Elderly primigravida leading to Cardio-Renal issue due to Fast-Paced lifestyle

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ABSTRACT

Background: Advanced maternal age (AMA), defined as pregnancy at ≥35 years, is increasingly associated with adverse perinatal outcomes. In addition to obstetric complications, adverse pregnancy outcomes are recognized as early markers of future cardiovascular and renal risk in women. This study aimed to evaluate the association between maternal age, gestational-related complications, neonatal outcomes, and postpartum cardiovascular risk factors.

Methods: A historical prospective study was conducted using electronic health records from a multi-hospital health system, including 222 pregnant women categorized into three maternal age groups: 21–29 years (n = 53), 30–34 years (n = 75), and ≥35 years (n = 94). Maternal variables assessed included reproductive history, lifestyle factors, hypertensive disorders of pregnancy, gestational diabetes mellitus, placental complications, postpartum complications, and cardiovascular and renal outcomes. Neonatal outcomes included birth weight, gestational age, fetal growth abnormalities, NICU admission, congenital anomalies, and perinatal complications. Statistical associations were evaluated using Chi-square tests, with significance set at $P < 0.05$.

Results: Women aged ≥35 years demonstrated significantly higher prevalence of preeclampsia, eclampsia, gestational diabetes mellitus, placental complications, pregnancy-related acute kidney injury, postpartum haemorrhage, and chronic hypertension after pregnancy ($P < 0.05$). Preterm birth, post-term delivery, small for gestational age/intrauterine growth restriction, large for gestational age, and NICU admissions were significantly associated with advanced maternal age. Placenta previa occurred exclusively among women aged ≥35 years, while placental abruption was significantly more common in this group. Cardiovascular complications, including ischemic heart disease, peripartum cardiomyopathy, and persistent hypertension after pregnancy, were also more frequently observed in older mothers.

Conclusion: Advanced maternal age is significantly associated with augmented maternal, neonatal, cardiovascular and renal complications. Pregnancy-related complications may serve as early indicators of long-term cardiovascular risk, emphasizing the importance of enhanced antenatal monitoring, individualized obstetric care, and structured postpartum follow-up in women of advanced maternal age.

Keywords: Advanced maternal age; pregnancy outcomes; maternal complications; neonatal outcomes; cardiovascular risk; gestational diabetes mellitus.

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1. INTRODUCTION

Mature maternal age is defined by the American College of Obstetricians and Gynaecologists as pregnancy occurring at 35 years of age or older and has become increasingly prevalent worldwide owing to delayed marriage, career prioritization, economic planning and the expanding utilization of assisted reproductive technologies **[1]**. In India, this demographic transition is particularly evident among professional women employed in high-stress corporate environments, where occupational demands may further intensify obstetric and cardiovascular risks associated with delayed childbearing **[2,3]**.

Female reproductive potential declines progressively with advancing age as a result of diminished ovarian reserve, hormonal dysregulation, and increased chromosomal

instability, contributing to higher rates of infertility, ectopic pregnancy, spontaneous miscarriage and greater dependence on fertility treatments **[1,2]**. In addition to reproductive ageing, pregnancy in older women is accompanied by age-related physiological adaptations, including increased arterial stiffness, altered vascular remodelling, progression of carotid intima-media thickness and reduced cardiovagal baroreflex sensitivity, all of which reflect underlying cardiovascular ageing and reduced vascular resilience **[4,5]**.

Women with advanced maternal age have a much-increased risk of pregnancy-related problems. Hypertensive diseases of pregnancy, such as gestational hypertension and preeclampsia, occur more commonly in AMA pregnancies and are closely related with endothelial dysfunction, poor autonomic control and decreased heart rate variability **[6,7]**. Similarly, gestational diabetes mellitus is significantly more common in older pregnant women, especially in the context of obesity or pre-existing metabolic risk factors **[7,8]**. These vascular and metabolic disturbances contribute to downstream maternal complications such as pregnancy-related acute kidney injury, hepatic dysfunction and peripartum cardiomyopathy **[9,10,20]**.

Adverse perinatal outcomes are also more commonly observed in AMA pregnancies. Previous studies have indicated higher risks of preterm birth, low birth weight, small for gestational age newborns, Intensive Care Nursery admission and chromosomal abnormalities, including trisomy 21, among neonates delivered to older moms**[11,12]**. These findings indicate that the impact of maternal age extends beyond maternal health and substantially influences fetal and neonatal outcomes.

Importantly, the effects of AMA remain beyond pregnancy. Women with a history of hypertensive problems during pregnancy had considerably higher long-term risks of chronic hypertension, ischemic heart disease, stroke, chronic kidney disease and progression to end-stage renal disease later in life.**[4,10,13,16–19]**. Pregnancy may thus serve as an early predictor of future cardiovascular fragility, especially among women who have pregnancy-related problems.

Professional women in corporate sectors may represent a uniquely vulnerable subgroup, as advanced maternal age frequently coexists with occupational exposures such as prolonged working hours, shift work, psychosocial stress, sleep disruption, sedentary behaviour, and tobacco use, all of which may synergistically augmented the risk of hypertensive disorders, gestational diabetes, and adverse perinatal outcomes **[21–29]**. In spite of the broader understanding of these risks, limited studies have comprehensively evaluated the interaction between maternal age, occupational factors, lifestyle exposures, pregnancy complications, and long-term cardiovascular outcomes among Indian corporate women.

Therefore, the present study systematically evaluates pregnancy history, maternal complications, occupational and lifestyle exposures, perinatal outcomes, and long-term cardio-renal health among Indian corporate women, with particular emphasis on advanced maternal age as a determinant of maternal and neonatal risk. The findings are expected to support targeted antenatal surveillance, individualized obstetric care, workplace-based interventions, and early postpartum cardiovascular risk stratification in this high-risk population.

