



## Maternal and Fetal outcome among Booked and Unbooked Pregnancies – Prospective Study.

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### Abstract

**Background:** Antenatal care (ANC) is crucial to decrease maternal and fetal morbidity and mortality. Disparities in access and use of ANC services remain major challenge in developing nations, especially in rural, low socio-economic background and low literacy women. **Objective:** To assess the socio-demographic characteristics, risks of pregnancy, complications of pregnancy and fetal-maternal outcomes in booked vs unbooked pregnancies in a rural tertiary care institution. **Methods:** This prospective comparative study of 200 women was carried out in pregnant women (100 booked, 100 unbooked) over two years. The socio-demographic profile, medical illnesses, obstetric and intrapartum complications, mode of delivery, maternal and perinatal outcomes were obtained and chi-square tests were applied. **Results:** Outcomes were better in booked mothers than unbooked mothers. Compared to booked pregnancies, unbooked pregnancies had increased risks of anaemia (23% vs. 11%), eclampsia (9% vs. 1%), preterm labour (10% vs. 2%), postdated pregnancy (18% vs. 7%), postpartum haemorrhage (9% vs. 1%) and maternal death (2% vs. 0%). Unbooked pregnancy also resulted in worse outcomes among the newborn with lower Apgar scores, higher neonatal intensive care unit (NICU) admission (30% vs. 10%), increased birth asphyxia, neonatal sepsis, intrauterine deaths, and perinatal mortality. Unbooked pregnancies were associated with socio-demographic inequalities like illiteracy, poverty and rural background. **Conclusion:** Booked pregnancies have improved maternal and neonatal outcomes compared to unbooked pregnancies. Improving coverage of ANC, overcoming socio-economic and cultural obstacles and providing universal access to good quality services are vital to minimise preventable complications and achieve better maternal and infant survival.

**Keywords:** Prenatal care, Maternal Mortality, Pregnancy outcome, Antenatal care, Infant Mortality.



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### INTRODUCTION

Pregnancy is considered as the most important period in the life of a woman but it can also be a life-threatening period. A woman can encounter serious life-threatening complications while pregnancy. The mother has to be cared for her nutrition and to ensure best health of the fetus. The goal of any health care centre is to have a complication free pregnancy and give birth to a healthy baby after 9 months of pregnancy without any threat to the life of mother and her child.(1)

Most of the developed world has planned pregnancy and the number of fetomaternal complications are minimal. But in developing world the complications of pregnancy are more frequent as pregnancy is unplanned. The worst of the pregnancy complications is either maternal or fetal death. Maternal mortality ratio has decreased from 130 to 97 per 100,000 livebirth in between 2016 to 2020, but is still very high in India as compared to developed countries.(2) The rates of complications to the mother and perinatal outcomes in India are high, primarily due to suboptimal use of antenatal and delivery services.(3) Higher maternal mortality ratio in India is due to a combination of social, economic and health related factors. Mothers who are illiterate, get married early and hence get pregnant at an earlier age, are malnourished, have closely spacing and multiple pregnancies, and have a low socioeconomic status are at high risk. All these are added to the improper use of obstetric services, poor recognition of complications and delay in getting hospital care, home deliveries, unsafe abortions and inconsistent quality of services provided.(4)

Pregnant women who has had three antenatal consultations after the confirmation of pregnancy and delivered the baby in hospital are called booked cases. Whereas pregnancy women who have not seen any doctor during pregnancy and the first time they have seen doctor is at the time of onset of labor pains are known as unbooked cases.(5) There is a link between lack of antenatal care and negative pregnancy outcomes in unbooked pregnancy as compared to booked pregnancy.(6)

Improvisations in availability and accessibility of good antenatal and childbirth care services has improved pregnancy outcomes in booked pregnancies. The percentage of cases requiring intensive care unit admission and perinatal deaths are higher in unbooked pregnancies than booked pregnancies.(7) Obstructed labor and severe pre-eclampsia is common in unbooked cases. (8)

