Assessing the Prevalence and Consequences of Unbooked Pregnancies: A Study on Maternal-Foetal Outcome and JSSK Awareness: A Cross-Sectional Study in Central India

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Abstract: _Background: Mother and child should be considered one unit. The health of the children depends upon their mother's health. Awareness regarding JSSK and other government schemes about mother and child will encourage mothers to utilize health facilities more, which in turn indirectly improves the health status of mother and foetus. Thus, this study was conducted to assess the maternal-foetal outcome, between booked and unbooked cases._ _Methods: A cross-sectional study was conducted among 300 postnatal mothers over 2 months in a tertiary health care centre in Central India. Data was analysed using Jamovi 2.4.8. Qualitative data were analysed using chi-square. A Student t-test was used to compare the continuous variable with the categorical variable. The p-value of < 0.05 was considered to be statistically significant._ _Results: The mean age was 33.3 ± 19.8 years. Out of 300, the majority 199(66.3%) were males. Out of 300, 45 (15.0%) were found to have a delay in initiating post-exposure prophylaxis (>48hrs) & the most common reason for the delay was lack of money found in 15(33.0%)._

Keywords: Booked case, unbooked case, JSSK, foetal outcome, maternal outcome

1. Introduction

Maternal and child health is a critical area of public health that underscores the interconnectedness of maternal and infant well-being. The health of a child is profoundly influenced by the health of the mother, making it essential to consider them as a single unit in healthcare strategies. This holistic perspective recognizes that maternal health not only affects pregnancy outcomes but also has long-lasting implications for the child's development and overall health trajectory.

In India, the maternal mortality ratio (MMR) stands at 97 per 100,000 live births, reflecting significant progress in recent years; this represents a dramatic decline of 70% from 2000 to 2020, as reported by the United Nations Population Fund (UNFPA)[3]. A lower MMR is indicative of improved maternal healthcare services and reflects the availability and quality of healthcare for women. Despite these advancements, challenges remain, particularly in ensuring equitable access to quality care for all women.

According to the National Family Health Survey (NFHS-5), approximately 59% of pregnant women in India had at least four antenatal visits, while a concerning 6% did not attend any antenatal care[5]. This discrepancy indicates a gap in healthcare access and utilization that could have dire implications for both maternal and foetal health outcomes. Antenatal care is crucial for monitoring the health of both mother and foetus, identifying potential complications early on, and providing necessary interventions to improve outcomes.

The awareness and understanding of government schemes such as the Janani Shishu Suraksha Karyakram (JSSK) play a vital role in empowering mothers to utilize available healthcare facilities effectively. Increased awareness can lead to better health-seeking behaviours among mothers, encouraging them to seek timely medical attention during pregnancy and childbirth. This proactive approach not only improves individual health outcomes but also contributes to broader public health goals by reducing maternal and neonatal mortality rates.

Given this context, this study aims to investigate the maternal-foetal outcomes, and JSSK knowledge associated with booked versus unbooked cases. By analysing these differences, we hope to shed light on how antenatal care engagement influences health outcomes. Booked cases where mothers have received adequate antenatal care are expected to demonstrate better maternal and foetal outcomes compared to unbooked cases that lack such care. Through this research, we aim to contribute valuable insights that can inform public health policies and interventions aimed at enhancing maternal and child health services in India.

2. Materials and Methods

Study design and settings:

This cross-sectional study was conducted over two months from November to December 2023, in the Department of Obstetrics and Gynaecology at the Indira Gandhi Government Medical College and Hospital, Nagpur, in an anti-rabies vaccination clinic.

Study population:

The postnatal mothers, who delivered a healthy baby, or with intra-uterine death (IUD)/ stillbirth were willing to participate in the study were included. Pregnant women who came for induced abortions and abortion in the first trimester were excluded from the study.

