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Original article

PREGNANCY COMPLICATIONS AND ITS ASSOCIATED FACTORS AMONG MOTHERS IN RAJSHAHI DISTRICT: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background:
Pregnancy complications pose significant health risks for mothers and infants. Early detection enables timely interventions and better outcomes. This study assessed the prevalence and associated factors of pregnancy complications among mothers in the Rajshahi district, Bangladesh.

Methods:
A cross-sectional study was conducted among 400 mothers and their infants using a self-administered questionnaire. Pregnancy complications were assessed by asking: "Did you experience any complications during your pregnancy?" (Yes=1, No=0). Chi-square tests and logistic regression models were used to identify associated factors. Data were analyzed using IBM SPSS Statistics v20.

Results:
High prevalence of complications was observed, with gestational diabetes (91.3%) and hypertension (82.5%) being most common, while pre-eclampsia was less frequent (8.3%). Moderate complications included vomiting (49.3%), urinary tract infections (46.8%), edema (25%), and hormonal changes (11.3%). Anemia was more prevalent among overweight (42.1%), postgraduate (66.7%), and wealthier (43.2%) mothers, and was significantly associated with education, wealth, and BMI. Gestational diabetes was influenced by residence, age, occupation, education, nutritional status, and birth order; working women (AOR=0.074, p=0.001) and higher-educated women (AOR=0.126–0.172) had lower odds. Hypertension was linked to respondents' and husbands' occupations, income, education, and parity, with service-holder husbands (AOR=2.133) and lower-educated women (AOR=3.853, p<0.05) at higher risk. Urinary infections were associated with residence, occupation, income, education, and BMI. Pre-eclampsia risk increased with certain husband occupations (AOR=0.096, p=0.002). Vomiting correlated with age, income, and parity, while hormonal issues were linked to birth order.

Conclusion:
Maternal pregnancy complications are highly prevalent in Rajshahi and are influenced by socioeconomic, demographic, and health-related factors. Targeted interventions addressing education, occupation, nutrition, and parity are essential to reduce risks and improve maternal and infant health outcomes.

KEY WORDS: Pregnancy Complications; Maternal and child health; associated factors; Bangladesh

INTRODUCTION

Pregnancy is a transformative physiological process involving extensive hormonal and anatomical changes to support fetal development. While many pregnancies progress without complications, a significant proportion of women experience conditions that threaten both maternal and neonatal health. These

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complications range from mild disorders such as gestational diabetes to severe conditions including pre-eclampsia, eclampsia, anemia, placental abnormalities, and preterm birth. Understanding their causes, risk factors, and consequences is essential for reducing global maternal and neonatal morbidity and mortality.

According to the World Health Organization (WHO), approximately 287,000 women died from pregnancy- and childbirth-related causes in 2020, with 94% occurring in low-resource regions, especially sub-Saharan Africa and Southern Asia (WHO, 2023). For every maternal death, estimated 20–30 women suffer acute or chronic complications (White et al., 2020). Neonatal mortality also remains high, with about 2.3 million newborn deaths in 2021, nearly half of all under-five deaths (WHO, 2023). These trends highlight the interconnected nature of maternal and neonatal health.

In Bangladesh, maternal and neonatal mortality remain public health concerns. The Maternal Mortality Ratio (MMR) stands at 196 per 100,000 live births, with rural areas (211) experiencing higher rates than urban ones (153). Neonatal mortality shows a similar rural–urban disparity, reflecting inequities in healthcare access, socioeconomic status, and the availability of skilled maternal health services (NIPORT, 2022).

Globally, leading causes of maternal death include severe hemorrhage, infection, hypertensive disorders such as pre-eclampsia and eclampsia, and complications from unsafe abortions (WHO, 2023). Pre-eclampsia affects 2–8% of pregnancies worldwide and can lead to life-threatening outcomes, including eclampsia, stroke, and neonatal death (ACOG, 2017). Preterm birth, often linked to hypertensive disorders, infections, and placental insufficiency, remains the primary cause of neonatal deaths and is associated with long-term developmental and respiratory complications (Moon & Jang, 2022).

Intrauterine growth restriction (IUGR), frequently resulting from maternal malnutrition, hypertension, or placental dysfunction, increases risks of low birth weight, early neonatal death, and chronic diseases later in life. Risk factors for pregnancy complications include advanced maternal age, obesity, preexisting conditions such as diabetes or hypertension, and socioeconomic disadvantage (WHO, 2023). Strengthening antenatal care, ensuring early diagnosis, and improving equitable access to healthcare are critical in reducing adverse outcomes (CDC, 2020).