Appropriate antenatal care and hospital delivery during pregnancy help the obstetricians to detect complications in early pregnancy and take timely action to achieve good pregnancy outcomes. Pregnancy outcome in unbooked women are poor compared to booked pregnancy because of increased preterm deliveries, low birth weight infants and increased rate of cesarean section.<sup>9</sup> Unbooked pregnancies report late to the hospital and have complications; they find it difficult to perform surgeries due to fetal distress, obstructed labor and prolonged labor. In developing world, the rate of unbooked hospital delivery is 17% to 29%. (9) 81.4% of unbooked pregnancies were not aware of the pregnancy duration and most of the women conceived during non-menstrual period of lactational amenorrhea or depo-provera induced amenorrhea. (7) Improving health care services for all unbooked births and improving services for perinatal health through skilled attendants may improve birth outcomes. (10) Studies have reported that unbooked women were younger, illiterate and unemployed as compared to their matched booked women .(11) To address this, the current study compared the maternal risk factors and factors affecting feto-maternal outcome between booked and unbooked pregnant women who delivered in a rural tertiary care hospital in Ambala, Haryana..

## **METHODOLOGY**

This prospective comparative study was done in the Department of Obstetrics and Gynaecology at MMIMSR, Mullana, Ambala. The Institutional Ethical Committee (IEC) has approved the study. The study was planned to be conducted over two years (January 2023 to December 2025). OpenEpi, Version 3.01 (Sample Size for % Frequency in a Population) was used to determine the sample size for the current study. Using the prevalence of eclampsia unbooked cases (5.34%) reported by Gaikwad V et al. (12) the sample size was calculated to be 78 patients with 95% confidence and design effect 1.0. To improve the statistical power of the study, 100 patients (booked and unbooked) were included each, making a total of 200. We included 200 pregnant women, aged 19-40 years admitted for delivery at MMIMSR. Both groups consisted of an equal number of participants (100 each), with one group being booked and the other unbooked. Those who had three or more antenatal visits during the current pregnancy (at MMIMSR or any other private hospital) were considered booked cases. Those who had not had any antenatal check-up was unbooked. All women were asked for written informed consent. Were included all pregnant women with age of gestation (AoG)  $\geq$  28 weeks who delivered at MMIMSR during the study period. Women with pregnancy less than 28 weeks of gestation were excluded.

### **Study groups and Data collection**

Women who had antenatal care and delivered (booked mothers) at MMIMSR were enrolled in the study. And they were compared with a group of women who did not have antenatal care but had delivery, in the same institution during the same time (unbooked mothers). At the time of admission a history was taken which included age, socioeconomic and residential status, education and booking status. Obstetric history regarding her gravida, parity, last menstrual period (LMP), pregnancy duration, reason for admission and pregnancy complications, major events in previous pregnancy and past history of any medical and surgical disease was taken. The mother was examined and necessary tests were done to determine her health status and pregnancy. We compared the outcomes of the two groups, to assess the socio-demographic differences, maternal risks and feto-maternal outcomes.

### **Statistical analysis**

Data entry was done using Microsoft Excel (Microsoft Corporation, Redmond, WA, USA). SPSS version 28.0 (IBM Corp., Armonk, NY, USA) was used for statistical analysis. Data were summarised as frequencies and percentages. The Chi-square test (or Fisher's exact test if necessary) was used to assess the association between categorical variables. A p-value  $<0.05$  was statistically significant.

## **RESULTS**

### **Socio-demographic Profile**

The age of the women was marginally higher in booked ( $26.9 \pm 4.8$  years) than unbooked ( $25.0 \pm 3.9$  years) women. There was a strong link with religion, with a higher proportion of Hindu women in booked (84%) and Muslim women in unbooked (40%). There were socio-economic differences, with 72% of unbooked women belonging to the lower class compared to 58% of booked. City dwellers were more prevalent in the booked group (52%) compared to the unbooked (28%) but illiteracy was more prevalent among the unbooked (57%) than the booked (30%). (Table 1)

### **Maternal Risks and Clinical Factors**

The incidence of preterm (14%) and post-term (17%) pregnancy was higher in unbooked women while booked women mostly delivered at term (84%). Rates of anemia were significantly higher in unbooked pregnancies (23% vs. 11%) and

eclampsia was more common (9% vs. 1%). Unbooked women were also more likely to have obstetric complications, preterm labor (10% vs. 2%) and post-dated pregnancy (18% vs. 7%). PPH was more common in unbooked pregnancies (9% vs. 1%). There was no maternal mortality in the booked group (2%) but the difference was not significant. (Table 2)