Data collection:

After obtaining informed consent, the data from all postnatal mothers with eligible criteria were collected through face-to-face interviews till the desired sample size was achieved. A pre-designed proforma was used to collect the data which comprised three parts. The first part included socio-demographic characteristics with obstetric history such as age, gender, religion, education, occupation, residence, parity, intake of iron folic acid tablets, and booking status.

The second part included questions to assess the maternal outcome (mode of delivery, postpartum haemorrhage, blood transfusion, maternal ICU admission and maternal morbidity) and foetal outcome (gestation week at delivery, birth weight, neonatal ICU admission, neonatal mortality). The third part included questions assessing the knowledge about Janani Shishu Suraksha Karyakram (JSSK).

Operational definitions:

1) **Socio-economic status:** Modified Kuppuswamy socioeconomic scale 2023 was used. (Radhakrishnan)
2) **Parity:** Parity refers to the number of times a woman has given birth to a live-born infant, regardless of the infant's current status (alive or deceased)
3) **Iron Folic Acid (IFA) tablet consumption:** To assess the IFA consumption among study participants classifying them into 3 categories as given below.

Categories	Description
Low consumption	Less than a month / less than 30 tablets consumed during pregnancy
Moderate consumption	1-3 months / 30 – 90 tablets consumed during pregnancy
Adequate consumption	> 3 months / > 90 tablets consumed during pregnancy

4) **Booked case:** Referred to as pregnant women with a minimum of three antenatal visits (excluding registration visit) to a registered medical officer with a minimum of one dose of injection TT before delivery
5) **Unbooked case:** Referred to pregnant women with less than 3 antenatal visits or without a minimum of one dose TT injection
6) **JSSK knowledge score[6]:** 10 questions were formulated according to NHM guidelines for JSSK. Each question was given one score and if the accumulation of score came to be < 3 poor knowledge, 4-7 moderate knowledge and 8-10 fair knowledge.

1.	Have you heard about JSSK?
2.	Do you know about free and cashless delivery?
3.	Do you know about free caesarean section?
4.	Do you know about free drugs and consumables?
5.	Do you know about free diagnostics?
6.	Do you know about a free diet during your stay?
7.	Do you know about the free provision of blood for transfusion?
8.	Do you know about exemption from user charges?
9.	Do you know about free transport provision? (from home to health institution, between health institutions in case of referral and drop back to home)
10.	Do you know about free treatment, drugs, blood transfusion, and transport for sick newborns till 30 days after birth?

Sample size estimation:

The sample size was obtained using the formula: $n = \frac{Z^2 pq}{e^2}$. To calculate the sample size, the prevalence of 26.0% was taken from the study "Obstetrics referrals: maternal and perinatal outcome in medical college hospital in eastern India" conducted by **Dutta I et al**[4]. The sample size derived was 295.6, and it was rounded to 300.

Data analysis:

The data were analysed using Jamovi 2.4.8. Qualitative data was expressed in number and percentage while quantitative data was expressed in mean and standard deviation. The chi-square test and binomial logistic regression were applied to find the association between two categorical variables. A Student t test was used to compare the continuous variable with the categorical variable. The p-value of < 0.05 was considered to be statistically significant.

Ethical consideration:

The Institutional Ethics Committee approved the study.

3. Results
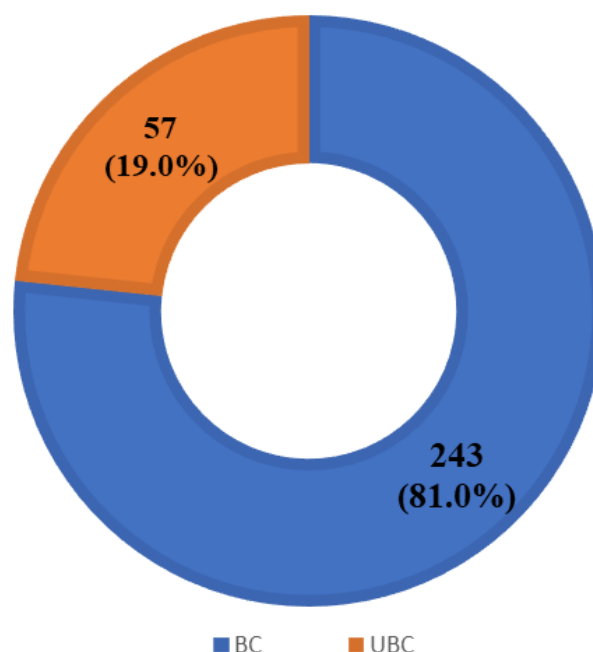
Figure 1: Distribution of study participants according to the booking status of their pregnancy

