ORIGINAL ARTICLE

Association of antenatal care and birth outcome: A community based cross-sectional study in Bundelkhand region of Uttar Pradesh

Yashvant Singh, Shailendra Singh Chaudhary, Suneel Kumar Kaushal, Mohd Maroof, Lal Divakar Singh, Tarnnum

Department of Community Medicine, Rani Durgavati Medical College, Banda, Uttar Pradesh, 210001

CORRESPONDING AUTHOR

Dr. Yashvant Singh, Department of Community Medicine, Rani Durgavati Medical College, Banda, Uttar Pradesh, 210001

Email: yashvant.rajput1234@gmail.com

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ABSTRACT

Background: Adverse birth outcome is a major health concern especially in developing nations and abortion & stillbirth are two most common forms of natural pregnancy losses. The prevalence of stillbirth (4.2 to 14.8) is reported to be widely variable across the Indian states; whereas an estimated number of abortions in India was 15.6 million in the year 2015. **Aims & objectives**: To find an association between antenatal care factors with birth outcome in Bundelkhand region of Uttar Pradesh. **Methodology**: A community based cross-sectional study was conducted among 406 registered pregnant women in rural area of Banda District. A multistage simple random sampling was used. House to house visit was paid to collect the data. **Results**: The birth outcomes reported in the present study were: live birth (91.6%), stillbirths (5.9%) and spontaneous abortions/miscarriage (2.46%). 25% of all babies were born with a low birth weight, 20% of all deliveries were pre-term in nature, and 10% were home deliveries. **Conclusion**: The quality and frequency of antenatal care services has significant association with birth outcome. Early ANC registration, four or more ANC visit, consumption of IFA and deworming tablets and getting dietary counselling during pregnancy were important for favourable birth outcome i.e. live birth.

KEYWORDS

Pregnancy Outcome; Prenatal Care; Live Birth; Still Birth; Abortion

INTRODUCTION

Although pregnancy and childbirth are a joyful experience for most women, sometimes this ends up in adverse birth outcome.(1) A study published in 2016, estimated a prevalence of adverse birth outcomes in rural India to be 25.70%.(2) As per the National Family Health Survey (NFHS-4) 2015-16; 90.2% of all births were live births, 5.7% were miscarriages, 3.4% were abortions, and 0.7% were stillbirths; while according to (NFHS-5), conducted between 2019 and 2021, 88.9% of pregnancies had live births whereas 7.3% ended in a miscarriage, 2.9% in an abortion, and 0.9% have stillbirths.(3,4) Banda district in Bundelkhand region has 66% rate of early ANC registration, during first trimester of pregnancy; while less than 40% have minimal prescribed i.e. four ante-natal care visits during pregnancy.

Aim & Objective

To find an association between antenatal care factors with birth outcome in Bundelkhand region of Uttar Pradesh.

MATERIAL & METHODS

Study design: Community-based, non-interventional, cross-sectional study. **Study setting:** Study was conducted in a rural area of Banda district in Bundelkhand region of Uttar Pradesh.

Study population: All women who get enrolled for ANC at selected primary health centre in Mahuva.
Study duration: 1 February 2023 to 31 July 2024(18 months).
Data collection strategy: A multistage simple random sampling was used to select the study participants. There are eight rural blocks in Banda district and in first stage, Mahuva Block was selected by simple random sampling technique using a lottery method. In next stage; one primary health center (PHC) was selected randomly from the pool of 07 PHCs in the Mahuva Block (Badokhar bujurg, Devrar, Khurhand, Mahuva, Nai, Nandwara, Syodha). Thus, PHC Mahuva in Mahuva block of Banda was selected for the present study.
Sample Size calculation: Taking a prevalence of live birth as 87.3% in rural Uttar Pradesh as per NFHS-5 (2019-2021), 5% probability of α error, 95% absolute level of precision and effect size of 2, a minimum sample size of 348 was calculated. As per the data available with the district health administration, on an average, 400 pregnancies were getting registered during every quarter, in the Mahuva PHC; so, it was decided to include all the pregnancies who were getting registered in a quarter, for the purpose of study. A final data of 406 women was collected and analysed in the present study.
Inclusion criteria: Women who conceived and get delivered between January 23 to December 23 and those who gave the consent to participate in the study.
Exclusion criteria: Only those women who either did not gave their consent or were unavailable even after more than two attempts during the phase of data collection were excluded from the study.
Operational definition: Still birth means death of a foetus weighing 1000g (this is equivalent to 28 weeks of gestation) or more. Spontaneous abortion is the natural loss of pregnancy before the foetus becomes viable, this has been fixed administratively at 28 weeks.
Methodology: List of all the women, who got registered for ante-natal care (ANC) in Mahuva PHC, during the first quarter of 2023 i.e. between January 1st, 2023 to March 31st, 2023 was obtained from ANC register of the PHC and a house-to-house visit was paid to them between April to December 2023 i.e. after completion of pregnancy period.
Ethical approval: Was taken from the institutional ethical committee of Rani Durgavati Medical College, Banda (IEC/RDMC/Cert/04) before commencing the study. Informed consent was obtained from all the participants involved in the study. General information of the study participants including sociodemographic characteristics and ANC services related factors as well as the birth outcome was collected by face-to-face interviews using a pre-designed and semi-structured questionnaire.
Data analysis: Data analysis involved entering information into Microsoft Excel and transferring it to the Statistical Package for Social science (SPSS) software version 25.0 for analysis. Chi-square test was employed and a significance level was set at p-value of less than 0.05.

