



Original Research Article

SOCIO-DEMOGRAPHIC AND OBSTETRIC DETERMINANTS OF ADVERSE PREGNANCY OUTCOMES: A HOSPITAL-BASED STUDY IN INDIA

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ABSTRACT

Background: Adverse pregnancy outcomes remain a major public health challenge in developing countries, including India. Socio-demographic and obstetric factors significantly influence maternal and neonatal outcomes. Identifying these determinants is essential for planning targeted interventions and improving maternal health services. **Objectives:** To assess the socio-demographic and obstetric determinants of adverse pregnancy outcomes among women delivering at a tertiary care hospital in India.

Materials and Methods: A hospital-based cross-sectional analytical study was conducted among 629 pregnant women admitted for delivery at a tertiary care hospital over a period of one year. Data were collected using a structured questionnaire and review of medical records. Socio-demographic variables, obstetric risk factors, and pregnancy outcomes were recorded. Statistical analysis was performed using SPSS software. Chi-square test and independent t-test were applied to assess associations. A p-value <0.05 was considered statistically significant.

Results: The prevalence of adverse pregnancy outcomes was 21.9%. Teenage pregnancy (p=0.014), advanced maternal age (p=0.021), low socioeconomic status (p<0.001), low maternal education (p<0.001), anemia (p<0.001), fewer than four antenatal visits (p=0.002), preterm delivery (p<0.001), and higher parity (p=0.029) were significantly associated with adverse pregnancy outcomes. Preterm delivery and maternal anemia showed particularly strong associations.

Conclusion: Adverse pregnancy outcomes are significantly influenced by socio-demographic disadvantage and preventable obstetric risk factors. Strengthening antenatal care services, improving maternal education, addressing anemia, and promoting optimal birth spacing are critical strategies to reduce adverse maternal and neonatal outcomes.

Keywords: Adverse pregnancy outcome; Socio-demographic determinants; Obstetric risk factors.

INTRODUCTION

Pregnancy is a natural physiological process; however, it remains associated with significant maternal and perinatal risks, particularly in developing countries. Despite substantial improvements in maternal healthcare services, adverse pregnancy outcomes such as low birth

weight (LBW), preterm birth, stillbirth, intrauterine growth restriction (IUGR), congenital anomalies, and early neonatal mortality continue to pose major public health challenges. Globally, approximately 130 million births occur annually, with nearly 20 million infants born with low birth weight, the highest burden being in South Asia. India alone contributes significantly to the global share of

adverse perinatal outcomes due to its large population and socio-economic disparities.^[1]

The determinants of pregnancy outcomes are multifactorial and include socio-demographic, obstetric, medical, environmental, and healthcare-related factors. Socio-demographic variables such as maternal age, education, occupation, socioeconomic status, residence, and family support have been consistently shown to influence pregnancy outcomes. Teenage pregnancy and advanced maternal age are well-recognized risk factors for preterm delivery, low birth weight, and obstetric complications. Women from lower socioeconomic strata often experience inadequate nutrition, limited access to antenatal care (ANC), and delayed healthcare seeking, thereby increasing the risk of adverse outcomes.^[2]

Obstetric determinants including parity, birth spacing, history of previous adverse pregnancy outcomes, anemia, hypertensive disorders, gestational diabetes, and inadequate antenatal visits significantly affect fetal and maternal outcomes. Early identification of high-risk pregnancies through systematic risk assessment during antenatal visits remains a cornerstone of maternal health programs. The concept of “social obstetrics” emphasizes that social determinants such as education, income, occupation, and housing conditions have a measurable impact on pregnancy outcomes.^[3]

In India, maternal and child health (MCH) programs under the National Health Mission have improved institutional deliveries and antenatal coverage; however, disparities persist between rural and urban populations. Studies have demonstrated that women with limited education and low socioeconomic status are more likely to experience perinatal morbidity and mortality.^[4] Furthermore, modifiable risk factors such as anemia, poor nutrition, short inter-pregnancy intervals, and inadequate ANC utilization contribute significantly to preventable adverse outcomes.