### Obstetrical and Intrapartum Complications

Of the obstetrical complications, preterm labour and post-dated pregnancy were significantly higher in unbooked women (10% vs. 2% and 18% vs. 7%, respectively). The frequency of other complications, including premature rupture of membranes, placenta previa, abruptio placenta and fetal intrauterine growth restriction were all higher in unbooked women, although not significantly so. Interestingly, the absence of obstetrical complications was recorded in 61% of booked pregnancies vs. 33% of unbooked, which was highly significant. Unbooked women had more intrapartum complications, such as obstructed labour (7% vs. 2%), malpresentation (12% vs. 7%) and meconium-stained liquor (8% vs. 3%). While the individual complications were not statistically significant, the absence of intrapartum complications was significantly higher in booked pregnancies (77% vs. 61%). (Table 3)

### Mode of Delivery and Postpartum outcomes

Booked women experienced more spontaneous vaginal delivery, but similar proportions of women had a cesarean section. Cesarean hysterectomy was only reported in unbooked women, denoting more complicated labour. Proportions of indications for cesarean section were different: fetal distress and cephalopelvic disproportion were higher in the booked group while antepartum haemorrhage and obstructed labour and eclampsia were higher in the unbooked group. In particular, eclampsia was a cause of one-fifth of cesareans in unbooked pregnancies but only a tiny fraction of booked pregnancies. Unbooked women had many more complications. Postpartum blood loss was significantly higher in unbooked cases (9%) than booked (1%). Other complications, including urinary tract infection, wound infection, puerperal sepsis and acute renal failure were also more common in unbooked women. On the other hand, most booked women (94%) did not experience any complications of pregnancy compared to 70% of unbooked women. (Table 4)

### Feto-maternal Outcomes

APGAR scores of 7 or more at 1 minute was seen in 91% of booked and 74% unbooked births, and 97% and 86% at 5 minutes, respectively. The rate of neonatal intensive care unit (NICU) admissions was three-fold higher in unbooked babies (30% vs. 10%). Unbooked pregnancies had a greater fetal morbidity, with more birth asphyxia (9% vs. 4%) and sepsis (5% vs. 1%). Perinatal mortality was also higher, with intrauterine (5% vs. 1%) and early neonatal deaths (10% vs. 2%) mostly in the unbooked group. (Table 5).

**Table 1: Sociodemographic status of the study population**

| Parameter                    | Booked pregnancy | Unbooked Pregnancy | Total      | $\chi^2$ | p value |
|------------------------------|------------------|--------------------|------------|----------|---------|
| Age (years), n (%)           |                  |                    |            |          |         |
| ≤ 20                         | 8 (8.0)          | 11 (11.0)          | 19 (9.5)   | 12.749   | 0.005*  |
| 21 – 25                      | 28 (28.0)        | 43 (43.0)          | 71 (35.5)  |          |         |
| 26 – 30                      | 44 (44.0)        | 41 (41.0)          | 85 (42.5)  |          |         |
| > 30                         | 20 (20.0)        | 5 (5.0)            | 25 (12.5)  |          |         |
| Religion, n (%)              |                  |                    |            |          |         |
| Hindu                        | 84 (84.0)        | 60 (60.0)          | 144 (72.0) | 14.286   | <.001*  |
| Muslim                       | 16 (16.0)        | 40 (40.0)          | 56 (28.0)  |          |         |
| Socio-economic status, n (%) |                  |                    |            |          |         |
| Lower class                  | 58 (58.0)        | 72 (72.0)          | 130 (65.0) | 9.517    | 0.049*  |
| Lower middle class           | 23 (23.0)        | 20 (20.0)          | 43 (21.5)  |          |         |
| Middle class                 | 12 (12.0)        | 8 (8.0)            | 20 (20.0)  |          |         |
| Upper middle class           | 5 (5.0)          | 0                  | 5 (2.5)    |          |         |
| Upper class                  | 2 (2.0)          | 0                  | 2 (2.0)    |          |         |
| Residence                    |                  |                    |            |          |         |
| Urban                        | 52 (52.0)        | 28 (28.0)          | 80 (40.0)  | 12       | <.001*  |
| Rural                        | 48 (48.0)        | 72 (72.0)          | 120 (60.0) |          |         |
| Education level              |                  |                    |            |          |         |
| Illiterate                   | 30 (30.0)        | 57 (57.0)          | 87 (43.5)  | 17.39    | <.001*  |
| Primary education            | 50 (50.0)        | 36 (36.0)          | 86 (43.0)  |          |         |
| Secondary education          | 8 (8.0)          | 4 (4.0)            | 12 (6.0)   |          |         |
| Higher secondary education   | 12 (12.0)        | 3 (3.0)            | 15 (7.5)   |          |         |