1.1 Objectives

The current study endeavours to assess the link between maternal age and pregnancy-related maternal and newborn outcomes among women giving birth at a Tertiary referral centre.

Specific objectives were:

- To describe the demographic and maternal age distribution population.
- Determine the prevalence of pregnancy-related obstacles, such as hypertensive disorders, gestational diabetes, placental abnormalities and postpartum issues.
- To examine associations between maternal obstacles and postpartum cardiovascular and renal outcomes.
- To evaluate neonatal outcomes including gestational age at birth, birth weight, fetal growth abnormalities, NICU admissionand neonatal complications.

1.2 Problem Statements

Advanced maternal age is increasingly connected with negative pregnancy outcomes, many of which are emerging as early markers of future cardiovascular and renal illness in women.

However, existing maternal risk models inadequately incorporate reproductive history, pregnancy complications, occupational exposuresand lifestyle factors, particularly in Indian populations.

This study addresses this gap by analysing multi-hospital electronic health record data to assessthe link between advanced maternal age and

pregnancy-related complications, neonatal outcomes and long-term maternal cardio-renal health.

1.3 **Female-specific physiology and structure feature** of Study population

Pregnancy-related complications were determined in accordance with standardized clinical criteria, incorporating blood pressure measurements, laboratory parameters, imaging assessments, and established clinical practice guidelines, as detailed in Table 1.

Table 1: Female-specific physiology Feature

Variable/Condition/ Features	Definition
Demographic Profile (Age)	Maternal age of participants categorized into predefined groups for analysis (e.g., 21–29, 30–34, ≥35 years).
Gestational Hypertension	At 20 weeks of pregnancy, blood pressure should be ≥140/90 mmHg on two separate occasions, at least 4 hours apart, with no proteinuria or organ damage.
Preeclampsia	After 20 weeks of gestation, blood pressure should be ≥140/90 mmHg with proteinuria (≥300 mg/24 h or dipstick ≥1+) or end-organ failure (thrombocytopenia, increased liver enzymes, renal insufficiency, pulmonary edema, or neurological symptoms).
Eclampsia	New-onset generalized seizures in a lady with preeclampsia, unrelated to other neurological reasons
HELLP Syndrome	The presence of hemolysis (↑LDH, abnormal smear), high liver enzymes (AST/ALT), and low platelet count (<100,000/μL)
Gestational Diabetes Mellitus (GDM)	OGTT results (24-28 weeks): fasting ≥92 mg/dL, 1-hour ≥180 mg/dL, or 2-hour ≥153 mg/dL.
Pregnancy related Acute Kidney Injury	Sudden rise in serum creatinine, reduced urine output (<0.5 ml/kg/hr), occurring during pregnancy or postpartum, with no prior renal disease
Postpartum Haemorrhage	Blood loss ≥500 mL after vaginal delivery or ≥1000 mL after cesarean section, or any blood loss causing hemodynamic instability
Placenta Previa	Ultrasonography reveals that the placenta is partially or totally covering the cervical os.
Placental Abruption	Clinical diagnosis based on painful vaginal bleeding, uterine tenderness/rigidity, fetal distress; ultrasound supportive but not definitive
HBP after Pregnancy	Persistent blood pressure ≥140/90 mmHg measured at or beyond 6 weeks postpartum on follow-up

Gap and opportunity: Current predictive models for maternal cardiovascular risk often overlook female-specific physiological and reproductive variables, including advanced maternal age, pregnancy-related hypertensive disorders, gestational diabetes, placental abnormalities, and postpartum cardiovascular sequelae. There remains an opportunity to integrate these sex-specific predictors with structured multi-hospital electronic health records to improve long-term risk stratification in women.

2. LITERATURE SURVEY

Maternal demographic and reproductive characteristics are important determinants of pregnancy outcomes. Variables as maternal age at conception, gravidity, and parity have been consistently associated with reproductive outcomes and obstetric risk profiles. Women are more likely present higher gravidity and parity, reflecting greater cumulative reproductive exposure and it is linked to higher chances of miscarriage, reduced fertility, and increased use of medically assisted conception **[1–4]**. Furthermore, itis independently associated with declining, chromosomal instability, and ovarian reserve, reproductive efficiency, thereby increasing the likelihood of adverse conception-related outcomes.

Pregnancy-related complications are substantially more common among women aged ≥35 years. Hypertensive disorders of pregnancy significantly higher frequencies in older pregnant women due to endothelial dysfunction, impaired placentation, vascular stiffness and altered autonomic regulation **[5,6]**. In parallel, metabolic disturbances such as gestational diabetes mellitus (GDM) are also increasingly prevalent with advancing maternal age, particularly among women with obesity or pre-existing metabolic risk factors **[7,8]**.

The presence of pre-existing maternal comorbidities further amplifies pregnancy-associated risks in AMA pregnancies and substantially increase susceptibility to hypertensive disorders, pregnancy-related acute kidney injury, placental insufficiency, and adverse fetal outcomes **[8–10]**. Abnormalities of Placental are also reported more frequently among older mothers and contribute significantly to medically indicated preterm delivery and maternal haemorrhagic complications **[11]**.

Delivery-related complications are similarly elevated among women. Multiple literature has demonstrated higher rates of both elective and emergency caesarean section in this population, alongside increased risks of postpartum haemorrhage, severe maternal morbidity, and intensive care or high-dependency unit admissions **[12–15]**. Pregnancy-related acute kidney injury is of particular concern among older women with hypertensive disorders or underlying renal dysfunction and represents an important contributor to maternal morbidity **[9,15]**.