Despite medical progress, knowledge gaps remain regarding the mechanisms behind conditions such as pre-eclampsia and the long-term effects of gestational diabetes. Pregnancy complications also impose significant social and economic burdens due to increased healthcare costs and long-term care needs for affected mothers and infants (Stutchfield et al., 2010).

This study aims to investigate pregnancy complications among mothers in the Rajshahi district of Bangladesh. It seeks to determine the prevalence of major complications such as pre-eclampsia, gestational diabetes, anemia, preterm labor, and infections and to examine their causes, associated risk factors, and consequences for maternal and neonatal health. The study also aims to identify gaps in local maternal healthcare services and propose context-specific strategies to strengthen antenatal care and early management.

Overall, the findings aim to support evidence-based policies and interventions that improve maternal and neonatal health

outcomes in Rajshahi and similar low-resource settings.

MATERIALS AND METHODS

The study was conducted in Rajshahi district, northern Bangladesh (2,407 km²; 24°07'–24°43' N, 88°17'–88°58' E), bordered by Naogaon, Natore, Chapai Nawabganj, West Bengal (India), Kushtia, and the Ganges. The area includes the Barind Tract, Diara, and Char lands (Banglapedia). Several government and non-government hospitals and clinics serve the district, where most mothers deliver their newborns.

This was a cross-sectional study conducted to investigate pregnancy complications and their effects on maternal nutritional status and infant health outcomes. All mothers and their infants (from birth up to one year of age) residing in the Rajshahi district constituted the target population of this study. Mothers residing in the Rajshahi district that had no serious pre-existing illnesses before pregnancy and were willing to provide written consent were included in the study.

Sample Size Determination: The minimum sample size for this study was calculated using the formula:

$$,n = \frac{z^2 p(1-p)}{d^2}$$ where n = required sample size, p = proportion of pregnancy complications (0.461, based on the prevalence of 46.1% in the Rajshahi Division (NIPORT, 2022), z = 1.96 at 95% confidence level, and d = 0.05 (margin of error).The calculated sample size was 382. However, a total of 400 samples were considered to account for a 5% non-response rate.

Sampling Technique: A three-stage random sampling was employed. Two *Upazilas* and three Wards were randomly selected from Rajshahi district and City Corporation. Two Unions per *Upazila* and two *Muhallas* per ward were then chosen. From these, 55 mothers with infants per Union and 30 per *Muhalla* were selected, totaling 400 participants. Eligible participants were identified through Union *Parishad* and Ward Councilor offices. The research team visited households, explained the study objectives, and obtained written informed consent.

Data Collection Procedure: Data were collected using a self-developed, pre-tested, structured questionnaire consisting of two parts.

(i) General information (socio-economic, demographic, and health-related) of mothers and their infants;

(ii) Pregnancy complications and delivery-related information.

The reliability and validity of the questionnaire were assessed using appropriate statistical techniques.

Outcome Variable: The main outcome variable was pregnancy complications, assessed by asking mothers whether they experienced any complications during pregnancy. When available, responses were verified using pregnancy records. The presence of complications was coded as 'Yes' (1) and absence as 'No' (0).

Independent Variables: Socio-economic, demographic, anthropometric, behavioral, and health-related factors were considered as independent variables (listed in Table 1).

Statistical Analysis: All data were entered into SPSS (IBM Version 20) and checked for completeness, consistency, and missing values. Descriptive statistics (frequency distributions) were used to estimate the prevalence of pregnancy complications and summarize categorical variables. Chi-square tests identified factors associated with pregnancy complications, and variables with statistical significance were included in a binary logistic regression model to assess the effects of socio-

economic, demographic, health-related, and behavioral factors. Multicollinearity among independent variables was evaluated using the Variance Inflation Factor (VIF), with values ranging from 0 to 5, indicating no multicollinearity. All statistical tests were two-tailed, and p-values < 0.05 were considered significant.