**Table 2: Comparison of Parity, Gestational Age, Labour Presentation, and Anemia**

| Parameter                  | Booked pregnancy (%) | Unbooked Pregnancy (%) | Total (%)  | $\chi^2$ | p value |
|----------------------------|----------------------|------------------------|------------|----------|---------|
| Parity, n (%)              |                      |                        |            |          |         |
| 0                          | 45 (45.0)            | 49 (49.0)              | 91 (45.5)  | 2.377    | .305    |
| 1 – 4                      | 54 (54.0)            | 44 (44.0)              | 11 (5.5)   |          |         |
| > 4                        | 1(1.0)               | 7(7.0)                 | 98 (49.0)  |          |         |
| Duration of Pregnancy      |                      |                        |            |          |         |
| Preterm                    | 9 (9.0)              | 14 (14.0)              | 23 (11.5)  | 21.01    | <.001*  |
| Term                       | 84 (84.0)            | 58 (58.0)              | 142 (71.0) |          |         |
| Post term                  | 7 (7.0)              | 17 (17.0)              | 24 (12.0)  |          |         |
| No know duration           | 0                    | 11 (11.0)              | 11 (5.5)   |          |         |
| Presentation during Labour |                      |                        |            |          |         |
| Cephalic presentation      | 93 (93.0)            | 88 (88.0)              | 181 (90.5) | 1.497    | 0.473   |
| Breech presentation        | 5 (5.0)              | 8 (8.0)                | 13 (6.5)   |          |         |
| Transverse presentation    | 2 (2.0)              | 4 (4.0)                | 6 (3.0)    |          |         |
| Degree of Anemia, n (%)    |                      |                        |            |          |         |
| Mild (9 – 10 gm/dl)        | 4 (36.4)             | 10 (43.5)              | 14 (41.2)  | 0.194    | 0.908   |
| Moderate (7 – 8 gm/dl)     | 4 (36.4)             | 8 (34.8)               | 12 (35.3)  |          |         |
| Severe (<7 gm/dl)          | 3 (27.2)             | 5 (21.7)               | 8 (23.5)   |          |         |

**Table 3: Comparison of Systemic illness in booked and unbooked pregnancies**

| Medical Disorder                    | Booked (n=100) |            | Unbooked (n=100) |            | p value |
|-------------------------------------|----------------|------------|------------------|------------|---------|
|                                     | Present (%)    | Absent (%) | Present (%)      | Absent (%) |         |
| Anemia                              | 11 (11.0)      | 89 (89.0)  | 23 (23.0)        | 77 (77.0)  | 0.012*  |
| Gestational Hypertension            | 12 (12.0)      | 88 (88.0)  | 19 (19.0)        | 81 (81.0)  | 0.171   |
| Preeclampsia                        | 2 (2.0)        | 98 (98.0)  | 7 (7.0)          | 93 (93.0)  | 0.170   |
| Eclampsia                           | 1 (1.0)        | 99 (99.0)  | 9 (9.0)          | 91 (91.0)  | 0.009*  |
| Thyroid disorder                    | 4 (4.0)        | 96 (96.0)  | 3 (3.0)          | 97 (97.0)  | 0.500   |
| Gestational Diabetes Mellitus (GDM) | 2 (2.0)        | 98 (98.0)  | 3 (3.0)          | 97 (97.0)  | 1.000   |
| Heart disease                       | 1 (1.0)        | 99 (99.0)  | 2 (2.0)          | 98 (98.0)  | 1.000   |
| Nil                                 | 33 (33.0)      | 67 (67.0)  | 66 (66.0)        | 34 (34.0)  | <0.001* |