Beyond pregnancy, adverse maternal outcomes may persist long after delivery. Women with a history of hypertensive disorders during pregnancy are at a significantly higher risk of developing same diseases later in life **[16–19]**. These findings support the notion of pregnancy as an early cardiovascular stress test, with pregnancy problems potentially revealing underlying cardiometabolic susceptibility. The advanced maternal age combined with hypertensive pregnancy disorders may predispose women to peripartum cardiomyopathy and subsequent heart failure **[20]**.

Occupational and lifestyle-related exposures further influence maternal and perinatal risk. Longer weekly working hours, rotating or night shifts, and occupational stress have been associated with elevated risks of hypertensive disorders and gestational diabetes during pregnancy **[21,22]**. Similarly, psychosocial stress, poor sleep quality, smoking, alcohol exposure, physical inactivity, and elevated Pre-pregnancy BMI significantly contributes to maternal cardiovascular risk and unfavourable pregnancy outcomes **[23–29]**. These factors may be particularly relevant among professional women employed in high-demand corporate settings.

Maternal age has a major effect on infant health status. Advanced maternal age is linked to an increased risk of preterm birth, low birth weight, small-for-gestational-age children, intrauterine growth restriction, and fetal macrosomia **[30–32]**. Neonates born to older mothers more frequently require intensive neonatal care, including resuscitation, ventilatory support, NICU admission, and treatment for neonatal jaundice requiring phototherapy **[33]**.

In addition to acute newborn morbidity, advanced maternal age is closely linked to poor fetal and long-term child health outcomes. The incidence of chromosomal abnormalities, such as trisomy 21 and other aneuploidies, increases dramatically with maternal age. Older maternal age is also associated with greater chances of congenital abnormalities, stillbirth, neonatal death, and long-term neurodevelopmental difficulties in kids **[34–36]**. Collectively, these findings underscore as a major determinant of maternal, fetal, and long-term offspring health outcomes.

3. MATERIALS AND METHODS

3.1 Design**, setting and duration** of the study

Descriptive observational research was carried out using retrospective electronic health record (EHR) data gathered from a multi-hospital healthcare system. The study used maternal and newborn information gathered during a 12-month period from January 2025 to January 2026. The study sought to assess the relationship between maternal age, pregnancy-related problems, newborn outcomes, and postpartum cardiovascular and renal risk factors.

3.2 Study population and sample size

In 269 maternal records were initially screened for eligibility. Following data verification and quality assessment, 222 participants with complete and verifiable socio-demographic and pregnancy-related clinical information were included in the final analysis.

Among these 222 participants, detailed obstetric history, postpartum outcomes, and neonatal outcome data were fully available for a subset of 122 participants, which were used for specific subgroup analyses as presented in the corresponding tables.

Study population are grouped into three maternal age groups for comparative analysis:

- 21–29 years (n = 53)
- 30–34 years (n = 75)
- ≥35 years (n = 94)

3.3 Inclusion & Exclusion Criteria

Inclusion Criteria

- Delivered maternal during the study period within the participating hospital network.
- Availability of complete maternal socio-demographic and pregnancy-related clinical records.
- Documented maternal age and delivery outcome data.

Exclusion Criteria

- Records with incomplete or missing socio-demographic information.
- Incomplete obstetric, postpartum, or neonatal clinical documentation.
- Duplicate or inconsistent EHR entries identified during data cleaning.

Only participants with complete and internally consistent records were included in the respective analyses.

3.4Ethics-Approval
The study was undertaken after permission by the Institutional Ethics Committee for secondary analysis of de-identified electronic health record data.As this involved retrospective analysis of anonymized clinical records with minimal participant risk, the requirement for informed consent was waived in accordance with institutional ethical guidelines and applicable research governance standards.

3.5 Proposed System Analysis

The analytical framework was designed as a hierarchical clinical classification model to systematically organize pregnancy-related conditions according to standardized diagnostic criteria and their progression toward maternal complications.

At the primary level, pregnancy-related disorders were categorized into major clinical groups including gestational hypertension, preeclampsia, gestational diabetes mellitus, placental abnormalities, and postpartum hypertension.

At the secondary level, progression and severity of hypertensive disorders were further classified. Preeclampsia was diagnosed based on hypertension, proteinuria, or end-organ failure.

Severe manifestations eclampsia and HELLP syndrome were incorporated as advanced disease states.

Metabolic complications such as gestational diabetes mellitus were integrated using standardized oral glucose tolerance test criteria to enable simultaneous assessment of vascular and metabolic pathways.

At the tertiary level, pregnancy-related conditions were linked to adverse maternal outcomes, including:

- Pregnancy-related acute kidney injury (AKI)
- Postpartum haemorrhage (PPH)
- Placenta previa and placental abruption
- Persistent postpartum hypertension

This paradigm allowed for a systematic assessment of both short-term obstetric problems and long-term cardio-renal risk trajectories, as shown in Figure 1.

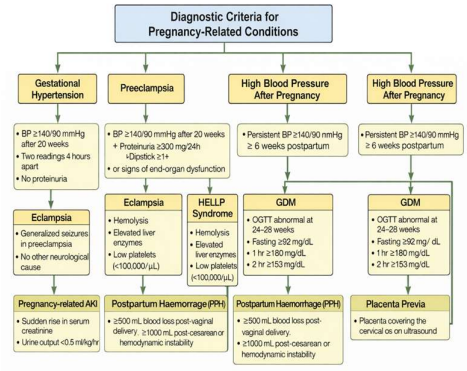


Figure 1: Structured analytical framework for classification of pregnancy-related conditions and maternal complications.

Interpretation: Overall, this structured analytical model in this Figure 1, enables a multi-dimensional assessment of maternal health by:

1. Identifying primary pregnancy-related risk conditions
2. Mapping their clinical progression and severity

3. Linking them to short-term obstetric complications and long-term cardio-renal outcomes

This hierarchical approach facilitates robust statistical analysis (e.g., chi-square association testing) and supports the identification of high-risk maternal profiles, particularly among women with advanced maternal age.