Table 1: Association of sociodemographic factors with booking status of the pregnancy

Characteristics	Booked case (BC) 243 (81.0%)	Unbooked case (UBC) 57 (19.0%)	Total 135	χ^2, df, p
Age (in years)				
<18	2 (40.0%)	3 (60.0%)	5	
19-24	87 (75.0%)	29 (25.0%)	116	
25-30	113 (83.7%)	22 (16.3%)	135	**0.005***
31-36	41 (93.2%)	3 (6.8%)	44	
Residence				0.400
Urban	160 (82.1%)	35 (17.9%)	195	1
Rural	83 (79.0%)	22 (21.0%)	105	0.527
Religion				
Hindu	131 (78.9%)	35 (21.1%)	166	2.33
Muslim	85 (85.9%)	14 (14.1%)	99	2
Buddhist	27 (77.1%)	8 (22.9%)	35	0.313
Education				49.7
Literate	223 (87.8%)	31 (12.2%)	254	1
Illiterate	20 (43.5%)	26 (56.5%)	46	**< 0.001**
Occupation				7.89
Employee	90 (90.0%)	10.0 (10.0%)	100	1
Housewife	153 (76.5%)	47 (23.5%)	200	**< 0.005**
Socioeconomic class				
Upper middle (II)	49 (80.3%)	12 (19.7%)	61	0.348
Lower middle (III)	104 (82.5%)	22 (17.5%)	126	3
Upper lower (IV)	27 (79.4%)	7 (20.6%)	34	0.951
Lower (V)	63 (79.7%)	16 (20.3%)	79	
Family type				
Nuclear	136 (82.9%)	28 (31.1%)	164	1.30
Joint	27 (75.0%)	9 (25.0%)	36	2
Three generation	80 (80.0%)	20 (20.0%)	100	0.521
Parity				19.0
1	114 (71.7%)	45 (28.3%)	159	1
≥ 2	129 (91.5%)	12 (26.8%)	141	**< 0.001**
IFA consumption				
Low	28 (68.3%)	13 (31.7%)	41	9.80
Moderate	73 (76.0%)	23 (24.0%)	96	2
Adequate	142 (87.1%)	21 (12.9%)	163	**0.007**
Weight gain during pregnancy				6.00
< 9 kg	29 (67.4%)	14 (32.6%)	43	1
> 9 kg	214 (83.3%)	43 (16.7%)	257	**0.014**

Table 2: Association of maternal-foetal outcome with booking status of the pregnancy

