International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Clinical spectrum and fetomaternal outcome of heart disease in pregnancy: A Retrospective Descriptive Study

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Received: 06-01-2026
Accepted: 14-01-2026
Available online: 11-02-2026

ABSTRACT

Background: Heart disease complicating pregnancy remains an important cause of maternal and perinatal morbidity in low- and middle-income countries, with rheumatic heart disease (RHD) continuing to be a predominant etiology. Physiological cardiovascular changes during pregnancy may exacerbate underlying cardiac lesions, making early diagnosis and functional assessment essential. **Objectives:** To study the clinical spectrum and fetomaternal outcomes of heart disease in pregnancy and to assess the association between the type and severity of cardiac disease, maternal functional status, mode of delivery, and perinatal outcomes. **Methods**: This retrospective descriptive study included 52 pregnant women with structural or electrical heart disease managed at a tertiary care center. Data regarding booking status, demographic profile, clinical presentation, timing of diagnosis, NYHA functional class, echocardiographic findings, ejection fraction, mode of delivery, and perinatal outcomes were analyzed. Statistical analysis was performed using descriptive statistics and Chi-square test, with $p < 0.05$ considered significant. **Results**: Most women were booked cases and had been diagnosed with heart disease prior to pregnancy. Rheumatic heart disease was the most common etiology, with severe mitral stenosis constituting a high-risk subgroup. The majority were asymptomatic at presentation, and NYHA Class I and II predominated; however, women in NYHA Class III and IV experienced higher maternal morbidity, ICU/CCU admissions, and adverse perinatal outcomes, establishing maternal functional status as the strongest predictor of outcome. Mitral and tricuspid regurgitation were the most frequent echocardiographic findings, and left ventricular systolic function was preserved in most cases. Caesarean section was significantly more common in women with severe rheumatic disease ($p = 0.02$). One maternal mortality was recorded. Adverse neonatal outcomes, including preterm birth and NICU admission, were predominantly associated with severe RHD, while repaired congenital lesions and arrhythmic disorders had favorable outcomes. **Conclusion**: Pregnancy outcomes in women with heart disease are strongly influenced by the type and severity of cardiac lesion, with NYHA functional class being the most important predictor of fetomaternal outcome. Early diagnosis and multidisciplinary care are crucial to improve outcomes.

Keywords: Heart disease in pregnancy; Rheumatic heart disease; congenital heart disease; Mitral stenosis; NYHA classification; Perinatal outcomes; Mode of delivery; Echocardiography.

INTRODUCTION

Heart disease complicating pregnancy remains a major cause of maternal and perinatal morbidity and mortality, particularly in low- and middle-income countries where rheumatic heart disease (RHD) continues to be prevalent alongside congenital

heart disease (CHD) and arrhythmic disorders. Advances in medical and surgical management have improved survival among women with cardiac conditions, allowing many to reach reproductive age. However, pregnancy induces physiological changes, including increases in blood volume, cardiac output, and heart rate, which may overwhelm compromised cardiovascular systems and precipitate clinical deterioration. As a result, pregnancy in women with heart disease represents a high-risk state that requires careful antenatal surveillance and multidisciplinary management.[1]

The clinical impact of cardiac disease in pregnancy is highly variable and depends on the type of lesion, severity of hemodynamic compromise, ventricular function, and functional status as assessed by the New York Heart Association (NYHA) classification. While women with mild disease or corrected congenital lesions often tolerate pregnancy well, those with significant valvular lesions particularly rheumatic mitral stenosis are at increased risk of heart failure, arrhythmias, thromboembolism, and adverse perinatal outcomes. In many settings, delayed diagnosis and limited access to preconception counseling further compound these risks.[2]

Patterns observed in clinical practice highlight that a substantial proportion of women with heart disease are diagnosed prior to pregnancy, often during evaluation for cardiac symptoms or as part of routine screening. However, a notable number are identified only during pregnancy or in the postpartum period, when physiological stress unmasks underlying pathology. Functional status at presentation varies widely, with most women being asymptomatic or mildly symptomatic, while a significant subset presents with advanced functional limitation, reflecting the burden of severe disease within the population.[3]