3.6 Study Flow Diagram

The study followed a systematic workflow beginning with initial screening of maternal records from the hospital EHR database.

After eligibility assessment and data cleaning, 222 participants were included in the final analytical cohort. Data collection was organized into two major domains:

- Socio-demographic variables (complete cohort, n = 222)
- Clinical outcome variables including obstetric, postpartum, and neonatal data (complete subset, n = 122)

Participants were subsequently stratified into predefined maternal age groups (21–29, 30–34, and ≥35 years) to enable comparative analysis, as in Figure 2.

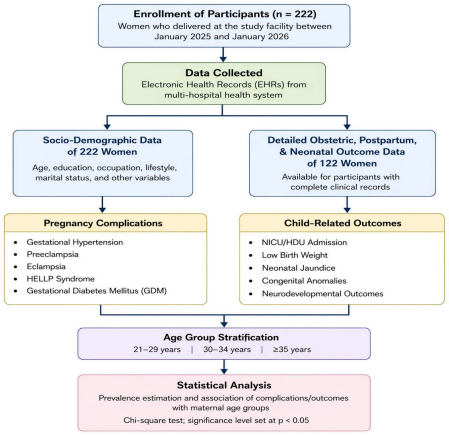


Figure 2: Diagram illustrating participant selection, data categorization and analytical workflow.

Interpretation: Figure 2 illustrates that maternal outcomes comprised pregnancy-related complications, postpartum complications, and cardiovascular or renal sequelae, whereas neonatal outcomes asgestational age at birth, weight of child, growth abnormalities, NICU admission, and neonatal complications. Statistical analysis involved prevalence estimation and Chi-square testing, with statistical significance considered at $P < 0.05$.

3.7 Maternal Complication among study population

A schematic overview was developed to illustrate the prevalence and progression of pregnancy-related maternal complications among the 222 study participants.

The framework depicts the prevalence of hypertensive diseases during pregnancy, such as gestational hypertension, preeclampsia, and eclampsia, as well as the development to severe problems like HELLP syndrome. Gestational diabetes mellitus and accompanying fetal problems were also included to demonstrate the combination of metabolic and hypertensive pathways that contribute to poor maternal and newborn outcomes, as shown in Figure 3.

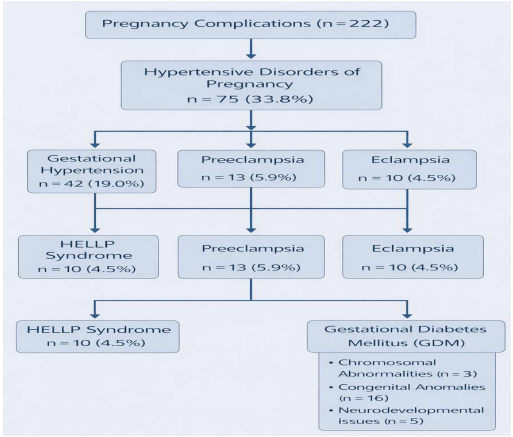


Figure3: Schematic representation maternal complications among study participants.

Interpretation: Figure 3 provides an integrated overview of complication prevalence and patterns of disease progression within the study population.

4.FEATURE ANALYSIS OF STUDY PARTICIPANTS

4.1 **Distribution of Maternal Age (n = 222)**

Among the 222 women included in the study, the largest proportion belonged to the advanced maternal age group (≥35 years), accounting for 42.3% (n = 94). Women aged 30–34 years constituted 33.8% (n = 75), while those aged 21–29 years represented 23.9% (n = 53).

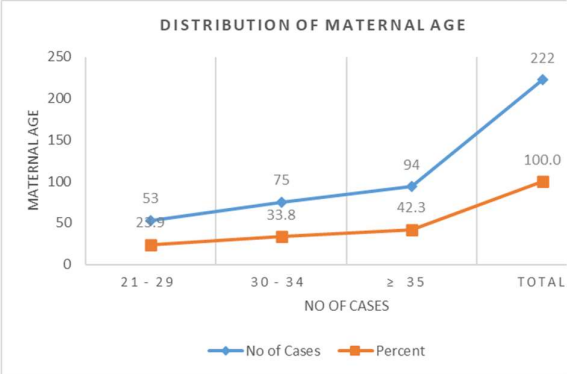


Figure 4: Distribution of maternal age among study participants (n = 222).

Interpretation: Figure 4 demonstrates that more than population belonged advanced maternal group, indicating a substantial proportion of pregnancies occurring at later reproductive ages within the study cohort.

4.2 Occupation-wise Distribution (n = 222)

Among the 222 study participants, the majority were homemakers, accounting for 42.3% (n = 94). Other commonly represented occupations included teachers (12.6%, n = 28), software engineers (10.4%, n = 23), and participants categorized under other occupations (15.8%, n = 35).

Smaller proportions included assistant professors (8.1%, n = 18), business professionals (3.2%, n = 7), engineers (2.3%, n = 5), doctors (1.8%, n = 4), professors (1.4%, n = 3), architects (0.9%, n = 2), human resource professionals (0.9%, n = 2), and academicians (0.5%, n = 1).

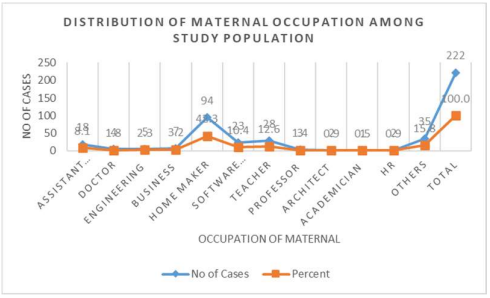


Figure 5: Occupation-wise distribution of study participants (n = 222).