RESULTS

We observed that 27.2% of the mothers belonged to the early childbearing group, 40.8% were in the optimal childbearing age, and 32% fell into the late childbearing group. A majority of the participants resided in rural areas compared to urban areas (54.2% vs. 45.8%). In terms of religion, 93% of the mothers were Muslim, while 7% were Hindu. Regarding occupation, 82.8% of mothers were housewives, and 17.2% were engaged in service-related jobs. As for the occupation of husbands, 27.5% were employed in service, 32% were involved in business, and 40.5% were engaged in labor-intensive occupations such as farming. Educational attainment among mothers showed that 44% had completed secondary education, 25.5% higher secondary, 23% graduation, and 7.5% post-graduation. Economic status was assessed through total household income: 21.2% of mothers belonged to poor households, 34.8% to middle-income families, and 44% to wealthy households. Regarding family size, over 60% of mothers lived in small families (1–4 members), 28.8% in medium-sized families (5–6 members), and 9% in large families (more than 6 members). Regarding the number of children, 42.5% of mothers had one child, 38.8% had two, and 18.8% had three or more. Maternal nutritional status, measured by Body Mass Index (BMI), revealed that 12% of mothers were underweight, 54.8% had normal weight, and 33.3% were overweight or obese. It is noteworthy that 72% of mothers received antenatal care at least four times during pregnancy, while the remaining 28% received it less frequently. Postnatal care coverage was high, with 93.8% of mothers receiving it, while only 6.3% did not. Most babies were delivered via cesarean section (63%). Among the infants, over 50% were male, and 41.5% had low birth weight. Regarding birth order, 47.3% of the infants were firstborns, 37% were second-born, and 13.5% were of third or higher birth order. Encouragingly, 82% of mothers initiated breastfeeding within one hour of delivery.

Pregnancy Complications: Fig. 1 shows the prevalence of various pregnancy complications during pregnancy among mothers living in Rajshahi district, Bangladesh. *T*he participants experienced various pregnancy complications. Among these, gestational diabetes and hypertension showed the highest prevalence rates, at 91.30% and 82.50% respectively. Pre-eclampsia had the lowest prevalence at 8.30%. Other complications, such as vomiting (49.30%), urinary tract infection (46.80%), hormonal issues (11.30%), and edema (25.00%), were observed at moderate levels.

Table 1: Frequency distribution of socio-economic and demographic variables of mothers

Variable	Group	Frequency	%
Age	Early Childbearing (<20 years)	109	27.20
	Perfect age of Childbearing (20-29 years)	163	40.80
	Late (30< years)	128	32.00
Living area	Urban	183	45.80
	Rural	217	54.20
Religion	Muslim	372	93.00
	Non-Muslim	28	7.00
Occupation	Housewife	331	82.80
	Service-holder	69	17.20
Husband's occupation	Service- Holder	110	27.50
	Business	128	32.00
	Others	162	40.50
Educational qualification	Secondary	176	44.00
	Higher-Secondary	102	25.50
	Graduation	92	23.00
	Post-Graduation	30	7.50
Family income	Poor (BDT<15000)	85	21.20
	Medium (BDT15000-25000)	139	34.80
	Rich (>BDT 25000)	176	44.00
Family size	Small (1-4 members)	249	62.20
	Medium (5-6 members)	115	28.80
	Large (>6 members)	36	9.00
Number of children	1 child	170	42.50
	2 children	155	38.80
	More than 3 children	75	18.80
Body mass index	Underweight (<18.5)	48	12.00
	Healthy Weight (18.5-24.9)	219	54.80
	Overweight (25<)	133	33.3
Number of antenatal care	Less than 4 times	112	28.00
	4 and more times	288	72.00
Postnatal care	Yes	375	93.80
	No	25	6.30

Mode of delivery	Cesarean	252	63.00
	Normal	148	37.00
Gender of infants	Boy	220	55.00
	Girl	180	45.00
Birth weight	Low	165	41.50
	Medium	180	45.20
	High	53	13.30
Age of the infant	1-6 Months	360	90.00
	7-12 Months	40	10.00
Birth order	1st	189	47.30
	2nd	147	37.00
	3rd	54	13.50
	Above 3rd	9	2.20
Early initiation of breastfeeding	Yes	328	82.00
	No	72	18.00

Anemia:

Mothers with higher secondary education are 2.97 times more likely to experience anemia compared to those who completed post-graduate education (AOR = 2.965; 95% CI: 1.215–7.237; *p* = 0.017). Similarly, mothers with a graduate-level education are 4.28 times more likely to have anemia than those with post-graduate qualifications (AOR = 4.281; 95% CI: 1.750–10.470; *p* = 0.001). In terms of economic status, individuals in the "medium" wealth category are 1.99 times more likely to have anemia compared to those in the "rich" category (AOR = 1.987; 95% CI: 1.144–3.450; p=0.015). Additionally, underweight individuals are 2.52 times more likely to develop anemia than those who are overweight (AOR = 2.517; 95% CI: 1.136–5.574; *p* = 0.023). These associations are statistically significant. The Hosmer and Lemeshow goodness-of-fit test indicated that the model fits the data well (p> 0.05) (Table 2).

