Yes	No			
Consumption of tobacco ever before					
Yes	4(66.7)	2(33.3)	0.019 (Fisher's)	0.019*	0.124 (0.022-0.695)
No	50(19.8)	202(80.2)			

*=P<0.05 (Statistically significant), **= P<0.001(Highly significant)

Socio-demographic characteristics

The majority of participants (86.4%) were aged between 20-35 years, followed by those under 20 years (11.7%), and the remainder over 35 years (1.9%). The mean age was 25.91 years (SD±4.636). Nearly half of the participants were from the upper caste (46.9%), with the rest distributed among disadvantaged janajatis (20.2%), dalits (19.0%), relatively advantaged janajatis (11.6%), disadvantaged non-dalit terai caste (1.5%), and religious minorities (0.8%). In terms of residence, 60.9% of the participants were from rural areas, while 39.1% were from urban areas. Regarding education levels, less than half had a secondary level education (48.8%), followed by basic education (26.7%), a bachelor’s degree (21%), informal education (1.9%), a master’s degree and above (1.2%), and 0.4% were illiterate.

Birth preparedness and knowledge-related information

Only 10.1% of participants had heard about adverse birth outcomes, with most identifying miscarriage (67.6%), followed by stillbirth (16.2%), low birth weight (10.8%), and preterm birth (5.4%). About 57.4% were aware of pregnancy/delivery complications, citing anemia (58.1%), miscarriage (40.1%), high blood pressure (31.8%), bleeding (20.9%), labor complications (10.1%), and low birth weight (6.8%). For a healthy pregnancy, 89.9% recommended nutritious food, 69.4% rest, 64.3% health checkups, and 12.4% love and support. Nutritious food was defined as green leafy vegetables (92.2%), fruits and juice (76.4%), meat (42.2%), and milk and eggs (34.5%). During pregnancy, 90.3% consumed more nutritious food, mainly green leafy vegetables (90.1%), fruits and juice (45.9%), fish and meat (32.2%), and eggs (30.0%). Most participants (94.6%) rested during pregnancy, with 59.4% resting most of the time and the remainder resting 2-3 times a day.

Current obstetric and service utilization factors

ANC checkup coverage was 100%, with more than half (57.0%) of participants having four ANC visits, followed by 38.4% with more than four visits. Participants primarily attended private hospitals (40.0%), government/community hospitals (39.5%), and health posts (19.0%) for their ANC checkups. Most health institutions were within 30 minutes of their residential area (72.5%). A majority (89.9%) decided to visit a health

institution independently, and 52.3% were accompanied by their husbands. Nearly all participants (99.6%) were vaccinated with TD, and iron supplementation coverage was 100%, with 81.0% starting iron tablets after the first trimester. About 35.7% consumed 100-170 iron tablets, and 14.3% consumed over 170 tablets. Only 3.5% reported health problems, primarily diseases/infections. For 59.7% of participants, their pregnancy order was more than two, while 40.3% were first-time pregnancies. Additionally, 76.6% had a birth interval of more than four years.

Past obstetric and gynecologic factors

The majority (92.2%) of previous births were normal. However, 9.3% and 6.2% of participants had experienced miscarriage and had an abortion before current pregnancy respectively.

Lifestyle-related factors

Only 2.3% of participants had consumed tobacco before their current pregnancy, but none continued to do so during pregnancy. Similarly, 5.0% of participants had consumed alcohol before, but they abstained during current pregnancy.

Current delivery-related factors

More than half of the deliveries (53.5%) were normal, followed by 43.8% via cesarean section and 2.7% using vacuum extraction. There were only a few cases of stillbirth (1.2%), and 13.2% of the deliveries were preterm.

Newborn related information

More than half of the newborns were male (57.8%), while 42.2% were female. Additionally, 17.4% of the newborns had a low birth weight (i.e., less than 2500 grams), and 10.1% faced complications after birth.

DISCUSSIONS

This study was carried out to assess the adverse birth outcomes in three different hospitals in Pokhara metropolitan. The findings of this study revealed that 20.9% were adverse outcomes, with 13.2% preterm birth, 17.4% low birth weight, and 1.2% stillbirths and remaining 79.1% normal live births. The findings align with that of adverse birth outcomes in Ethiopia. (4, 5) The

current study identified several factors associated with adverse birth outcomes, such as participants education, knowledge of pregnancy or delivery complications, feeling safe in society and at home, experiencing partner violence, consumption of nutritious food, rest during pregnancy, family support, timing and number of ANC visits, iron tablet consumption, pregnancy complications, previous birth outcomes, history of miscarriage, tobacco use, and gestational age.

This study found that the proportion of adverse birth outcomes was higher among women aged 20 to 25 years (21.6%) compared to those under 20 years and over 35 years (13.6%). However, no statistical association was found between age group and birth outcomes, consistent with findings from a study in eastern Nepal. (2) Among participants who became pregnant before age 20, 20.5% experienced adverse birth outcomes, while 21.0% of those who became pregnant after age 20 had similar outcomes. Although there was no statistical significance, study suggests that delayed pregnancy, particularly after age 35, may be associated with adverse pregnancy outcomes. (3)

The study found that mothers with some knowledge of pregnancy or delivery complications had a lower rate of adverse birth outcomes (16.2%) compared to those without knowledge (27.3%), and this difference was statistically significant, consistent with findings from a study in southern Ethiopia. (1) Additionally, there was a strong association between the consumption of more nutritious food during pregnancy and the occurrence of low birth weight, similar to findings from studies conducted in Dangle Primary Hospital, Amhara Regional State, northwest Ethiopia (7), and Japan. (8) Participants who received support from their husbands had a lower rate of adverse birth outcomes (20.2%) compared to those who did not (60.0%), though this difference was not statistically significant. However, violence from partner was significantly associated with adverse outcomes, with 75.0% of cases occurring in those who experienced violence, compared to 20.1% in those who did not.