Interpretation: Figure 5 indicates that although homemakers constituted the largest occupational group, the study population also comprised participants from diverse professional backgrounds.4.3 Place-wise Distribution of Participants (n = 222)

Among the 222 participants, the largest proportion resided in **Bengaluru**, accounting for 45.9% (n = 102), followed by **Mandya** with 31.1% (n = 69). Together, these two locations accounted for more than three-quarters of the total study population.

Smaller proportions of participants were from **Mysuru** (5.9%, n = 13), **Maddur** (5.0%, n = 11), and other surrounding areas (4.5%, n = 10). Limited representation was observed from **Srirangapatna** (2.3%, n = 5), **Malavalli** (1.8%, n = 4), **Channapatna** (1.4%, n = 3), **Koppa** (1.4%, n = 3), and **Ramanagara** (0.9%, n = 2).

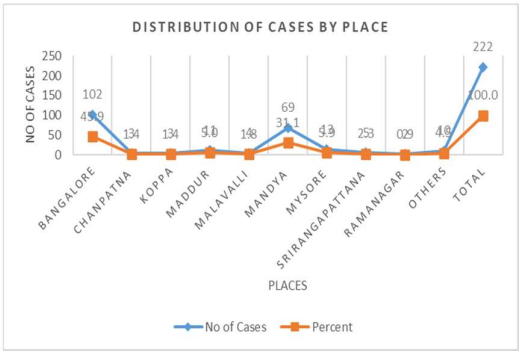


Figure 6: Residential Distribution of Study Participants (n = 222)

Interpretation: Figure 6 shows that the study population was predominantly drawn from urban and semi-urban areas, with the highest representation from Bengaluru and Mandya.

4.4 Obstetric History of the Study Participants (n = 222)

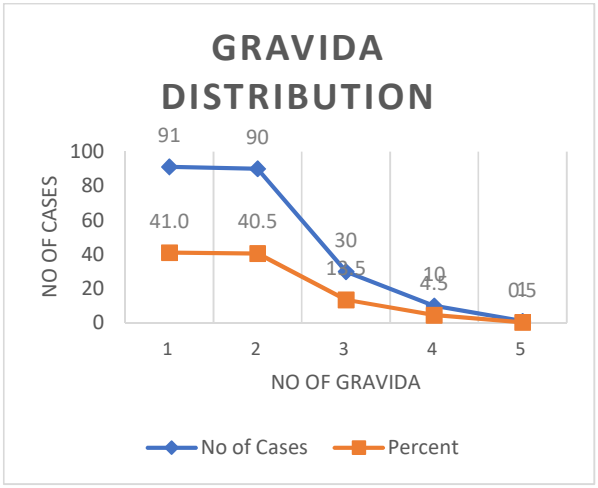
The obstetric profile demonstrated that most women had lower gravidity and parity.

A majority of participants were either primigravida (41.0%) or had two pregnancies (40.5%), while higher-order pregnancies (≥3) were less common (18.5%).

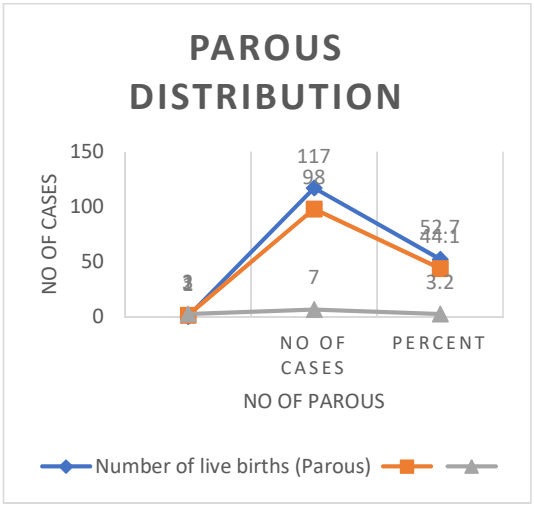
Regarding parity, More than 50% of the participants had one live birth (52.7%), followed by two live births (44.1%), whereas only 3.2% reported three or more live births.

In relation to pregnancy loss, most women reported no history of miscarriage (66.7%). One prior miscarriage was reported by 26.1% of participants, while 7.2% had experienced two or more miscarriages.

Ectopic pregnancy was uncommon in this cohort, with 97.3% reporting no prior history and only 2.8% reporting at least one ectopic pregnancy.



(a)



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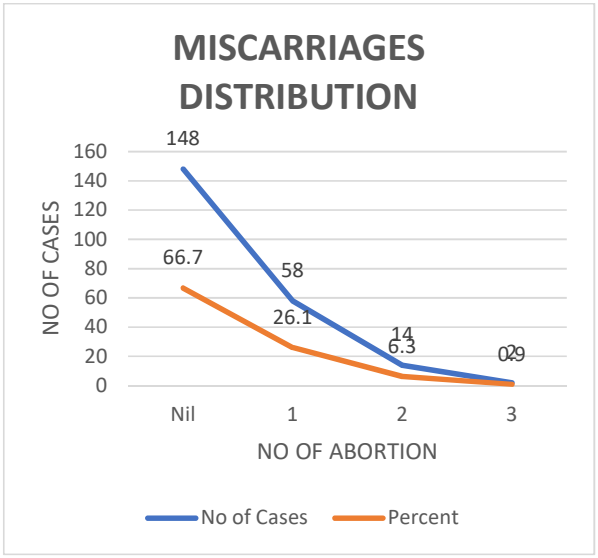