Obstetric management in women with cardiac disease is closely linked to disease severity. While vaginal delivery is generally preferred due to lower hemodynamic stress, operative delivery is frequently required in women with severe valvular lesions to minimize maternal risk. Similarly, perinatal outcomes are influenced by maternal cardiac status, with higher rates of preterm birth, neonatal intensive care unit admission, and perinatal mortality reported in association with severe rheumatic disease. In contrast, women with repaired congenital lesions or isolated arrhythmic disorders typically experience favorable maternal and neonatal outcomes.[4]

Against this background, the present study was undertaken to evaluate the demographic profile, clinical characteristics, echocardiographic findings, mode of delivery, and perinatal outcomes among pregnant women with heart disease. By correlating cardiac diagnosis and severity with obstetric and neonatal outcomes, this study aims to provide insights that can inform risk stratification, guide delivery planning, and improve multidisciplinary care for this high-risk group.

METHODOLOGY

Study Design and Setting

This was a retrospective descriptive study conducted at Patan Academy of Health Sciences (PAHS) Lagankhel, Kathmandu, Nepal with dedicated obstetric, cardiology, and neonatal services. The study was carried out over a defined study period after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants prior to enrolment. (Ethical Approval number - drs2512192182).

Study Population

Pregnant women with pre-existing or newly diagnosed heart disease who were admitted for antenatal care, delivery, or postpartum management were included in the study. Both booked and unbooked cases were considered to reflect real-world clinical practice.

Inclusion Criteria

- All cases of heart disease in pregnancy and had reached 28 weeks gestation.
- Patients with peripartum cardiomyopathy.
- Patient who had undergone echocardiography

Exclusion Criteria

- Heart disease with ectopic pregnancy
- Heart disease with molar pregnancy
- Patient with incomplete records
- Patient delivered outside our hospital

Data Collection

A structured proforma was used to collect data from February 2020 and 31 February 2025 through clinical examination, medical records, and investigations. If cardiovascular disease was suspected on the basis of symptoms and examination, a Echocardiography was performed by trained cardiologists using standard protocols. Left ventricular systolic function was categorized based on ejection fraction values. The delivery mode and the perinatal outcome were dully filled.

Outcome Measures

The primary outcomes were:

- Association between type of heart disease and (clinical spectrum)

- Perinatal outcomes in relation to maternal cardiac diagnosis

Secondary outcomes included distribution of NYHA class, echocardiographic findings, and ventricular function among the study population.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using appropriate statistical software. Categorical variables were expressed as **frequencies and percentages**, while continuous variables were summarized using **means** where applicable. Associations between type of heart disease and mode of delivery were assessed using the **Chi-square test**. A *p* value of less than 0.05 was considered statistically significant.

RESULTS

A total of 52 women with heart disease complicating pregnancy were included in the present study. The age distribution showed that the largest proportion of women were aged more than 30 years (40.38%), followed by those between 26–30 years (34.62%), while women aged 18–25 years constituted 25% of the cohort. The majority of patients belonged to an urban background (69.23%). With regard to socioeconomic status, most women were from the lower-middle (46.15%) and upper-middle (32.69%) classes, reflecting a predominantly middle socioeconomic representation (Table 1). The booking status, as shown in Figure 1, revealed that most patients were booked and had received regular antenatal care.

In terms of obstetric profile, multigravida women constituted a significantly larger proportion of the study population (65.38%) compared to primigravida women (34.62%) (Table 3). Most women were asymptomatic at presentation (84.62%), while a smaller proportion reported symptoms such as palpitations, shortness of breath, or limb swelling (Table 4). The timing of diagnosis indicated that cardiac disease was predominantly pre-existing, with 65.38% of women diagnosed before pregnancy. A smaller proportion were diagnosed after delivery (28.84%) or during pregnancy (5.77%) (Table 5).