**Table 4: Evaluation of Obstetric and Intrapartum complications**

| Parameters                             |                   | Booked (n=100) | Unbooked (n=100) | p value |
|----------------------------------------|-------------------|----------------|------------------|---------|
| <b>Obstetrical complications</b>       |                   |                |                  |         |
| Premature Rupture of membrane          |                   | 01 (1%)        | 04 (4%)          | 0.174   |
| Pre term labour                        |                   | 02 (2%)        | 10 (10%)         | 0.008*  |
| Post dated pregnancy                   |                   | 07 (7%)        | 18 (18%)         | 0.009*  |
| APH                                    | Placenta previa   | 03 (3%)        | 04 (4%)          | 0.526   |
|                                        | Abruptio placenta | 01 (1%)        | 03 (3%)          |         |
|                                        | Placenta accreta  | 0              | 01 (1%)          |         |
| Previous CS with ST                    |                   | 02 (2%)        | 06 (6%)          | 0.149   |
| Rh negative pregnancy                  |                   | 07 (7%)        | 05 (5%)          | 0.552   |
| IUGR (Intrauterine Growth Restriction) |                   | 01 (1%)        | 04 (4%)          | 0.174   |
| Twin pregnancy                         |                   | 06 (6%)        | 02 (2%)          | 0.149   |
| Bad obstetric history (BOH)            |                   | 01 (1%)        | 02 (2%)          | 0.561   |
| Amniotic fluid level                   | Polyhydramnios    | 05 (5%)        | 04 (4%)          | 0.881   |
|                                        | Oligohydramnios   | 03 (3%)        | 04 (4%)          |         |
| Nil                                    |                   | 61 (61%)       | 33 (33%)         | <0.001* |
| <b>Intrapartum Complications</b>       |                   |                |                  |         |
| MSL (Meconium stained liquor)          |                   | 03 (3%)        | 08 (8%)          | 0.061   |
| Fetal distress                         |                   | 08 (8%)        | 04 (4%)          | 0.117   |

|                                                       |          |          |        |
|-------------------------------------------------------|----------|----------|--------|
| Previous CS (Cesarean section) + ST (Scar tenderness) | 02 (2%)  | 05 (5%)  | 0.125  |
| Obstructed labour                                     | 02 (2%)  | 07 (7%)  | 0.088  |
| Rupture uterus                                        | 01 (1%)  | 03 (3%)  | 0.621  |
| Malpresentation                                       | 07 (7%)  | 12 (12%) | 0.114  |
| Nil                                                   | 77 (77%) | 61 (61%) | 0.007* |

**Table 5: Comparison of Mode of Delivery and Maternal Outcomes**

| Parameters                             | Booked (n=100) | Unbooked (n=100) | p value |
|----------------------------------------|----------------|------------------|---------|
| Mode of delivery                       |                |                  |         |
| Normal vaginal delivery                | 65 (65.0)      | 53 (53.0)        | 0.159   |
| Breech assisted                        | 2 (2.0)        | 6 (6.0)          |         |
| Forceps delivery                       | 2 (2.0)        | 1 (1.0)          |         |
| Vacuum extraction                      | 1 (1.0)        | 1 (1.0)          |         |
| Lower section cesarean section         | 30 (30.0)      | 35 (35.0)        |         |
| Caesarean hysterectomy                 | 0              | 4 (4.0)          |         |
| Previous LSCS                          |                |                  |         |
| Present                                | 11 (11.0)      | 8 (8.0)          | 0.469   |
| Absent                                 | 89 (89.0)      | 92 (92.0)        |         |
| Indication of LSCS                     |                |                  |         |
| Cephalopelvic Disproportion (CPD)      | 3 (10.0)       | 1 (2.9)          | 0.164   |
| Fetal distress                         | 6 (20.0)       | 2 (5.7)          |         |
| Antepartum hemorrhage (APH)            | 4 (13.3)       | 8 (22.9)         |         |
| Previous LSCS                          | 11 (36.7)      | 8 (22.9)         |         |
| Obstructed labour                      | 2 (6.7)        | 5 (14.3)         |         |
| Transverse lie                         | 2 (6.7)        | 3 (8.6)          |         |
| Breech presentation                    | 1 (3.3)        | 1 (2.9)          |         |
| Eclampsia                              | 1 (3.3)        | 7 (20.0)         |         |
| Puerperal Sepsis                       |                |                  |         |
| Present                                | 0              | 2 (2.0)          | 0.497   |
| Absent                                 | 100 (100.0)    | 98 (98.0)        |         |
| Postpartum hemorrhage                  |                |                  |         |
| Present                                | 1 (1.0)        | 9 (9.0)          | 0.009*  |
| Absent                                 | 99 (99.0)      | 91 (91.0)        |         |
| Postpartum complications               |                |                  |         |
| No complication                        | 94 (94.0)      | 70 (70.0)        | 0.768   |
| Postpartum Hemorrhage (PPH)            | 1 (1.0)        | 9 (9.0)          |         |
| Urinary tract infection (UTI)          | 3 (3.0)        | 5 (5.0)          |         |
| Wound infection                        | 2 (2.0)        | 5 (5.0)          |         |
| Puerperal sepsis                       | 0              | 2 (2.0)          |         |
| Congestive heart failure (CHD)         | 0              | 1 (1.0)          |         |
| Pulmonary edema                        | 0              | 1 (1.0)          |         |
| Acute renal failure (ARF)              | 0              | 2 (2.0)          |         |
| Disseminated intravascular Haemorrhage | 0              | 1 (1.0)          |         |
| Postpartum eclampsia                   | 0              | 2 (2.0)          |         |
| Postpartum cardiomyopathy              | 0              | 1 (1.0)          |         |
| Maternal outcome                       |                |                  |         |
| Death of mother                        | 0              | 2 (2.0)          | 0.498   |
| Mother is alive                        | 100 (100.0)    | 98 (98.0)        |         |