RESULTS

The majority of study subjects were aged between 21-30 years (82%), were Hindu (96%), belonged to a joint family (67%), and were able to read and write (93%). Thirty percent were from Scheduled Castes and Scheduled Tribes (SC/ST). The mean age was 25.49 years with a standard deviation of 3.96 years, and range of 19 to 42 years. Only one fifth of the women were found to have a financially gainful job; while majority of them did not have any health insurance to cover their expenses. Ninety percent of the women had their body mass index in a normal range (BMI 18.5-24.9 kg/m2) while 96% were heighted more than 145 centimetres.
Thirty one percent of women were primigravidae; while rest was multigravida. 91.6% of pregnancies resulted in a live birth; while 5.9% ended in a stillbirth, and 2.46% had an abortion/miscarriage. Birth weight records of 372 live births and 2 still births were available and showed that the 74.9% of the newborns had a birth weight ≥2500 grams; while 25.1% had weight less than 2500 grams i.e. were LBW. The mean birth weight at birth was 2649 grams with a standard deviation of 375 grams. Twenty percent of all the births were preterm in nature and 10% deliveries were conducted at home.
Regarding ANC services; it was found that 38% of the women failed to do an early registration of pregnancy (in first trimester) but 74% still managed to have four or more ante-natal visits during pregnancy. The quality of care during ANC visits was not satisfactory as 17% did not consumed any Iron-Folic Acid (IFA) tablet, 27% did not have a deworming tablet and 87% were not advised regarding any danger signs during pregnancy.
The study assessed the impact of various socio-demographic and antenatal care service-related factors with their birth outcomes. Among all socio-demographic factors studied, a statistically significant association was found with education and birth outcome as women with an education of more than 6th to up-to 12th standard had highest chances of live births in comparison to illiterate and other women. All other socio-demographic factors like age, religion, caste, type of family, occupation and socio-economic status failed to show a

statistically significant association with birth outcome in the present study. A woman's weight, height, body mass index as well as her gravida or anaemic status were also not significantly associated with the birth outcome.

For deliveries occurring before 37 weeks of gestation; almost three fourth resulted in live births (76.5%) while 23.4% had unfavourable outcomes. In contrast, deliveries after 37 weeks gestation saw more than ninety-five percentage of live births and only 4.6% had an unfavourable outcome. The relationship between birth outcomes and gestational age at delivery has a statistically significant association between the two ($p < 0.001$). Slightly more than two third of the home deliveries was associated with a live birth (69.76%), whereas 30.2% had an unfavourable birth outcome. Institutional deliveries; on the other hand, had 94.2% live births and only 5.8% unfavourable outcomes. There was a statistically significant relationship between birth outcome and the place of delivery ($p<0.001$).

Many ante-natal care (ANC) service-related factors were found to have a statistically significant association with favourable birth outcome, live birth, in the present study including an early ANC registration of pregnancy, more than four ANC visit, presence of ASHA during ANC visits, consumption of IFA and deworming tablets and receiving dietary counselling during pregnancy. On the other hand; not getting an advice on danger signs of pregnancy, substance abuse, and usage of traditional medicine during pregnancy had no significant association with birth outcome. Full term deliveries as well as institutional deliveries had significantly higher proportion of live births in compare to preterm and home deliveries with a p value of <0.001 in both the cases.(Table 1; Table 2 & Figure 1)

Table 1: Relationship of Birth Outcome with Sociodemographic Characteristics (n=406)