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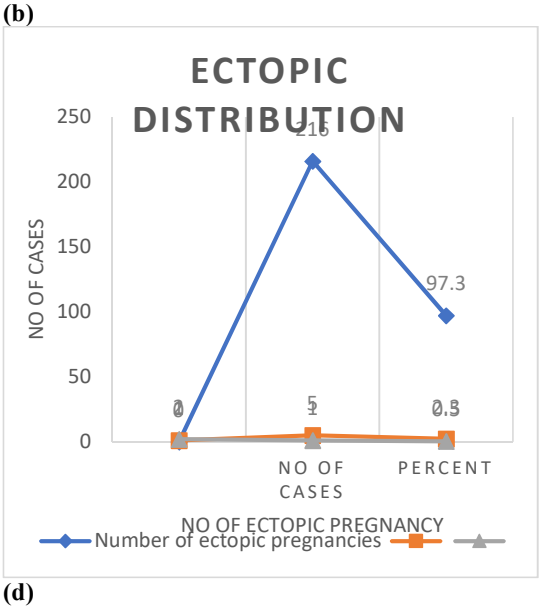


(d)

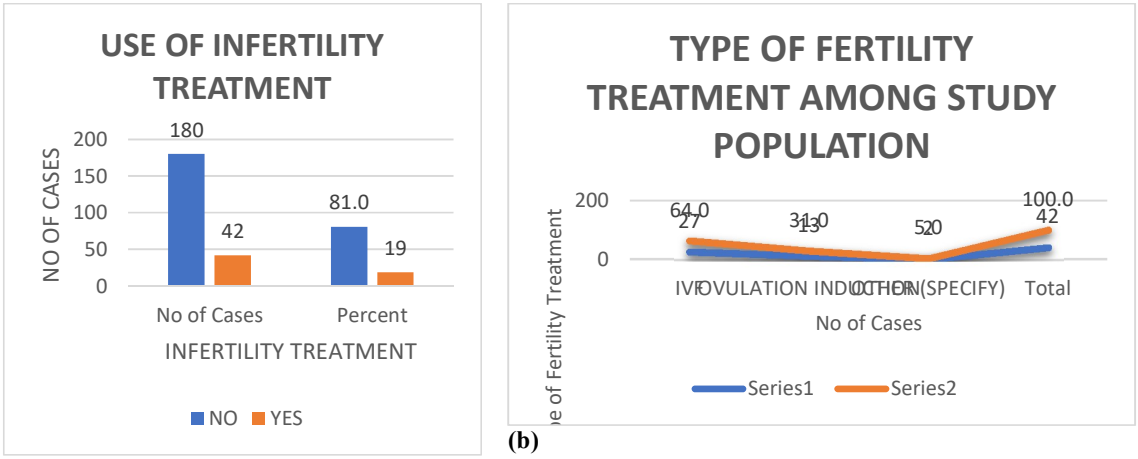
Figure 7: Distribution of Obstetric History (a-d) (a) Distribution of Gravida on Study Participants (b) Parity Distribution among Study Participants (c) Distribution of Abortion History among Study Participants (d) Distribution of Ectopic Pregnancy History among Study Participants

Interpretation: Figure 7 illustrate, Overall, the study population in Figure 7, was characterized by relatively low gravidity, low parity, limited pregnancy loss history, and very low prevalence of ectopic pregnancy.

4.5 Infertility Treatment Among Study Participants (n = 222)

Among the 222 women included in the study, 42 participants (19.0%) reported use of infertility treatment for at least one pregnancy, whereas the majority (81.0%, n = 180) conceived without assisted reproductive intervention.

Among women who underwent infertility treatment (n = 42), (IVF) was the most frequently used modality. reported 27 participants (64.0%). Ovulation induction was used by 13 participants (31.0%), while other treatment modalities accounted for 2 cases (5.0%).



(a) **(b)**

Figure 8 (a-b): (a)Use of Infertility Treatment (b) Type of Infertility Treatment among study participation

Interpretation: Figures 8(a) and 8(b) indicate that infertility treatment was utilized by a minority of participants; however, IVF emerged as the predominant assisted reproductive technique among women requiring fertility support, suggesting a greater reliance on advanced reproductive technologies within this cohort.

4.6 Distribution of Prevalence condition among study participation

Among the 222 study participants, Gestational Diabetes Mellitus (GDM) was the most common maternal complication, affecting 49 women (22.0%), followed by **gestational hypertension** in 42 women (19.0%). **Preeclampsia** was observed in 13 cases (6.0%), whereas **eclampsia** and **HELLP syndrome** were each reported in 10 cases (4.5%).

Overall, hypertensive disorders of pregnancy together with GDM constituted a substantial proportion of maternal complications.

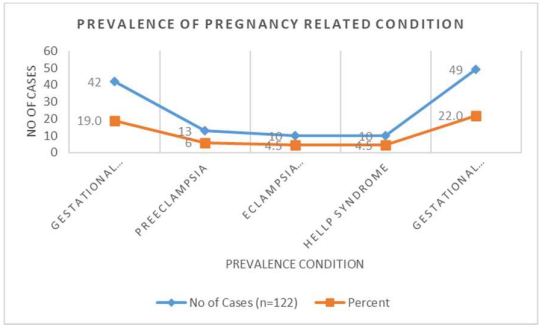


Figure 9: Prevalence condition among study participation Distribution

Interpretation: Figure 9 shows that gestational diabetes mellitus (GDM) and hypertension diseases account for a large burden of metabolic and vascular problems during pregnancy, particularly in women of advanced maternal age or with a high-risk obstetric history.

4.7 Placenta Complication among study participation

Among the 222 participants, the majority (71.2%) reported no placental complications. **Placental abruption** was the most frequently observed placental disorder, occurring in 58 women (26.1%), while **placenta previa** was comparatively uncommon, reported in only 6 cases (2.7%).