Functional assessment using the NYHA classification showed that the majority of women were in Class I (38.46%) and Class II (23.08%), although a substantial proportion belonged to Class III (28.85%) and Class IV (9.62%), indicating varying degrees of functional limitation (Table 6). Echocardiographic evaluation revealed diverse cardiac abnormalities. Mild mitral and tricuspid regurgitation was the most common finding (21.15%), followed by normal echocardiograms (23.08%). Severe lesions such as severe mitral stenosis and severe tricuspid regurgitation, as well as congenital heart diseases and atrial septal defects, were less frequent but clinically significant (Table 7). Left ventricular systolic function was largely preserved, with 76.92% of women having an ejection fraction between 50–60% (Table 8).

A statistically significant association was observed between the type of heart disease and mode of delivery. Women with rheumatic heart disease complicated by severe mitral stenosis underwent lower segment caesarean section more frequently compared to other groups ($p = 0.02$), whereas vaginal delivery was more common among women with repaired congenital lesions and arrhythmic disorders such as Wolff–Parkinson–White syndrome (Table 9).

Perinatal outcomes varied according to the underlying maternal cardiac condition. Preterm delivery, lower mean birth weight, increased nursery and NICU admissions, and lower Apgar scores were predominantly observed in pregnancies complicated by rheumatic heart disease, particularly severe mitral stenosis. In contrast, favourable neonatal outcomes were noted in women with repaired congenital heart disease, isolated atrial septal defects, and WPW syndrome (Table 10). Maternal admissions to CCU and ICU are depicted in Figure 2, while Figure 3 illustrates the echocardiographic findings among newborns. Overall, the results demonstrate that the type and severity of maternal heart disease significantly influence maternal functional status, mode of delivery, and perinatal outcomes.

Table 1: Demographic distribution

		Frequency	Percentage
Age groups	18 to 25 years	13	25
	26 to 30 years	18	34.62
	>30 years	21	40.38
Residence	Rural	16	30.77
	Urban	36	69.23
Socio economic class	Lower middle	24	46.15
	Upper	10	19.23
	Upper lower	1	1.92
	Upper middle	17	32.69

Table 3: Distribution based on gravida

	Frequency	Percentage
Primigravida	18	34.62
Multigravida	34	65.38
Total	52	100

Table 4: Presenting complaints of the study population

Clinical details	Frequency	Percentage
Cough/ SOB	1	1.92
Palpitation	1	1.92
Palpitation/ SOB	4	7.69
SOB/ Limb Swelling	2	3.85
None	44	84.62
Total	52	

Table 5: Time of diagnosis

Time of diagnosis	Frequency	Percentage
After delivery	15	28.84
Before pregnancy	34	65.38
During pregnancy	3	5.77
Total	52	100.00

Table 6: Distribution according to NYHA classification

NYHA Classification	Frequency	Percentage
Class I	20	38.46
Class II	12	23.08
Class III	15	28.85
Class IV	5	9.62
Total	52	100

Table 7: Echo findings of the study population

Echo findings	Frequency	Percentage
ASD	3	5.77
Congenital Heart diasese	3	5.77
Dilated LA	4	7.69
Mild MR/TR	11	21.15
Moderate MR/TR	7	13.46
Normal	12	23.08
Severe MS	4	7.69
Severe TR	3	5.77
Thickened AML, Mild MR/TR	2	3.85
Trace TR	3	5.77
Total	52	100.00

Table 8: Ejection fraction

Ejection fraction	Frequency	Percentage
40 to 50%	9	17.31
50 to 60%	40	76.92
60 to 70%	3	5.77
Total	52	100

Table 9: Type of heart disease and association with mode of delivery

Type of heart disease	LSCS	SVD	Chi square value	p value
RHD WITH SEVERE MS	7	0		
RHD	15	8		
CONGENITAL HEART DISEASE	4	2		
ASD	4	4		
VSD CLOSURE	3	2		
ASD CLOSURE	1	1		
WPW SYNDROME	0	1	4.923	0.02*

Total	34	18		

Table 10: Association of perinatal outcomes with type of heart diseases.