Variable		Live birth (n=372)	Stillbirth + Abortion (n=34)	Total (N=406)	P value
Age (in Years)	<21	40 (93.0%)	3 (7.0%)	43 (100.0%)	χ2=4.65;
	21-30	306 (91.6%)	28 (8.4%)	334 (100.0%)	df=3
	31-40	25 (92.6%)	2 (7.4%)	27 (100.0%)	p=0.198
	>40	1 (50.0%)	1 (50.0%)	2 (100.0%)	
Religion	Hindu	354 (91.2%)	34 (8.8%)	388 (100.0%)	χ2=1.72;
	Other	18 (100.0%)	0 (0.0%)	18 (100.0%)	df=1
					p=0.189
Caste	Unreserved	76 (95.0%)	4 (4.0%)	80 (100.0%)	χ2=3.35;
	OBC	181 (89.2%)	22 (10.9%)	203 (100.0%)	df=2
	SC/ST	115 (93.5%)	8 (6.5%)	123 (100.0%)	p=0.187
Type of Family	Nuclear	125 (93.3%)	9 (6.7%)	134 (100.0%)	χ2=0.71;
	Joint	247 (90.8%)	25 (9.2%)	272 (100.0%)	df=1
					p=0.397
Socio- economic class (as per modified BG Prasad for 2023)	Upper	2(100.0%)	0(0.0%)	2(100.0%)	χ2=6.986;
	Upper-middle	66(98.5%)	1(1.5%)	67(100.0%)	df=4
	Middle	160(90.9%)	16(9.0%)	176(100.0%)	p=0.136
	Lower-Middle	134(88.7%)	17(11.3%)	151(100.0%)	
	Lower	10(100.0%)	0(0.0%)	10(100.0%)	
Occupation	Household work	293(91.8%)	26(8.2%)	319(100.0%)	χ2=0.097;
	Daily wager	69(90.8%)	7(9.2%)	76(100.0%)	df=2
	Job on fixed month income	10(90.9%)	1(9.1%)	11(100.0%)	p=0.952
Education	Illiterate	24(88.9%)	3(11.1%)	27(100.0%)	χ2=11.347;
	1-5 class	121(85.8%)	20(14.2%)	141(100.0%)	df=3
	6-12 class	219(95.6%)	10(4.4%)	229(100.0%)	p=0.009
	Graduate & above	8(88.9%)	1(11.1%)	9(100.0%)	

Table 2: Association of birth outcome with utilization and coverage of antenatal care Services (n=406)

	Live birth	Stillbirth + Aborted	Total	p-value
Early ANC registration				
Yes	239 (95.2%)	12 (4.8%)	251 (100.0%)	χ2=11.064 df=1 p<0.001

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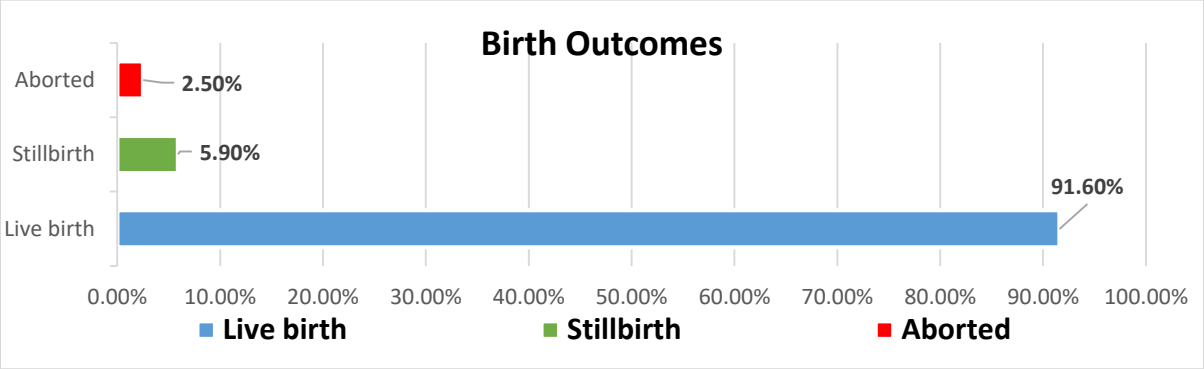
No	133 (85.8%)	22 (14.2%)	155 (100.0%)	
Number of ANC visit				
<4	84 (79.2%)	22 (20.7%)	106 (100.0%)	χ2=28.655; df=1 p<0.001
≥4	288 (96.0%)	12 (4.0%)	300 (100.0%)	
IFA received				
Yes	344 (94.0%)	22 (6.0%)	366 (100.0%)	χ2=27.044; df=1 p<0.001
No	28 (70.0%)	12 (30.0%)	40 (100.0%)	
IFA consumed				
Yes	319 (93.8%)	21 (6.2%)	340 (100.0%)	χ2=13.167; df=1 p<0.001
No	53 (80.3%)	13 (19.7%)	66 (100.0%)	
Deworming				
Yes	276 (93.6%)	19 (6.4%)	295 (100.0%)	χ2=5.258; df=1 p<0.021
No	96 (86.5%)	15 (13.5%)	111 (100.0%)	
Dietary counselling during pregnancy				
Yes	311 (94.5%)	18 (5.5%)	329 (100.0%)	χ2=19.056; df=1 p<0.001
No	61 (79.2%)	16 (20.8%)	77 (100.0%)	
Advice on danger signs during pregnancy				
Yes	52 (94.5%)	3 (5.5%)	55(100.0%)	χ2=0.706; df=1 p<0.400
No	320 (91.2%)	31 (8.8%)	351 (100.0%)	
Substance abuse				
Yes	32 (94.1%)	2 (5.9%)	34 (100.0%)	χ2=0.300; df=1 p<0.583
No	340 (91.4%)	32 (8.6%)	372 (100.0%)	
Use of Traditional Medicine				
Yes	8 (100.0%)	0 (0.0%)	8 (100.0%)	χ2=0.745; df=1 p<0.387
No	364 (91.5%)	34 (8.5%)	398 (100.0%)	