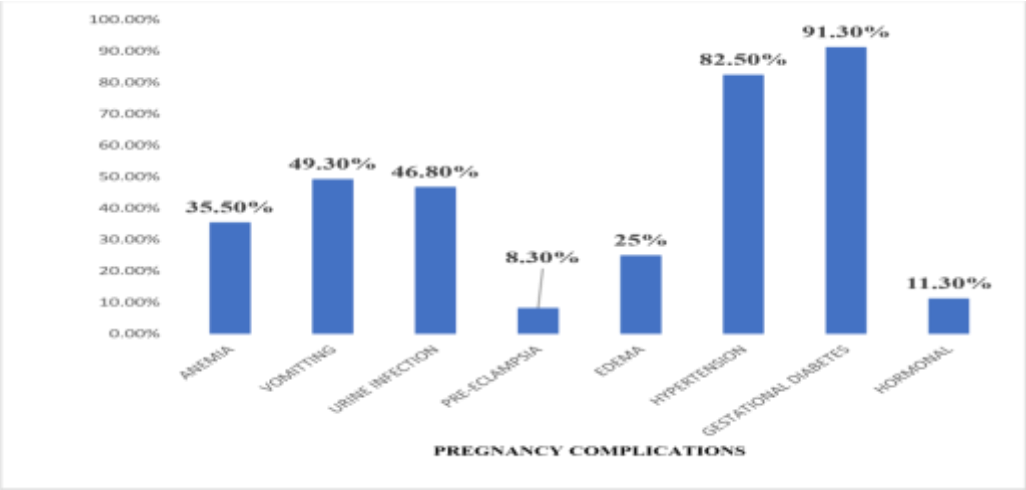

Fig.1: Prevalence of pregnancy complications

Table 2: Determinants of Anemia during Pregnancy

Variable	B	SE	P-value	AOR	95% CI for AOR	
					Lower	Upper
Secondary VS Post-Graduation [R]	0.766	0.460	0.096	2.151	0.873	5.296
Higher Secondary VS Post-Graduation [R]	1.087	0.455	0.017	2.965	1.215	7.237
Graduation vs Post-Graduation [R]	1.454	0.456	0.001	4.281	1.750	10.470
Poor VS Rich [R]	0.587	0.318	0.065	1.799	.964	3.357
Medium VS Rich [R]	0.687	0.282	0.015	1.987	1.144	3.450
Underweight VS Overweight [R]	0.923	0.406	0.023	2.517	1.136	5.574
Normal Weight VS Overweight [R]	0.269	0.235	0.253	1.308	0.825	2.074
Hosmer and Lemeshow Test						
Chi-square		df		p-value		
7.303		8		0.504		

N.B.: **β**= Coefficient, **AOR**: Adjusted odds ratio, SE= Standard Error

Gestational diabetes:

Employed women had significantly lower odds of developing diabetes compared to housewives (AOR = 0.074, 95% CI: 0.017–0.322, p = 0.001). Regarding education, women with a higher secondary degree had significantly lower odds of diabetes than those with a postgraduate degree (AOR = 0.126, 95% CI: 0.028–0.570, p = 0.007), while graduates also showed reduced odds (AOR = 0.172, 95% CI: 0.044–0.670, p = 0.011). In terms of parity, women with one child had significantly lower odds of diabetes compared to those with more than two children (AOR = 0.204, p = 0.001), and those with two children had even lower odds (AOR = 0.084, 95% CI: 0.014–0.513, p = 0.007). Additionally, women with a normal body weight had significantly lower odds of gestational diabetes compared to overweight women (AOR = 0.204, 95% CI: 0.077–0.544, p = 0.001). The Hosmer–Lemeshow test yielded a p-value of 0.863, indicating a good model fit, as the value is greater than 0.05 (Table 3).

Hypertension:

Women whose husbands are service holders had significantly 2.133 times higher odds of having hypertension compared to the other occupation groups (AOR= 2.133, C.I:0.964-4.718, p = 0.062<0.05). On the other side, women who completed their higher secondary education had a significantly higher odd of having hypertension compared to the post-graduates. (Odds Ratio = 3.853, C.I: 1.081-13.732, p = 0.038<0.05). Finally, the poor women compared to the rich one had a significantly higher odds of having hypertension (Odds Ratio = 2.797, C.I: 1.239-6.314, p = 0.013<0.05).