The identification and quantification of socio-demographic and obstetric risk factors are essential for targeted interventions. Hospital-based studies provide valuable insights into the patterns and determinants of adverse pregnancy outcomes within specific populations. Understanding these determinants can guide evidence-based strategies aimed at reducing maternal and neonatal morbidity and mortality. Therefore, this study was undertaken to evaluate socio-demographic and obstetric determinants of adverse pregnancy outcomes in a tertiary care hospital setting in India.^[5]

Aim

To assess the socio-demographic and obstetric determinants of adverse pregnancy outcomes among women delivering at a tertiary care hospital in India.

Objectives

1. To study the socio-demographic profile of pregnant women delivering in the hospital.

2. To evaluate obstetric risk factors associated with pregnancy outcomes.
3. To determine the association between socio-demographic and obstetric factors with adverse pregnancy outcomes.

MATERIALS AND METHODS

Source of Data

The data were collected from pregnant women admitted for delivery in the Department of Obstetrics and Gynecology of the selected tertiary care hospital. Information was obtained from patient interviews, antenatal records, laboratory reports, and delivery registers.

Study Design

The study was a hospital-based cross-sectional analytical study.

Study Location

The study was conducted in the Department of Obstetrics and Gynecology at a tertiary care teaching hospital in India, catering to both urban and rural populations.

Study Duration

The study was conducted over a period of 12 months.

Sample Size

The total sample size included 629 pregnant women who delivered during the study period and fulfilled the inclusion criteria.

Inclusion Criteria

- Pregnant women admitted for delivery during the study period.
- Women who provided informed consent to participate in the study.
- Singleton pregnancies.

Exclusion Criteria

- Women with incomplete medical records.
- Women who were critically ill and unable to provide consent.
- Multiple pregnancies (twins or higher-order gestation).

Procedure and Methodology

After obtaining ethical clearance from the Institutional Ethics Committee, eligible pregnant women were enrolled consecutively until the required sample size of 629 was achieved. Written informed consent was obtained prior to data collection.

A pre-designed and pre-tested structured questionnaire was used to collect socio-demographic information including age, residence, education, occupation, socioeconomic status, and family type. Obstetric details such as parity, gravidity, birth spacing, number of antenatal visits, anemia status, history of obstetric complications, gestational age at delivery, and mode of delivery were recorded.

Adverse pregnancy outcomes were defined as the presence of one or more of the following: low birth weight (<2.5 kg), preterm birth (<37 weeks),

stillbirth, neonatal intensive care unit (NICU) admission, congenital anomalies, or early neonatal death.

Sample Processing

Birth weight was measured using a calibrated digital weighing scale within one hour of birth. Hemoglobin estimation was performed using an automated hematology analyzer. Blood pressure measurements were recorded using a standard sphygmomanometer. Gestational age was calculated based on last menstrual period (LMP) and confirmed by ultrasonography when available.

Statistical Methods

The collected data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) version 25. Descriptive

statistics were expressed as mean \pm standard deviation for continuous variables and frequency with percentage for categorical variables.

Chi-square test was used to determine association between categorical variables. Independent t-test was applied for comparison of means where appropriate. Multivariate logistic regression analysis was performed to identify independent predictors of adverse pregnancy outcomes. A p-value <0.05 was considered statistically significant.

Data Collection

Data were collected using face-to-face interviews and review of hospital records. Confidentiality of participants was maintained throughout the study. Each participant was assigned a unique identification number to ensure anonymity.

RESULTS

Table 1: To assess the socio-demographic and obstetric determinants of adverse pregnancy outcomes (N = 629)

Variable	Category / Mean \pm SD	n (%) / Value	95% CI	Test of Significance	p-value
Adverse Pregnancy Outcome	Present	138 (21.9%)	18.7–25.3	χ^2 goodness-of-fit	0.001*
	Absent	491 (78.1%)	74.7–81.3		
Maternal Age (years)	Mean \pm SD	25.8 \pm 4.6	25.4–26.2	One-sample t-test	0.018*
Teenage (<20 yrs)	Yes	72 (11.4%)	9.0–14.1	χ^2	0.021*
Advanced age (≥ 35 yrs)	Yes	48 (7.6%)	5.6–9.9	χ^2	0.032*
Low Socioeconomic Status	Yes	264 (42.0%)	38.1–46.0	χ^2	$<0.001^*$
Maternal Education <10th	Yes	301 (47.9%)	43.9–51.9	χ^2	$<0.001^*$
Anemia (Hb <11 g/dL)	Yes	289 (45.9%)	41.9–49.9	χ^2	$<0.001^*$
<4 ANC visits	Yes	172 (27.3%)	23.9–31.0	χ^2	0.004*
Parity ≥ 3	Yes	119 (18.9%)	15.9–22.2	χ^2	0.039*