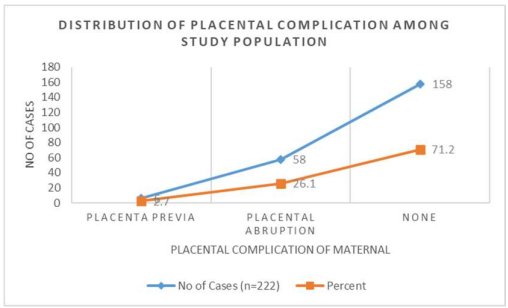


Figure 10: Distribution of Placenta Complication among study participation

Interpretation: Figure 10 demonstrates that although the majority of pregnancies were not associated with placental abnormalities, placental abruption constituted a clinically significant complication in nearly one-fourth of participants, highlighting the need for close antenatal monitoring.

4.8 Mode of Delivery among participation

Among the 222 women studied, emergency cesarean section was the most common mode of delivery, accounting for 52.3% (116 cases). This

was followed by normal vaginal delivery in 25.2% (56 cases) and elective cesarean section in 19.8% (44 cases). Assisted vaginal delivery (forceps or vacuum) was the least common, occurring in 2.7% (6 cases).

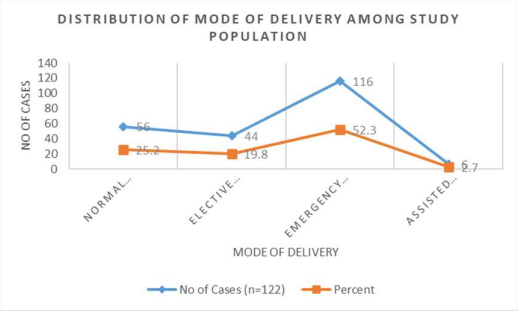


Figure 11: Mode of Delivery among participation Distribution

Interpretation: Figure 11 indicates that the high prevalence of emergency cesarean delivery reflects an increased burden of obstetric complications or intrapartum emergencies requiring urgent surgical intervention within this cohort.

4.9 Postpartum complications (n = 222)

Postpartum complications were observed with varying frequencies among the study participants. extensive care unit (ICU) or high-dependency unit (HDU) admission was the most common consequence, affecting 30 women (13.5%), showing a significant need for extensive postnatal surveillance and critical care assistance.Pregnancy-related acute kidney injury (AKI) was identified in 23 participants (10.4%), reflecting a notable burden of renal morbidity during the postpartum period. Blood transfusion was required in 21 women (9.5%), likely attributable to severe anemia or obstetric blood loss. In contrast, postpartum haemorrhage (PPH) was documented in only 8 women (3.6%), representing the least common postpartum complication observed in the cohort.

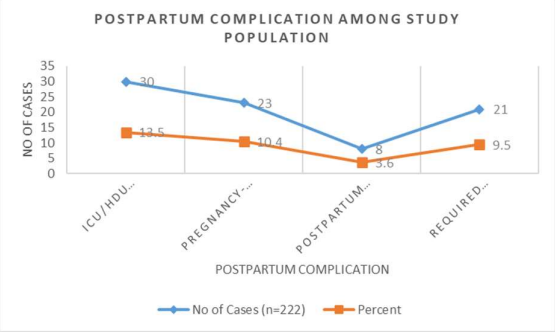


Figure 12: Distribution of Postpartum complications (n = 222)

Interpretation: Figure 12 illustrates that although conventional obstetric complications such as postpartum haemorrhage were relatively infrequent, a considerable proportion of women experienced severe systemic complications necessitating intensive care or supportive interventions. These findings highlight the need for diligent postpartum surveillance and quick treatment of maternal problems, especially in high-risk pregnancies.

Among women evaluated for long-term maternal outcomes, new-onset hypertension following pregnancy emerged as the most prevalent comorbidity, affecting 19 women (8.6%). Ischemic heart disease or myocardial infarction was reported in 10 participants (4.5%), while peripartum cardiomyopathy was identified in 4 women (1.8%). No cases of stroke or transient ischemic attack (TIA) were recorded in the study population. Overall, cardiovascular complications, particularly hypertension, constituted the predominant contributors to long-term maternal morbidity after pregnancy.

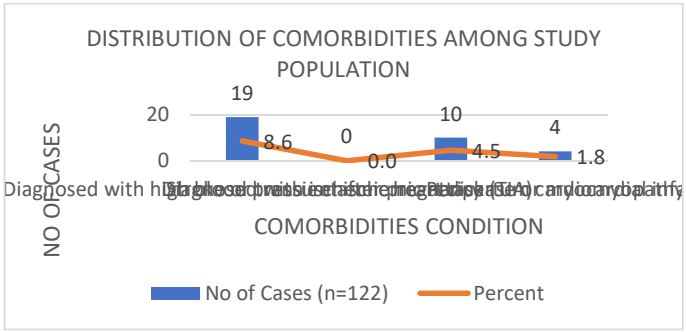


Figure 13: Distribution of comorbidities after pregnancy among participants

Interpretation: Figure 13 illustrates that the predominance of cardiovascular morbidity following pregnancy highlights the need for long-term maternal surveillance, cardiovascular risk stratification, and targeted follow-up among women with high-risk pregnancies.

4.11 Working environment

Most participants reported working fewer than 40 hours per week during pregnancy, with nearly half working <30 hours/week (46.8%). Exposure to night or rotational shifts was uncommon, as 91.9% of participants reported no such work schedules, indicating predominantly regular working patterns.

Perceived occupational stress was generally low to moderate. A moderate stress score (score 3) was most frequently reported (39.2%), whereas only a small proportion of participants reported high stress levels.

Overall, the study population demonstrated relatively stable working conditions during pregnancy, with limited exposure to prolonged working hours, irregular shifts, or severe occupational stress.