Table 3: Determinants of gestational diabetes during pregnancy

Variable	B	SE	P-Value	AOR	95% CI for AOR	
					Lower	Upper
Early Age VS Late[R]	-0.094	0.971	0.923	0.910	0.136	6.102
Perfect Age VS Late [R]	-0.321	0.568	0.572	0.725	0.238	2.208
Urban VS Rural [R]	0.651	0.662	0.326	1.918	0.523	7.026
Service Holder VS Housewife [R]	-2.605	0.751	0.001	0.074	0.017	0.322
Secondary VS Post-Graduate [R]	-1.621	0.985	0.100	0.198	0.029	1.364
Higher Secondary VS Post-Graduate [R]	-2.073	0.774	0.007	0.126	0.028	0.573
Graduate VS Post-Graduate[R]	-1.762	0.695	0.011	0.172	0.044	0.670
Poor VsRich[R]	-17.287	3812.890	0.996	0.000	0.000	
Medium VS Rich [R]	0.703	0.709	0.321	2.020	0.504	8.097
Underweight VS Overweight[R]	-1.894	1.227	0.123	0.151	0.014	1.669
Normal weight VS Overweight [R]	1.589	0.500	0.001	0.204	0.077	0.544
1 child VS More than 2 Children [R]	-5.120	1.429	0.000	0.006	0.000	0.098
2 children VS More than 2 Children [R]	-2.472	0.921	0.007	0.084	0.014	0.513
1ST VS Others [R]	0.982	1.565	0.530	2.671	0.124	57.334
2nd VS Others [R]	0.465	1.294	0.719	1.592	0.126	20.106
3rd VS Others [R]	-0.403	1.091	0.712	0.668	0.079	5.666
Hosmer and Lemeshow Test						
Chi-square		df		P-value		
3.937		8		0.863		

N.B.: B= Regression coefficient, AOR: Adjusted odds ratio, SE= Standard error

Table 4:: Determinants of hypertension during pregnancy (Table 4)

Variable	B	SE	p-value	AOR	95% CI for AOR	
					Lower	Upper
Service Holder VS Housewife[R]	-0.496	0.419	0.237	0.609	0.268	1.385
Service VS Others[R]	0.757	0.405	0.062	2.133	0.964	4.718
Business VS Others[R]	-0.011	0.397	0.979	0.989	0.455	2.154
Secondary VS Post-GraduateR	0.140	0.712	0.844	1.150	0.285	4.645
Higher Secondary VS Post-Graduation[R]	1.349	0.648	0.038	3.853	1.081	13.732
Graduate VS Post-Graduation[R]	0.557	0.620	0.369	1.746	0.518	5.888
Poor VsRich[R]	1.028	0.416	0.013	2.797	1.239	6.314
Medium VS Rich[R]	-0.409	0.409	0.316	0.664	0.298	1.479
1 child VS More than 2 Children [R]	0.133	0.462	0.774	1.142	0.462	2.824
2 children VS More than 2 Children [R]	0.659	0.453	0.146	1.933	0.795	4.699
Hosmer and Lemeshow Test						
Chi-square		df		P-value		
13.195		8		0.105		

N.B.: β= Coefficient, AOR: Adjusted odds ratio, S.E= Standard error

Urine Infection:

Poor women had significantly higher odds of having a urine infection compared to the rich women (AOR = 0.392, p = 0.005<0.05). Also, women in the medium socioeconomic group had significantly lower odds of having a urine infection compared to the rich group (AOR = 0.569, p = 0.046).

Finally, women with normal weight had significantly higher odds of having a urine infection compared to the women who are overweight (AOR = 2.223, p = 0.001). A non-significant p-value of Hosmer and Lemeshow Test (generally > 0.05) indicates that the model fits the data well. In this case, the p-value is 0.313, suggesting adequate fit (Table 5).