Table 1 presents the overall socio-demographic and obstetric determinants of adverse pregnancy outcomes among 629 study participants. The prevalence of adverse pregnancy outcomes was 21.9% (95% CI: 18.7–25.3), while 78.1% had no adverse outcome, which was statistically significant ($p=0.001$). The mean maternal age was 25.8 ± 4.6 years (95% CI: 25.4–26.2), showing statistical significance ($p=0.018$). Teenage pregnancies (<20 years) constituted 11.4% (95% CI: 9.0–14.1) and advanced maternal age (≥ 35 years) accounted for 7.6% (95% CI: 5.6–9.9), both significantly

associated ($p=0.021$ and $p=0.032$ respectively). A considerable proportion of women belonged to low socioeconomic status (42.0%; 95% CI: 38.1–46.0), had education below 10th standard (47.9%; 95% CI: 43.9–51.9), and were anemic (45.9%; 95% CI: 41.9–49.9), all showing highly significant associations ($p<0.001$). Additionally, 27.3% had fewer than four antenatal visits (95% CI: 23.9–31.0; $p=0.004$) and 18.9% had parity ≥ 3 (95% CI: 15.9–22.2; $p=0.039$), indicating that both inadequate antenatal care and higher parity were important determinants of adverse outcomes.

Table 2: To study the socio-demographic profile of pregnant women (N = 629)

Variable	Category	n (%)	95% CI	Test	p-value
Age Group (yrs)	<20	72 (11.4%)	9.0–14.1	χ^2	0.017*
	20–29	401 (63.8%)	59.9–67.5		
	30–34	108 (17.2%)	14.3–20.4		
	≥ 35	48 (7.6%)	5.6–9.9		
Residence	Rural	372 (59.1%)	55.2–63.0	χ^2	0.011*
	Urban	257 (40.9%)	37.0–44.8		
Education	Illiterate	98 (15.6%)	12.8–18.7	χ^2	$<0.001^*$
	Primary	163 (25.9%)	22.5–29.5		
	Secondary	248 (39.4%)	35.6–43.4		
	Graduate+	120 (19.1%)	16.1–22.4		
Occupation	Homemaker	515 (81.9%)	78.7–84.8	χ^2	$<0.001^*$
	Employed	114 (18.1%)	15.2–21.3		
Socioeconomic Status	Lower	264 (42.0%)	38.1–46.0	χ^2	0.002*
	Middle	297 (47.2%)	43.2–51.2		
	Upper	68 (10.8%)	8.5–13.4		

Table 2 describes the socio-demographic profile of the pregnant women included in the study. The

majority of participants were aged 20–29 years (63.8%), followed by 30–34 years (17.2%), while

teenage pregnancies accounted for 11.4% and women aged ≥ 35 years comprised 7.6%, with a statistically significant distribution ($p=0.017$). Most participants were from rural areas (59.1%) compared to urban areas (40.9%), which was statistically significant ($p=0.011$). Regarding educational status, 39.4% had secondary education, 25.9% had primary education, 19.1% were

graduates or above, and 15.6% were illiterate, showing a highly significant distribution ($p<0.001$). The majority of women were homemakers (81.9%) compared to 18.1% employed women ($p<0.001$). Nearly half of the participants belonged to middle socioeconomic class (47.2%), followed by lower class (42.0%) and upper class (10.8%), with statistical significance ($p=0.002$).

Table 3: To evaluate obstetric risk factors associated with pregnancy outcomes (N = 629)

Variable	Category / Mean \pm SD	n (%) / Value	95% CI	Test	p-value
Parity	Primigravida	271 (43.1%)	39.2–47.1	χ^2	0.028*
	Multigravida	358 (56.9%)	52.9–60.8		
Birth Interval (<2 yrs)	Yes	96 (15.3%)	12.6–18.4	χ^2	0.012*
Gestational Age at Delivery	Preterm (<37 wks)	92 (14.6%)	11.9–17.6	χ^2	<0.001*
Mean Gestational Age (weeks)	38.4 \pm 1.8	—	38.2–38.6	t-test	0.021*
Anemia	Yes	289 (45.9%)	41.9–49.9	χ^2	<0.001*
PIH	Yes	84 (13.4%)	10.8–16.3	χ^2	0.001*
Gestational Diabetes	Yes	51 (8.1%)	6.1–10.5	χ^2	0.018*
Mode of Delivery	LSCS	214 (34.0%)	30.3–37.9	χ^2	0.046*
	Vaginal	415 (66.0%)	62.1–69.7		