The study found that preterm birth was significantly associated with the number of ANC visits. Participants who had fewer than three ANC visits had a preterm birth rate of 41.7%, compared to 11.8% among those with more than four visits, consistent with findings from studies in Uganda (9) and eastern Nepal. (2) Additionally, participants with health problems had a higher rate of adverse birth outcomes (44.4%) compared to those without health problems (20.1%), though this was not statistically significant. Adverse outcomes were also higher among those who consumed medicine during pregnancy (50.0%) compared to those who did not (20.0%). Women with a history of low birth weight (LBW) deliveries had higher odds of delivering LBW neonates, consistent with studies from

Nigeria (10) and Japan. (8) Participants with a history of miscarriage had a 45.8% rate of adverse birth outcomes, compared to 18.4% among those with no history of miscarriage. Similarly, those with a history of abortion had a 37.5% rate of adverse outcomes, versus 19.8% among those without though these differences were not statistically significant. Tobacco use was significantly associated with adverse outcomes, with 66.7% of users experiencing adverse outcomes, compared to 19.8% among non-users, aligning with findings from a study in India. (11, 12)

The limitations of our study include its hospital-based design, which limits the generalizability of the findings to the broader community or population. Additionally, cases not available during the study period were excluded. While information was collected within three days of delivery, from the day of hospital admission, and birth records were obtained from hospital records to minimize information bias, not all hospital cases were included. These factors may impact the comprehensiveness and applicability of the results.

CONCLUSIONS

In conclusion, the study highlights that adverse birth outcomes are significantly influenced by factors such as poor knowledge of pregnancy or delivery complications, inadequate nutrition, lack of family support, previous adverse birth outcomes, history of miscarriage, tobacco use, and gestational age. Effective strategies to mitigate these outcomes include early identification and management of risk factors, comprehensive preconception care, and increased awareness of pregnancy health.

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CONFLICT OF INTEREST

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REFERENCES

1. Abdo R, Endalemaw T, Tesso F. Prevalence and associated factors of adverse birth outcomes among women attended maternity ward at Negest Elene Mohammed Memorial General Hospital in Hosanna Town, SNNPR, Ethiopia. *J Women's Health Care*. 2016;5(4):324.
2. Bhaskar RK, Deo KK, Neupane U, Chaudhary Bhaskar S, Yadav BK, Pokharel HP, et al. A case control study on risk factors associated with low birth weight babies in Eastern Nepal. *International journal of pediatrics*. 2015;2015(1):807373.

3. Bhattacharya S, Mukhopadhyay G, Mistry PK, Pati S, Saha SP. Stillbirth in a tertiary care referral hospital in north Bengal-A review of causes, risk factors and prevention strategies. *Online J Health Allied Scs.* 2010;9(4):4.
4. Tsegaye B, Kassa A. Prevalence of adverse birth outcome and associated factors among women who delivered in Hawassa town governmental health institutions, south Ethiopia, in 2017. *Reproductive health.* 2018;15:1-10.
5. Adane AA, Ayele TA, Ararsa LG, Bitew BD, Zeleke BM. Adverse birth outcomes among deliveries at Gondar University hospital, Northwest Ethiopia. *BMC pregnancy and childbirth.* 2014;14:1-8.
6. Adhena T, Haftu A, Gebreegziabher B. Assessment of magnitude and associated factors of adverse birth outcomes among deliveries at Suhul hospital Shire, Tigray, Ethiopia from September, 2015 to February, 2016. *Biomedical Journal of Scientific & Technical Research.* 2017;1(7):2045-52.
7. Talie A, Taddele M, Alemayehu M. Magnitude of low birth weight and associated factors among newborns delivered in Dangla primary hospital, Amhara regional state, Northwest Ethiopia, 2017. *Journal of Pregnancy.* 2019;2019(1):3587239.
8. Viengsakhone L, Yoshida Y, Harun-Or-Rashid M, Sakamoto J. Factors affecting low birth weight at four central hospitals in vientiane, Lao PDR. *Nagoya J Med Sci.* 2010;72(1-2):51-8.
9. Ayebare E, Ntuyo P, Malande OO, Nalwadda G. Maternal, reproductive and obstetric factors associated with preterm births in Mulago Hospital, Kampala, Uganda: a case control study. *Pan African Medical Journal.* 2018;30(1).
10. Agarwal K, Agarwal A, Agrawal V, Agrawal P, Chaudhary V. Prevalence and determinants of "low birth weight" among institutional deliveries. *Annals of Nigerian medicine.* 2011;5(2):48.
11. Ahankari A, Bapat S, Myles P, Fogarty A, Tata L. Factors associated with preterm delivery and low birth weight: a study from rural Maharashtra, India. *F1000Research.* 2017;6.
12. Tellapragada C, Eshwara VK, Bhat P, Acharya S, Kamath A, Bhat S, et al. Risk factors for preterm birth and low birth weight among pregnant Indian women: a hospital-based prospective study. *Journal of Preventive Medicine and Public Health.* 2016;49(3):165.