Table 5: Determinants of urine infection during pregnancy

Variable	B	SE	P-Value	AOR	95% CI for AOR	
					Lower	Upper
Urban VS Rural[R]	0.217	0.275	0.43	1.243	0.725	2.13
Service Holder VS Housewife [R]	-0.308	0.355	0.385	0.735	0.366	1.474
Service VS Others[R]	0.137	0.325	0.673	1.147	0.607	2.168
Business VS Others[R]	0.284	0.282	0.312	1.329	0.765	2.308
Secondary VS Post-Graduate[R]	-0.272	0.522	0.603	0.762	0.274	2.12
Higher Secondary VS Post-Graduate[R]	-0.797	0.497	0.109	0.451	0.17	1.194
Graduate VS Post-Graduate[R]	-0.547	0.483	0.257	0.578	0.224	1.49
Poor VsRich[R]	-0.937	0.337	0.005	0.392	0.202	0.759
Medium VS Rich[R]	-0.563	0.282	0.046	0.569	0.327	0.99
Underweight VS Overweight[R]	0.481	0.356	0.177	1.617	0.804	3.25
Normal weight VS Overweight[R]	0.799	0.238	0.001	2.223	1.393	3.547
Hosmer and Lemeshow Test						
Chi-square			df		P-Value	
9.363			8		0.313	

N.B.: β= Coefficient, AOR: Adjusted odds ratio, SE= Standard error

Excessive Vomiting:

Early child bearing woman's have 0.339 times the odds of vomiting compared to the late child bearing woman age group (AOR=0.339, 95% CI: 0.179- 0.642, p=0.001<0.05). On the other side, individuals in the perfect age category have 0.561 times the odds of vomiting compared to the late child bearing woman (AOR=0.561, 95% CI: 0.0337-0.933, p=0.026 <0.05). Women with 2 children have 0.458 times the odds of vomiting compared to those with more than 2 children (AOR=0.458, 95% CI: 0.255-0.820, p=0.009<0.05).Hosmer and Lemeshow test demonstrated that the model was good fitted (p>0.05) (Table 6).

Pre-eclampsia:

Respondents 'husbands' occupation had a significant effect on pre-eclampsia. Here the individuals who are service holders had significantly lower odds of pre-eclampsia compared to any other job category (AOR = 0.096, CI: 0.022-0.423, p = 0.002). Hosmer and Lemeshow Test assess the goodness of fit. A non-significant p-value (> 0.05) indicates good fit (Table 7).

Table 6: Determinants of excessive vomiting during pregnancy

Variable	B	S.E.	P-Value	AOR	95% C.I. for AOR	
					Lower	Upper
Early Age VS Late^{R}	-1.082	0.326	0.001	0.339	0.179	0.642
Perfect Age VS Late^{R}	-0.579	0.260	0.026	0.561	0.337	0.933
Poor VS Rich^{R}	-0.442	0.289	0.126	0.643	0.365	1.132
Medium VS Rich^{R}	0.193	0.256	0.451	1.213	0.734	2.003
1 child VS More than 2 Children^{R}	0.013	0.310	0.966	1.013	0.552	1.861
2 children VS More than 2 Children^{R}	-0.781	0.298	0.009	0.458	0.255	0.820
Hosmer and Lemeshow Test						
Chi-square			df		P-Value	
11.097			7		0.134	

N.B.: **β**= Coefficient, **AOR**: Adjusted odds ratio, **SE**= Standard error

Edema:

The key finding is that service holders are significantly more likely to experience edema compared to housewives, with an adjusted odds ratio (AOR) of 2.080 and a statistically significant p-value of 0.022. Additionally, individuals in business are also more likely to have edema compared to other occupations, with an AOR of 1.894 and a p-value of 0.038. Conversely, other occupational categories (service vs others, IST vs others, 2nd vs others, 3rd vs others) showed no significant association with edema. The Hosmer-Lemeshow test

indicates a good fit for the logistic regression model (p=0.405), suggesting the model is reliable in predicting edema based on these occupational factors (Table 8).

Table 7: Determinants of pre-eclampsia during pregnancy

Variable	B	S.E.	p-value	AOR	95% C.I. for AOR	
					Lower	Upper
Urban VS Rural [R]	-0.822	0.528	0.120	0.440	0.156	1.238
Service Holder VS Housewife [R]	0.218	0.543	0.688	1.243	0.429	3.604
Service VS Others [R]	-2.346	0.758	0.002	0.096	0.022	0.423
Business VS Others [R]	-0.886	0.750	0.237	0.412	0.095	1.792
Secondary VS PostGraduate[R]	-1.776	0.957	0.063	0.169	0.026	1.104
Higher Secondary VS Post-Graduate [R]	-0.931	0.889	0.295	0.394	0.069	2.250
Graduate VS PostGraduate[R]	-1.258	0.805	0.118	0.284	0.059	1.377
Poor Vs Rich [R]	1.441	1.101	0.191	4.223	0.488	36.547
Medium VS Rich [R]	-0.119	0.484	0.806	0.888	0.343	2.294
Hosmer and Lemeshow Test						
Chi-square			df		P-Value	
11.436			8		0.178	