| Characteristics	Booked case (BC) 243 (81.0%)	Unbooked case (UBC) 57 (19.0%)	Total 135	χ^2, df, p
Mode of delivery				0.0138
Normal vaginal	96 (80.7%)	23 (19.3%)	119	1
LSCS/ Instrumental	147 (81.2%)	34 (18.8%)	181	0.907
PPH				19.4
Yes	16 (51.6%)	15 (5.89%)	31	1
No	227 (84.4%)	42 (15.6%)	269	**<0.001**
Blood transfusion				8.42
Yes	43 (68.3%)	20 (31.7%)	63	1
No	200 (84.4%)	37 (15.6%)	237	**0.004**
Maternal mortality				
Yes	0	2 (100.0%)	2	**0.036***
No	243 (81.5%)	55 (18.5%)	298	
Delivery by gestational age				6.37
Pre-term baby	88 (73.9%)	31 (26.1%)	119	1
Term baby	155 (85.6%)	26 (14.4%)	181	**0.012**
Birth weight				5.32
Low (< 2.5 kg)	108 (75.5%)	35 (24.5%)	143	1
Normal (≥ 2.5 kg)	135 (86.0%)	22 (14.0%)	157	**0.021**
APGAR at 5 min				
< 7	6 (54.5%)	5 (45.5%)	11	**0.038***
≥ 7	237 (82.0%)	52 (18.0%)	289	
NICU/SNBCC admission				11.0
Yes	219 (83.9%)	42 (16.1%)	261	1
No	24 (61.5%)	15 (38.5%)	39	**<0.001**
Neonatal mortality				
Yes	243 (81.3%)	56 (18.7%)	299	0.190*
No	0	1 (100%)	1	

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Table 3: Binomial logistic regression analysis for sociodemographic factors, maternal-foetal outcome with booking status of their pregnancy

Characteristics		OR	95% CI	p
Occupation:	Employee	Reference		
	Housewife	3.21	1.40-7.33	**0.006**
Parity:	1	4.63	2.16-9.96	**< 0.001**
	≥ 2	Reference		
Maternal ICU admission:	Yes	2.43	0.76-7.66	0.131
	No	Reference		
PPH:	Yes	5.17	2.07-12.94	**< 0.001**
	No	Reference		
Blood transfusion:	Yes	2.27	1.06-4.87	**0.036**
	No	Reference		
Birth weight:	Low	2.06	1.05-4.05	**0.035**
	Normal	Reference		
NICU/SNBCC admission:	Yes	3.18	1.36-7.43	**0.008**
	No	Reference		

Table 4: Comparison of JSSK knowledge score between booked and unbooked case

Characteristic	Booked case (BC) Median (±SD)	Unbooked case (BC) Median (±SD)	p
JSSK knowledge score	5 ± 1.48	7 ± 1.70	**< 0.001**
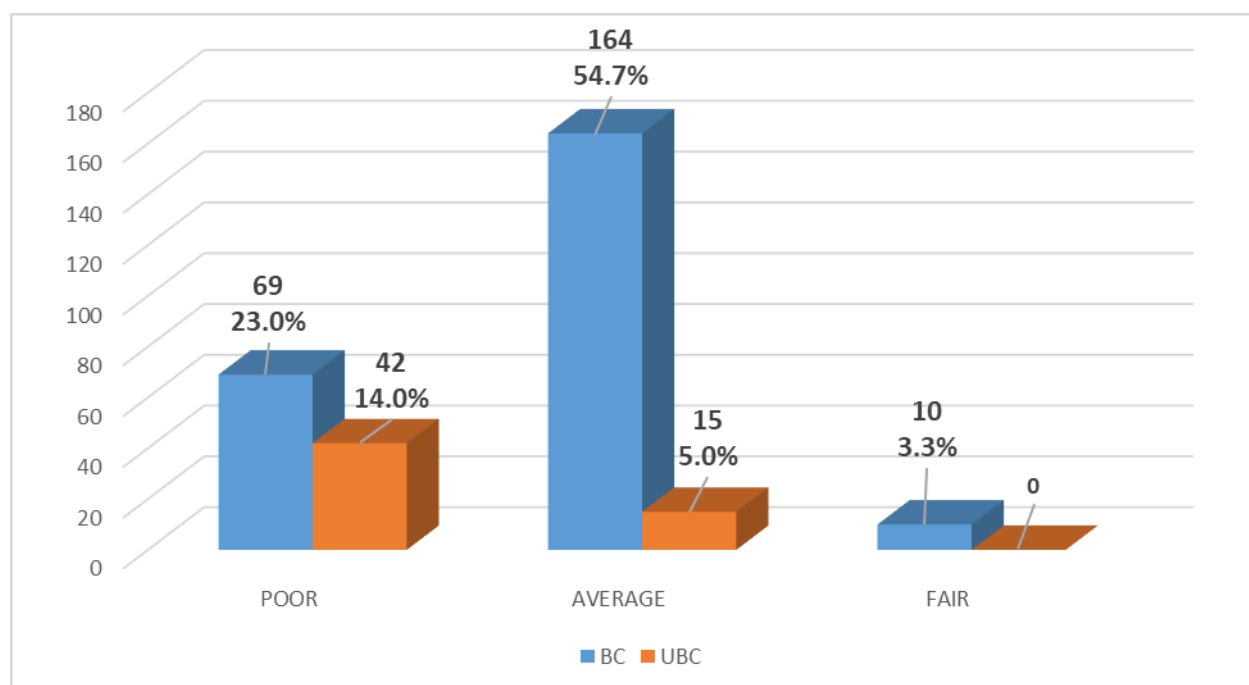
Figure 2: Distribution of study participants according to the knowledge of JSSK