Figure 1: Birth outcome of Study Subjects (N=406)



DISCUSSION

The present study has showed that the majority (91.6%) of the pregnancies in rural Banda concluded in a live birth while 5.9% ended in a stillbirth and 2.46% were over with a spontaneous abortion/miscarriage. According to NFHS-4 (3) and NFHS-5 (4), 84.9% and 87.3% of pregnancies in Uttar Pradesh resulted in a live birth. The proportion of miscarriage/abortion and still births was 9.1% and 0.7% respectively in NFHS-4; while it was 10.2% and 0.9% respectively in NFHS-5. Kumari R et al (5) who followed 305 pregnant women in Jammu noted a much higher rate of abortions (11.15%) and stillbirths (2.9%) in their study. Similarly; Kuppusamy P et al (6) reported a much higher prevalence of miscarriage among Indian women i.e. 73 per 1000 pregnancies (7.3%). Lower rates of abortion and miscarriage observed in the present study may be the fact that the starting point of present study was registration of pregnancy i.e. ANC registration, and so; there are high chances of missing many abortions and miscarriages that might have occurred before the registration of the pregnancy. The worrisome trend; however, is a comparatively higher rates of still births observed in the present study, which points out toward the prevalent socio-economic conditions and quality of ANC care in the study area.

When different socio-demographic factors were studied to find statistical association with the birth outcome in the present study, education of the women was found to be the only factor which has a significant association with the birth outcome with

a p value of 0.009. Primary educated women were found to has a lowest proportion of live births (85.8%) while illiterate as well as graduates & above had 88.9% live births in each group and women with an education of 6th-12th class has highest proportion of live births (95.6%). None of the other socio-demographic factors, studied by us, showed any statistically significant difference among favourable and unfavourable birth outcome groups.

The present study has found that preterm deliveries have 5-times higher proportion of unfavourable birth outcomes in comparison to term deliveries (23.4% vs. 4.6%). The relationship between birth outcomes and gestational age at delivery was found to have a statistically significant (p<0.001), which was similar to the study by Kuppusamy P et al (6) who found that short gestation age was a significant risk factor for pregnancy loss among Indian women. The present study also observed a 5-times more chances of unfavourable birth outcomes in home deliveries (30.2%) compared to institutional deliveries (5.8%) and the observed difference was statistically significant (<0.001).