N.B.:β= Coefficient, **AOR**: Adjusted odds ratio, **SE**= Standard error

Hormonal issues:
Compared to other groups, there was a statistically significant positive correlation on the birth order of the infants. Between the first child and other, those mother whose infant lies in the last group is 4.7 times more likely to have hormonal issue than the other mothers (AOR= 4.700, p = 0.048).The relationship is also statistically significant for the other groups also(AOR = 6.635, p = 0.018). There is a highly significant positive correlation between third and others (adjusted odds ratio = 29.231, p = 0.008). A good model fit was found using the Hosmer-Lemeshow test (p = 0.653) (Table 9).

DISCUSSION

This study identified gestational diabetes and hypertension as the most common pregnancy complications, reflecting the increasing burden of metabolic and hypertensive conditions in maternal health.

Table 8: Determinants of edema during pregnancy

Variable	B	S.E.	P-Value	AOR	95% CI for AOR	
					Lower	Upper
Service Holder VS Housewife [R]	0.732	0.321	0.022	2.08	1.11	3.898
Service VS Others [R]	-0.022	0.302	0.943	0.979	0.541	1.77
Business VS Others [R]	0.639	0.308	0.038	1.894	1.035	3.468
1ST VS Others [R]	-19.976	13346.4	0.999	0	0	
2nd VS Others [R]	-20.389	13346.4	0.999	0	0	
3rd VS Others [R]	-19.863	13346.4	0.999	0	0	
Hosmer and Lemeshow Test						
Chi-square			df		P-value	
7.236			7		0.405	

Table 9: Determinants of Hormonal issues during pregnancy

Variable	B	S.E.	P-VALUE	AOR	95% CI for AOR	
					Lower	Upper
Urban VS Rural [R]	-0.201	0.420	0.633	0.818	0.359	1.865
Service Holder VS Housewife[R]	0.610	0.400	0.127	1.841	0.840	4.032
Service VS Others[R]	-0.991	0.508	0.051	0.371	0.137	1.003
Business VS Others[R]	-0.396	0.497	0.425	0.673	0.254	1.783
1ST VS Others [R]	1.548	0.784	0.048	4.700	1.011	21.847
2nd VS Others [R]	1.892	0.801	0.018	6.635	1.380	31.907
3rd VS Others [R]	3.375	1.262	0.008	29.231	2.462	347.108
Hosmer and Lemeshow Test						
Chi-square			df		P-Value	
5.952			8		0.653	

Similar evidence from Bangladesh has reported notable morbidities, particularly blood-pressure-related complications and convulsions (Islam &Marium, 2022). Anaemia also remains highly prevalent among pregnant women and contributes to overall maternal vulnerability (Ara et al., 2024). These findings align with previous research, indicating that maternal complications continue to be a persistent health concern in Bangladesh (Islam &Marium, 2022; Ara et al., 2024)

Education level showed differential effect on the pregnancy complications. The likelihood of anemia and hypertension were significantly elevated among higher secondary and graduate-educated women compared to post graduate women. This aligns with previous literature where comparatively lower educated population exhibits higher risk of anemia (Silva L et al., 2008&Alem et al., 2023). This might be attributed to socioeconomic, lifestyle, and dietary variations among education groups. It is plausible that women completing graduate education but not yet well-established socioeconomically may experience nutritional stress, limited antenatal supplementation, or irregular health monitoring, thereby increasing both anemia and hypertension risk.In contrast, women with higher secondary or graduate education were significantly less likely to develop gestational diabetes than postgraduate women. This aligns with evidence that postgraduate women typically marry and conceive later, work in more sedentary jobs, and have lifestyle patterns that elevate metabolic risk (Wang X et al., 2024).

Women from poorer households showed higher likelihood of anemia and hypertension, which is consistent with previous reports. Previous study found that economically disadvantaged women had a greater burden of anemia due to limited nutritional intake and poor access to supplements. Similarly, another study indicated that lower socioeconomic status increases the risk of hypertension through restricted access to antenatal care and delayed medical interventions. Hence, our findings align with earlier evidence that financial constraints worsen maternal health risks (Alur et al., 2024).