**Table 6: Comparison of Fetal outcomes**

| Parameters                    | Booked (n=100) | Unbooked (n=100) | p value |
|-------------------------------|----------------|------------------|---------|
| APGAR score at 1 minute       |                |                  |         |
| ≥ 7                           | 91 (91.0)      | 74 (74.0)        | 0.002*  |
| < 7                           | 9 (9.0)        | 26 (26.0)        |         |
| APGAR score at 5 minute       |                |                  |         |
| ≥ 7                           | 97 (97.0)      | 86 (86.0)        | 0.005*  |
| < 7                           | 3 (3.0)        | 14 (14.0)        |         |
| Birth weight                  |                |                  |         |
| Very low birth weight (VLBW)  | 0              | 2 (2.0)          | 0.152   |
| Low birth weight (LBW)        | 10 (10.0)      | 16 (16.0)        |         |
| Normal birth weight           | 90 (90.0)      | 82 (82.0)        |         |
| NICU Admission                |                |                  |         |
| Yes                           | 10 (10.0)      | 30 (30.0)        | <.001*  |
| No                            | 90 (90.0)      | 70 (70.0)        |         |
| Fetal Morbidity               |                |                  |         |
| No morbidity                  | 91 (91.0)      | 65 (65.0)        | 0.001*  |
| Meconium stained liquor (MSL) | 3 (3.0)        | 8 (8.0)          |         |
| Jaundice                      | 1 (1.0)        | 4 (4.0)          |         |
| Congenital anomaly            | 0              | 2 (2.0)          |         |
| Birth asphyxia                | 4 (4.0)        | 9 (9.0)          |         |
| Neonatal sepsis               | 1 (1.0)        | 5 (5.0)          |         |
| Not known                     | 0              | 7 (7.0)          |         |
| Perinatal morbidity           |                |                  |         |
| No mortality                  | 97 (97.0)      | 85 (85.0)        | 0.012*  |
| Intrauterine death (IUD)      | 1 (1.0)        | 5 (5.0)          |         |
| Early neonatal death          | 2 (2.0)        | 10 (10.0)        |         |

## DISCUSSION

The current study was conducted to address the long-standing concern that unbooked pregnancies, especially in rural and disadvantaged communities, are at risk of increased maternal and perinatal complications and death. Antenatal care is a means of risk classification, diagnosis and intervention and the absence of antenatal care often leads to avoidable complications. The comparison of booked and unbooked pregnancies in the present study was undertaken to emphasise the risk and the value of antenatal care.