Type of heart disease	Pre term delivery	Mean Birth weight	APGAR at 5 min	Nursery	NICU	Mortality
RHD WITH SEVERE MS	2	2.7	7	2	4	0
RHD	4	2.7	8	5	7	0
CONGENITAL HEART DISEASE	0	3	8	3	1	0
ASD	1	2.6	9	0	0	0
VSD CLOSURE	0	2.9	8	1	0	0
ASD CLOSURE	0	2.9	9	1	0	0
WPW SYNDROME	0	3.1	9	0	0	0

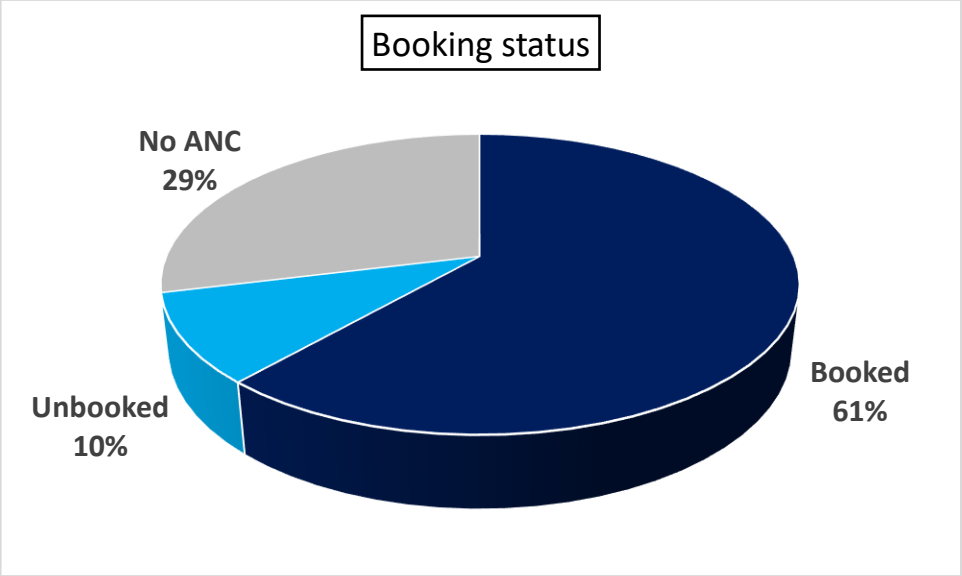

Fig. 1: Booking status of patients

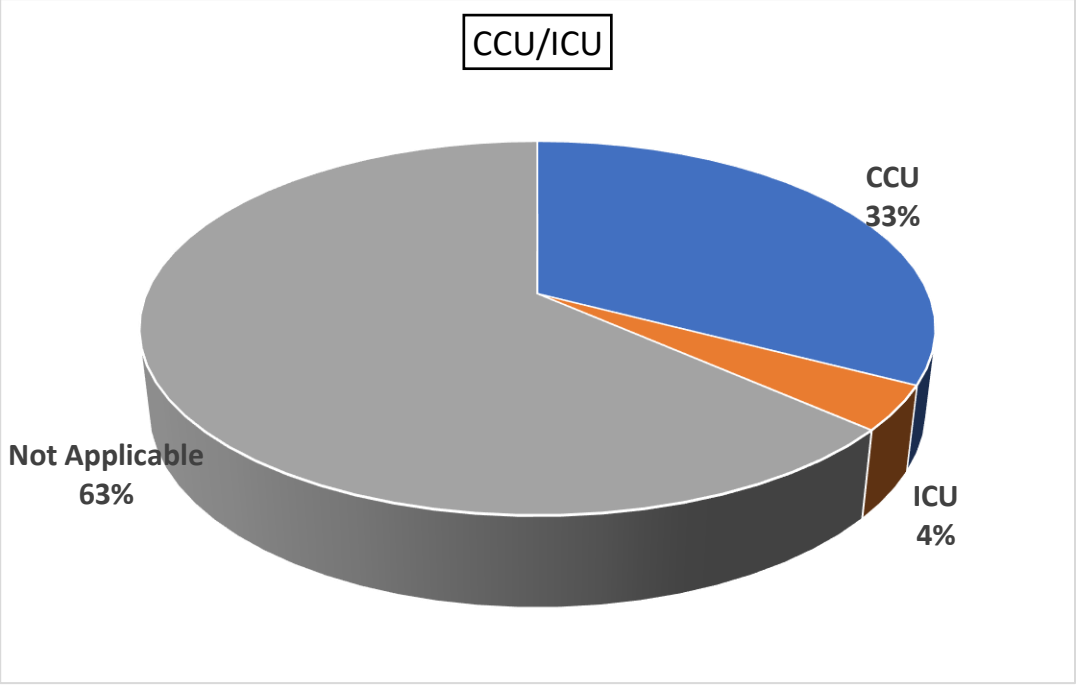

Fig. 2: Percentage of mothers admitted in CCU and ICU

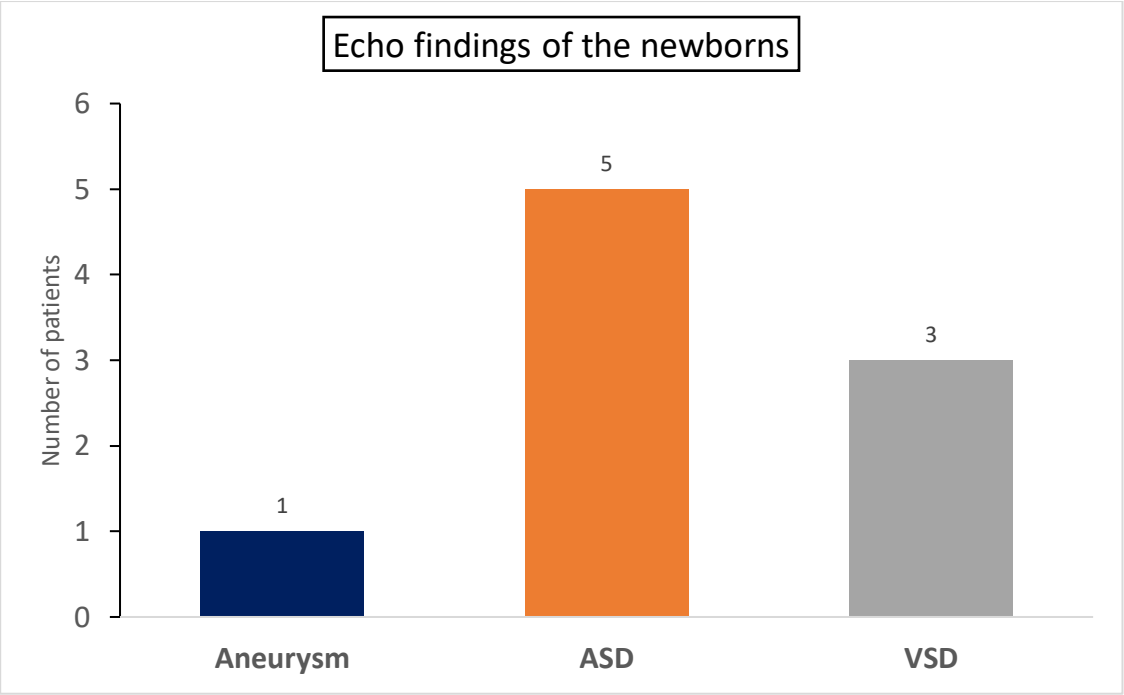

Fig. 3: Echo findings of new borns.

DISCUSSION

Heart disease in pregnancy remains a significant clinical challenge, particularly in low- and middle-income countries where rheumatic heart disease (RHD) continues to coexist with congenital and repaired cardiac lesions. The present study highlights the diverse clinical spectrum of heart disease encountered in pregnancy and demonstrates how the type and severity of cardiac pathology influence maternal functional status, mode of delivery, and perinatal outcomes.