4. Discussion

This hospital-based study was conducted among 300 postnatal mothers. **Figure 1** illustrates the booking status of pregnancies among the study participants. A significant majority, 243 (81%), were classified as booked cases, whereas 57 (19%) were unbooked. This visual representation emphasizes the disparity in antenatal care engagement, highlighting a need for improved outreach to unbooked cases. Our findings show that booked cases had significantly better outcomes compared to unbooked cases, with lower incidences of complications such as postpartum haemorrhage (PPH) and the need for blood transfusions. This trend is consistent with studies by **Dutta et al. (2020)[4]** and **WHO (2016)[1]**, which highlight the protective role of ANC in mitigating risks during childbirth.

The association between sociodemographic factors and booking status underscores persistent inequities in healthcare access. Illiteracy and unemployment emerged as key barriers, as unbooked cases were predominantly housewives and women with limited education. **Ahmed et al. (2010)[8] and Singh et al. (2012)[9]** have similarly observed that economic and educational disadvantages hinder healthcare utilization. Addressing these disparities is essential to improving antenatal coverage, particularly in underserved populations. Strategies such as community-based health education and financial incentives, as demonstrated in the Janani Shishu Suraksha Karyakram (JSSK), could significantly enhance engagement with ANC services.

Booked cases scored higher on JSSK knowledge (median score 7 ± 1.70) compared to unbooked cases (5 ± 1.48, p <

0.001) **(Table 4).** The significant disparities in JSSK awareness between booked and unbooked cases highlight the need for better dissemination of information regarding government programs.

Booked cases demonstrated higher JSSK knowledge scores **(Figure 2),** correlating with better utilization of healthcare services and outcomes. **Tripathi N et al. (2014)**[7] and the **Ministry of Health and Family Welfare (MoHFW, 2011)**[8] have noted that effective communication and grassroots outreach are pivotal in bridging this gap. Enhancing the role of Accredited Social Health Activists (ASHAs) in rural and urban marginalized communities could ensure that unbooked pregnancies receive adequate care.

The adverse outcomes observed in unbooked cases, including preterm deliveries, low birth weights, and higher neonatal ICU admissions, are particularly concerning. **Bala R et al. (2021)**[10] and **Filippi et al. (2016)**[11] argue that these outcomes are preventable with early identification of risk factors and timely intervention. These findings emphasize the urgency of universal access to quality ANC services, as advocated by the WHO and UNICEF in their maternal health frameworks. Policymakers must focus on eliminating financial, geographical, and cultural barriers to healthcare to achieve equitable outcomes.

5. Conclusion

- The findings of this study strongly advocate for the prioritization of antenatal care to improve maternal and neonatal health outcomes.
- Addressing sociodemographic barriers, enhancing awareness of government programs like JSSK, and increasing access to ANC services are critical steps in achieving these goals.
- This evidence should guide policymakers and healthcare providers in designing targeted interventions to reduce maternal and neonatal mortality and ensure equitable access to quality care.

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