Table 3 evaluates obstetric risk factors among the study population. Multigravida women constituted 56.9%, while 43.1% were primigravida ($p=0.028$). Short birth interval (<2 years) was observed in 15.3% of women ($p=0.012$). Preterm delivery occurred in 14.6% of cases (95% CI: 11.9–17.6), which was highly significant ($p<0.001$). The mean gestational age at delivery was 38.4 ± 1.8 weeks

(95% CI: 38.2–38.6), also statistically significant ($p=0.021$). Anemia was present in 45.9% of women ($p<0.001$), pregnancy-induced hypertension in 13.4% ($p=0.001$), and gestational diabetes in 8.1% ($p=0.018$), all demonstrating significant associations. Regarding mode of delivery, 34.0% underwent LSCS while 66.0% had vaginal delivery ($p=0.046$).

Table 4: Association between socio-demographic & obstetric factors with adverse pregnancy outcomes (N = 629)

Variable	Adverse Outcome Present n=138	Adverse Outcome Absent n=491	95% CI	Test	p-value
Teenage Pregnancy	28 (20.3%)	44 (9.0%)	1.12–2.89	χ^2	0.014*
Advanced Age ≥ 35 yrs	19 (13.8%)	29 (5.9%)	1.08–3.42	χ^2	0.021*
Low SES	82 (59.4%)	182 (37.1%)	1.72–3.64	χ^2	<0.001*
Education <10th	94 (68.1%)	207 (42.1%)	1.89–4.02	χ^2	<0.001*
Anemia	89 (64.5%)	200 (40.7%)	1.78–3.76	χ^2	<0.001*
<4 ANC visits	56 (40.6%)	116 (23.6%)	1.42–2.91	χ^2	0.002*
Preterm Delivery	54 (39.1%)	38 (7.7%)	3.48–6.92	χ^2	<0.001*
Parity ≥ 3	36 (26.1%)	83 (16.9%)	1.05–2.46	χ^2	0.029*

Table 4 demonstrates the association between socio-demographic and obstetric factors with adverse pregnancy outcomes. Teenage pregnancy was significantly associated with adverse outcomes (20.3% vs 9.0%; $p=0.014$). Similarly, advanced maternal age (13.8% vs 5.9%; $p=0.021$) showed a significant association. Women belonging to low socioeconomic status had a markedly higher proportion of adverse outcomes (59.4% vs 37.1%; $p<0.001$). Lower educational status (<10th) was also strongly associated (68.1% vs 42.1%; $p<0.001$). Anemia showed a significant association, with 64.5% of adverse outcome cases being anemic compared to 40.7% without adverse outcome ($p<0.001$). Inadequate antenatal visits (<4 visits) were significantly related to adverse outcomes (40.6% vs 23.6%; $p=0.002$). Preterm delivery showed the strongest association (39.1% vs 7.7%; $p<0.001$). Higher parity (≥ 3) was also significantly associated (26.1% vs 16.9%; $p=0.029$).

DISCUSSION

The present hospital-based study assessed the socio-demographic and obstetric determinants of adverse pregnancy outcomes among 629 women. The overall prevalence of adverse pregnancy outcomes in our study was 21.9%, which is comparable to findings reported in similar Indian tertiary care settings. Tamirat KS et al. (2021),^[1] reported an adverse outcome prevalence of 23.4% in a North Indian cohort, while de Lima Leite M et al. (2022),^[2] observed a rate of 19.8% in a tertiary hospital study. These similarities suggest that adverse pregnancy outcomes continue to remain a substantial public health concern in institutional deliveries.

The mean maternal age in our study was 25.8 ± 4.6 years, which aligns with findings by Ngandu CB et al. (2020),^[3] who reported a mean age of 26.1 ± 4.2 years. Teenage pregnancies constituted 11.4% in the present study and were significantly associated with adverse outcomes. This is consistent with findings

by Naseer S et al. (2022),^[4] who demonstrated increased risks of preterm birth and low birth weight among adolescent mothers. Similarly, Abadiga M et al. (2022),^[5] observed that teenage mothers had significantly higher rates of neonatal complications compared to women aged 20–29 years.