In this study, a majority of women were diagnosed with heart disease prior to pregnancy, reflecting increasing awareness and improved detection of cardiac conditions in women of reproductive age. However, a proportion of cases were identified during pregnancy or after delivery, underscoring the role of pregnancy-related hemodynamic stress in unmasking previously asymptomatic disease. Similar observations have been reported in earlier studies, which emphasize the importance of early screening and preconception counseling to optimize outcomes.[5]

Maternal functional status, as defined by the New York Heart Association (NYHA) functional classification, emerged as a key predictor of both maternal and perinatal outcomes in the present study. Women in lower NYHA classes (Class I and II) largely demonstrated preserved cardiac function, higher tolerance to pregnancy-related physiological changes, and favourable obstetric and neonatal outcomes. In contrast, those presenting with advanced functional limitation (NYHA Class III and IV) were more likely to have severe underlying cardiac lesions, require operative delivery, and experience adverse perinatal outcomes, including preterm birth and increased need for neonatal intensive care. These findings indicate that NYHA functional class reflects the physiological reserve of the maternal cardiovascular system and its ability to adapt to the hemodynamic stress of pregnancy, thereby serving as a robust clinical marker for risk stratification. Thus, maternal functional status, as assessed by NYHA classification, is a critical predictor of pregnancy outcome. [6]

Echocardiographic findings in the present study demonstrated a predominance of valvular lesions, especially mitral and tricuspid regurgitation, alongside smaller proportions of congenital heart disease and severe mitral stenosis. Left ventricular systolic function was preserved in the majority of women, which likely contributed to favorable outcomes in those with mild or repaired lesions. However, women with severe mitral stenosis represented a high-risk group, consistent with existing literature that identifies mitral stenosis as one of the most poorly tolerated lesions during pregnancy due to fixed cardiac output and increased risk of pulmonary hypertension and heart failure.[7]

Mode of delivery showed a significant association with the type of heart disease. Women with RHD complicated by severe mitral stenosis were more likely to undergo caesarean delivery, reflecting the need to minimize hemodynamic stress and avoid prolonged labor. In contrast, vaginal delivery was feasible in many women with repaired congenital lesions, isolated atrial septal defects, or arrhythmic conditions, supporting current recommendations that favor vaginal delivery in stable cardiac patients. Gavin et al., also reported positive correlation between mode of delivery and maternal heart diseases.[8]

Perinatal outcomes varied according to maternal cardiac diagnosis. Adverse outcomes such as preterm delivery, increased need for neonatal intensive care were predominantly associated with rheumatic heart disease, particularly severe mitral stenosis. Conversely, women with repaired congenital heart disease and Wolff–Parkinson–White syndrome generally had favorable neonatal outcomes, with good Apgar scores and minimal need for intensive neonatal support. These findings align with previous studies demonstrating that neonatal outcomes are closely linked to maternal cardiac function and

disease severity rather than the mere presence of heart disease. Naik et al., [9] also published similar findings and Alkema et al., reported high mortality in neonates with mothers with cardiac diseases.[10]
Overall, the findings of this study reinforce the importance of early diagnosis, functional assessment, and lesion-specific management in pregnancies complicated by heart disease. A multidisciplinary approach involving obstetricians, cardiologists, anesthesiologists, and neonatologists is essential to optimize maternal and fetal outcomes, particularly in women with severe rheumatic valvular disease.

CONCLUSION

Pregnancy complicated by heart disease continues to have significant risks to both mother and fetus, with outcomes largely determined by the type and severity of the underlying cardiac lesion. The present study demonstrates that rheumatic heart disease is still a predominant cardiac problem, associated with higher functional limitation, increased operative delivery, and poorer perinatal outcomes compared to congenital or repaired cardiac conditions. Preserved ventricular function and lower NYHA class were linked to more favorable maternal and neonatal outcomes. Thus it is suggested that regular cardiac auscultation and obstetric evaluation must sbe performed in antenatal women. Early diagnosis, counselling, routine antenatal supervision, delivery at tertiary centre, careful functional assessment, and lesion-specific, multidisciplinary management are essential to optimize outcomes in this high-risk population for favourable feto-maternal outcome.

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