Husband's occupation showed mixed associations with maternal complications. Women whose husbands were service holders had higher odds of hypertension but substantially lower odds of pre-eclampsia, while service or business occupations were linked to increased maternal edema. These contrasting directions may reflect two pathways one socioeconomic advantages greater income and better access to antenatal care may prevent progression to severe conditions like pre-eclampsia; and another stress-related or lifestyle pathways occupational stress, long working hours, or limited spousal support may increase maternal stress and dietary imbalance, raising risks of milder hypertensive conditions and edema. Prior studies support the influence of paternal socioeconomic and involvement factors on maternal outcomes, showing that paternal characteristics can shape ANC access, early management of complications, and overall risk of hypertensive disorders (Galaviz-Hernandez et al., 2019; NegesaBeyene et al.,2024; Gudeta TA et al., 2019).

Underweight women had higher odds of anemia compared with overweight women. This is consistent with evidence from a recent population-level study in Myanmar, which found that underweight (or severely underweight) women had lower hemoglobin and higher risk of anemia compared to normal or higher-BMI women (Acharya et al., 2024).Normal-weight women had lower odds of

gestational diabetes (AOR = 0.204) compared with overweight women aligns with a broader literature base. A recent systematic review and meta-analysis demonstrated that risk of GDM rises with increasing pre-pregnancy BMI; overweight/obese women had markedly higher pooled GDM prevalence than underweight or normal-weight women. Regarding urinary infection, while we observed increased odds among normal-weight women compared to overweight women, we hypothesize that this may not be directly attributable to BMI alone. Rather, it may reflect co-existing behavioral or care-seeking factors among women with normal body weight. Women who are overweight often receive more frequent antenatal monitoring due to their recognized metabolic risk profile.

Women with more than two children had higher odds of gestational diabetes and a hormonal complication while those with one or two children had lower odds is supported by existing epidemiologic evidence. Multiparity has been linked to increased lifetime risk of type 2 diabetes (Tian et al., 2014), and hospital-based studies have documented higher rates of fetomaternal complications, including GDM and hypertensive disorders, among high-parity women (Khan et al., 2022). Similarly, a large retrospective cohort study in China found that multiparous women had higher unadjusted risks of GDM, though the association weakened after adjustment (Geng et al., 2024), suggesting that parity may function more as a marker of an underlying high-risk metabolic profile. Research also shows that the combination of multiparity and advanced maternal age amplifies adverse pregnancy outcomes (Dai et al., 2023), indicating a synergistic age–parity effect. Together, these studies reinforce our findings and highlight that multiparity particularly when accompanied by increasing maternal age may contribute to greater metabolic and endocrine strain during pregnancy.

Maternal occupation was associated with edema, with women in service or business jobs at higher risk, possibly due to prolonged standing, occupational stress, and lifestyle factors, consistent with previous findings (M. V. et al., 2017). Hormonal complications were primarily associated with later birth order, with higher parity increasing risk substantially, reflecting cumulative endocrine stress from repeated pregnancies (Khan et al., 2022; Dai et al., 2023). These findings emphasize the need for occupational guidance and endocrine monitoring, particularly for working and multiparous women.

CONCLUSION

This study provides a comprehensive assessment of pregnancy complications and their associated factors, revealing the strong influence of socioeconomic, demographic, and health-related determinants on maternal outcomes. Gestational diabetes (91.3%) and hypertension (82.5%) were the most prevalent complications, while pre-eclampsia was less common (8.3%). Moderate issues such as vomiting, urinary tract infections, hormonal imbalances, and edema also contributed to maternal morbidity. Education, employment, and normal BMI significantly reduced the likelihood of complications, underscoring the importance of promoting female education, workforce participation, and healthy lifestyles. Socioeconomic disparities further shaped maternal health, with women from wealthier households experiencing fewer complications. Overall, the findings highlight the need for targeted, equity-focused interventions to

improve maternal health outcomes. To reduce pregnancy complications and improve maternal and infant health, implement early prenatal screenings, promote balanced nutrition, raise awareness through culturally appropriate campaigns, strengthen community health workers' capacity, encourage Kangaroo Mother Care for at-risk infants, align with national health programs, and conduct community-based studies to guide tailored interventions.

Limitations

This study has several limitations. Although simple random sampling and primary data collection provide a solid foundation, certain subgroups—such as high-risk pregnancies—may be underrepresented, introducing potential selection bias. Recall bias could affect the accuracy of self-reported pregnancy outcomes. The limited sample size and geographic focus may restrict generalizability. Uncontrolled confounding factors, including socioeconomic status, education, and pre-existing health conditions, may influence observed associations. Additionally, incomplete responses or participant dropout could affect data completeness. Future studies with larger, more diverse samples and improved data collection and confounder control would enhance validity and applicability.

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