In the current study, the incidence of maternal morbidity was higher in unbooked pregnancies. Puerperal sepsis, pulmonary edema, acute renal failure, disseminated intravascular coagulation, eclampsia in postpartum period, cardiomyopathy and congestive heart failure were not present or more common in unbooked pregnancies. The rate of puerperal sepsis (0% in booked and 2% in unbooked) was in agreement with Chourasia S et al. (13) and Sahoo S et al., (14) who found it more prevalent in unbooked women. Likewise, pulmonary edema was seen in 1% of unbooked women, correlating with Aggarwal A et al. (15) and Sahoo S et al. (14) These complications are a result of untreated hypertensive disorders, inadequate intrapartum care and lack of timely referral; which are prevalent in unbooked pregnancies. Acute renal failure (ARF) and disseminated intravascular coagulation (DIC) also highlight the impact of delayed diagnosis of obstetric complications. These results (0% vs. 2% for ARF and 0% vs. 1% for DIC) were in line with Sahoo S et al. (14) However, in the current study, there was no DIC in booked women in contrast to their study, which may be explained by differences in case severity and institutional practices. Postpartum eclampsia and cardiomyopathy were also higher in unbooked women and are due to unrecognised hypertension and failure to assess the cardiovascular system in pregnancy. (13)

Only unbooked women (2%) had maternal mortality from pulmonary edema and DIC. This finding was consistent with Sahoo S et al., (14) Aggarwal S et al. (15) and Chourasia S et al. (16) who found increased mortality in unbooked women. The mortality data reveal potentially avoidable complications that could be reduced by early antenatal check-ups and intrapartum care.

There were also obvious differences in the present study in regards to the neonates. The prevalence of low Apgar scores was higher in unbooked births (1 minute- 26% and 5 minute- 14%) in accordance with Sahoo S et al., (14) Mundhra R et al., (5) and Chourasia S et al. (13) This was possibly due to late presentation in labour and lack of intrapartum monitoring. LBW was significantly higher in unbooked cases (18% vs. 10%) in line with Mundhra R et al., (5) and was likely due to

unchecked maternal anemia and malnutrition. NICU admissions were three times more frequent in unbooked babies (30% vs. 10%) consistent with Aamir F et al. (17) and Chourasia S et al., (13) and reflect higher rates of neonatal complications secondary to intrapartum distress and preterm birth. The other neonatal complications such as meconium-stained liquor, birth asphyxia and sepsis were also higher in unbooked mothers. (5,13,15,16,18) These outcomes are most likely due to prolonged labor, fetal distress and lack of aseptic handling. Stillbirths and perinatal deaths were also higher in unbooked pregnancies. (13-15) These complications are a result of multiple factors such as hypertension, placental dysfunction and lack of timely obstetric care.

The differences in outcomes may have been related to the socio-demographic status. Literacy was significantly lower in unbooked mothers, which could have contributed to poor knowledge and antenatal care. They were more likely to have low socioeconomic background and live in rural areas, further limiting their access to timely interventions and institutional care. Age of the population and religious diversity also influenced health-seeking behaviour, with social and cultural determinants of health similar to those reported in literature. (11,19)

Unbooked pregnancies, therefore, are at a greater risk of maternal mortality, maternal morbidity and poor neonatal outcome. This is due to a multitude of reasons, including no antenatal surveillance, delayed identification of high-risk cases, poor socioeconomic and educational status and delayed referral for medical care. (11,20,21) On the other hand, booked pregnant women are monitored during pregnancy, risks are identified early, and appropriate obstetric interventions are applied, leading to better outcomes.

This highlights the need to improve antenatal service delivery, especially rural and marginalised areas. Antenatal care promotion at the community level, enhancing access, and linking this care with primary care services can result in a significant reduction in complications, and better feto-maternal outcomes.

This study has some limitations. As an observational study, a causal relationship between antenatal care and outcomes cannot be definitively determined. Confounding factors, such as nutritional status, co-morbidities and socio-cultural factors were not adjusted for, and may have affected the results. Further, the study only looked at maternal and neonatal outcomes immediately after delivery and did not follow them up, which means that we don't know whether there were delayed complications or sequelae.

## CONCLUSION

Outcomes of pregnancy in booked mothers were better than unbooked mothers. Being unbooked was positively associated with more maternal complications such as puerperal sepsis, pulmonary edema and maternal death, more adverse fetal outcomes such as low Apgar scores, low birth weight, admission to NICU, intrauterine deaths and more perinatal deaths. These demonstrate the challenge and opportunity in ANC as a vital component of the health system for mothers and children. Disparities still exist, especially among the young, rural, poor and less educated women who are vulnerable to being excluded from ANC services. Improving universal coverage and access to facilities is key to enhancing maternal satisfaction, minimising drop-outs and enhancing the effectiveness of integrated health programs. Thus, good antenatal care remains the gold standard for achieving improved maternal and child survival.

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