The present study also has assessed the impact of antenatal care (ANC) services on birth outcomes. ANC registration was found to be significantly associated with birth outcomes as fewer unfavourable birth outcomes were seen with early ANC registration (4.8%) in compared to late registration (14.2%) (p<0.001). More frequent ANC visits (four or more) were associated with improved birth outcomes (96.0%) i.e. live births when compared with less than four visits (79.2%) (p<0.001). Women who consumed Iron and Folic Acid (IFA) supplements during pregnancy had significantly better birth outcomes (93.8%) in comparison to those who denied about consumption of IFA (80.3%) (p<0.001). Similarly; those who underwent deworming (93.6% vs. 86.5; p=0.021) and dietary counselling during pregnancy had significantly better chances of favourable birth outcome (94.5% vs. 79.2%; p<0.001). Our findings were in concordance with the findings of Kuppusamy P et al (6) who reported that higher frequency of ANC visits was associated with lower chance of pregnancy loss among Indian women. Kuppusamy P et al (6) also found that poor nutrition was a significant risk factor for pregnancy loss among Indian women which is in-line of positive effect of dietary counselling on live births found in the present study. Though the mothers who received advice on danger signs in the present study was found to have a slightly higher proportion of live births (94.5%) in comparison to their counterparts (91.2%), the result was statistically non-significant (p>0.05). Similarly; those who reported substance abuse and those who gave history of use of traditional medicines during pregnancy also had no significant association with birth outcome with those factors (p>0.05).

CONCLUSION

The only socio-demographic factor which was found to be significantly associated with the birth outcome was a woman's level of education and mothers who were educated from 6th to 12th standard has highest proportion of favourable birth outcome i.e. live birth. Proportion of unfavourable birth outcome was 5-6 times more prevalent among pre-term deliveries in compared to term deliveries, and among home deliveries in compared to institutional deliveries.

Following ante-natal care factors were found to have a statistically significant association with favourable birth outcome in the present study: early ANC registration, more than four ANC visit, consumption of IFA and deworming tablets and receiving dietary counselling during pregnancy; while factors like getting an advice on danger sign, substance abuse and usage of traditional medicine during pregnancy were not significantly associated with the birth outcome.

RECOMMENDATION

The study re-emphasizes to promote the importance of early ANC registration and regular ANC visits, aiming for at least four such visits, to monitor the health of mother and baby throughout pregnancy, so that proportion of unfavourable outcomes can be minimised. The study also shows the need to ensure that all pregnant women receive and consume iron-folic acid (IFA) and deworming tablets as part of their ante-natal care. Raising the level of education of mothers, increase in the proportion of institutional deliveries and better management of pre-term deliveries are also important to reduce the chances of unfavourable birth outcome in the region.

LIMITATION OF THE STUDY

The starting point of study was registration of pregnancy i.e. ANC registration, and so; chances of missing out most of the miscarriages and some abortions that might have occurred before the registration of the pregnancy cannot be ruled out. For the same reason; the proportion of live births, still births and abortion/miscarriage, calculated in the present study, cannot be considered as a true population proportion of the community.

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RELEVANCE OF THE STUDY

The study highlights the rates and determinants of different birth outcomes that will help in planning tailor made interventions for the area to combat adverse birth outcome.

AUTHORS CONTRIBUTION

All authors have contributed equally.

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Nil

CONFLICT OF INTEREST

There is no conflict of interest.

DECLARATION OF GENERATIVE AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors haven't used any generative AI/AI assisted technology in writing process.

REFERENCES

1. Lawn JE, Lee AC, Kinney M, Sibley L, Carlo WA, Paul VK, et al. Two million intrapartum-related stillbirths and neonatal deaths: where, why, and what can be done? Int J Gynecol Obstet. 2009;107(Suppl 1):S5–19.
2. Lawn JE, Blencowe H, Waiswa P, Amouzou A, Mathers C, Hogan D, et al. Stillbirths: rates, risk factors, and acceleration towards 2030. Lancet. 2016;387(10018):587–603.
3. International Institute for Population Sciences (IIPS) and ICF. National Family Health Survey (NFHS-4) 2015-16. Mumbai: IIPS; 2021. https://dhsprogram.com/pubs/pdf/fr339/fr339.pdf (Accessed on 25-02-2025)
4. International Institute for Population Sciences (IIPS) and ICF. National Family Health Survey (NFHS-5), 2019-21. Mumbai: IIPS; 2021. https://dhsprogram.com/pubs/pdf/FR375/FR375.pdf (Accessed on 25-02-2025)
5. Kumari R, Mengi V, Kumar D. Maternal risk factors & pregnancy wastage in a rural population of Jammu District. JK Sci. 2013;15(2):82–5.
6. Kuppusamy P, Prusty RK, Chaaithanya IK, Gajbhiye RK, Sachdeva G. Pregnancy outcomes among Indian women: increased prevalence of miscarriage and stillbirth during 2015-2021. BMC Pregnancy Childbirth. 2023;23(1):150.