Advanced maternal age (≥ 35 years) accounted for 7.6% of cases and was significantly associated with adverse outcomes. This finding corroborates the results of Masembe S et al. (2024),^[6] who reported increased risks of chromosomal abnormalities, preterm birth, and obstetric complications in women aged 35 years and above. de Lima Leite M et al. (2022),^[2] also highlighted advanced maternal age as an independent predictor of adverse perinatal outcomes.

Socioeconomic status emerged as a significant determinant, with 42% belonging to lower socioeconomic class and demonstrating higher adverse outcomes. This finding is comparable to the study by Shivashankarappa DH et al. (2024),^[7] which emphasized that poverty, poor nutrition, and limited healthcare access significantly contribute to adverse maternal and neonatal outcomes. Lower educational status ($< 10^{\text{th}}$ standard) was also strongly associated with adverse outcomes, consistent with observations by Ngandu CB et al. (2020)^[3], who reported that maternal education is inversely related to perinatal morbidity and mortality.

Anemia was present in 45.9% of women and showed a strong association with adverse pregnancy outcomes. This finding is in agreement with Zhang X et al. (2021),^[8] who demonstrated that maternal anemia significantly increases the risk of low birth weight and preterm delivery. Similarly, Tamirat KS et al. (2021),^[1] observed a higher incidence of adverse neonatal outcomes among anemic mothers. Inadequate antenatal care (< 4 ANC visits) was noted in 27.3% of women and significantly associated with adverse outcomes. This supports findings from Ngandu CB et al. (2020),^[3] who reported that reduced antenatal visits are linked to increased perinatal morbidity. Adequate ANC enables early detection and management of complications, thereby improving pregnancy outcomes.

Regarding obstetric risk factors, preterm delivery was observed in 14.6% of cases and showed the strongest association with adverse outcomes. This aligns with the findings of Tadese M et al. (2022),^[9] who highlighted prematurity as a leading cause of neonatal morbidity and mortality worldwide. Pregnancy-induced hypertension (13.4%) and gestational diabetes (8.1%) were also significantly associated, consistent with findings by Lavanya M et al. (2023),^[10] respectively.

Higher parity (≥ 3) and short birth interval (< 2 years) were significantly associated with adverse outcomes, similar to findings by Tadese M et al. (2022),^[11] who reported increased risks of preterm birth and low birth weight with short interpregnancy intervals.

CONCLUSION

The present hospital-based study highlights that adverse pregnancy outcomes remain a significant concern, affecting 21.9% of women delivering at the tertiary care hospital. The study clearly demonstrates that both socio-demographic and obstetric factors play a crucial role in determining pregnancy outcomes. Teenage pregnancy, advanced maternal age, low socioeconomic status, low maternal education, anemia, inadequate antenatal care visits, higher parity, and preterm delivery were found to be significantly associated with adverse pregnancy outcomes.

Among these determinants, anemia, low socioeconomic status, poor educational status, and preterm delivery showed strong statistical associations, indicating that modifiable social and healthcare-related factors substantially contribute to poor outcomes. The findings emphasize that improving maternal education, ensuring adequate antenatal care coverage, early detection and management of anemia, promoting birth spacing, and strengthening maternal health services can significantly reduce adverse pregnancy outcomes.

Thus, targeted interventions focusing on vulnerable groups, particularly women from lower socioeconomic strata and those with inadequate antenatal care utilization, are essential to improve maternal and neonatal health indicators. Strengthening community-based awareness programs and ensuring comprehensive antenatal care can substantially contribute toward achieving national and global maternal and child health goals.

Limitations of The Study

1. The study was hospital-based and conducted in a tertiary care center; therefore, the findings may not be fully generalizable to the entire community population.
2. As a cross-sectional analytical study, causal relationships between risk factors and adverse outcomes could not be definitively established.
3. Some socio-demographic information was self-reported, which may have introduced recall bias.
4. The study did not assess long-term neonatal outcomes beyond the immediate perinatal period.
5. Certain potential confounding variables such as nutritional status, psychosocial stress, and environmental exposures were not evaluated in detail.
6. Being a single-center study, regional variations across different parts of India may not be represented.

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