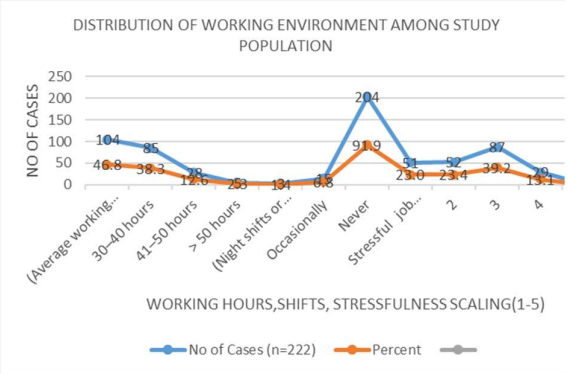


Figure 14: Distribution of Working Environment among participants

Interpretation: Figure 14 shows that the majority of participants experienced comparatively favourable occupational conditions during pregnancy, which may have minimized workplace-related stressors and their potential contribution to adverse pregnancy outcomes.

4.12 Lifestyle Habits of the study participants (n = 222)

Unhealthy lifestyle habits during pregnancy were relatively uncommon among participants. Only **1.8%** reported smoking, while **0.5%** reported alcohol consumption during pregnancy.

Regarding physical activity, **15.3%** engaged in daily exercise, **27.5%**engaged in exercise 1–2 times per week, while 11.3% exercised 3–4 times per week. Notably, nearly half of the participants (**45.9%**) reported rarely exercising during pregnancy, indicating generally low physical activity levels within the cohort.

Overall, these findings suggest limited engagement in harmful lifestyle behaviours; however, insufficient regular physical activity was observed among a substantial proportion of pregnant women.

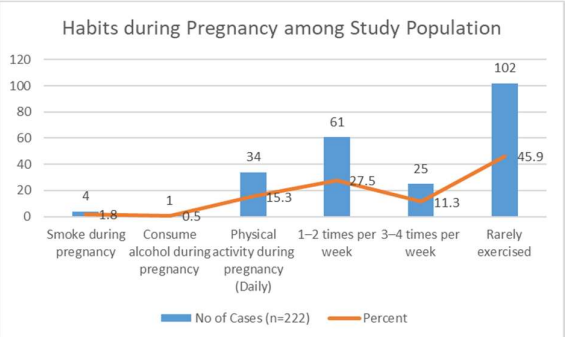


Figure 15: Distribution of Lifestyle during pregnancy among participants

Interpretation: Figure 15 shows that although smoking and alcohol consumption were infrequent, the predominance of low physical activity reflects a relatively sedentary lifestyle during pregnancy within this cohort, which may contribute to adverse maternal metabolic outcomes and pregnancy complications.

4.13 Gestational Age at Birth (n = 222)

Among the 222 participants, the majority of pregnancies resulted in term births (37–41 weeks), accounting for 54.5% of cases. Nevertheless, preterm deliveries (<37 weeks) were observed in 41.0% of pregnancies, indicating a considerable prevalence of early births within the study population. Most newborns had normal birth weight (74.8%), whereas low birth weight (<2500 g) was reported in 23.4% of infants. Macrosomia was relatively uncommon, occurring in only 1.8% of cases.

Furthermore, short for gestational age was detected in 24.3% of pregnancies, indicating a significant burden of fetal growth restriction, but LGA was only found 5.0% of instances. Overall, while normal birth weight, gestational age were the most common outcomes, the cohort had clinically "significant rates of preterm delivery, low birth weight, and fetal growth restriction"

Table 2: Gestational Age of child relates to neonatal birth weight, SGA and LGA among study Population

Child related factors		No of Cases (n=222)	Percent
Gestational age at birth (last pregnancy)	<32 weeks	32	14.4
	32–36 weeks	59	26.6
	37–41 weeks	121	54.5
	≥42 weeks	10	4.5
Baby's birth weight	<2500 g (Low birth weight)	52	23.4
	2500–3999 g	166	74.8
	≥4000 g (Macrosomia)	4	1.8
Baby Small for Gestational Age (SGA) or diagnosed with IUGR	YES	54	24.3
	NO	152	68.5
	NOT SURE	16	7.2
Baby Large for Gestational Age (LGA)	YES	11	5.0
	NO	199	89.6
	NOT SURE	12	5.4

Interpretation: Table 2 indicates that although term delivery and normal birth weight constituted the most common neonatal outcomes, adverse growth parameters and preterm birth remained clinically significant within the study population.

4.14 Child-Related Outcomes (n = 222)

Several adverse neonatal and child-related outcomes were identified among the 222 cases. Neonatal jaundice requiring phototherapy was the

most frequently reported complication, affecting 31.0% of infants. Approximately 23.9% of newborns required resuscitation and/or ventilatory support at birth, indicating a substantial burden of immediate neonatal compromise.

Congenital anomalies present at birth were reported in 7.2% of cases, whereas chromosomal abnormalities, including Down syndrome, were relatively uncommon (1.4%). A history of stillbirth or perinatal death in any pregnancy was reported by 10.4% of participants. Long-term neurodevelopmental issues were documented in a smaller proportion of children (2.3%).

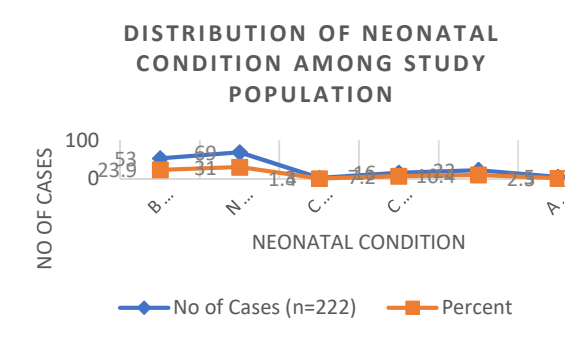


Figure 16: Distribution of child related outcomes among participants

Interpretation: Figure 16 demonstrates a considerable burden of neonatal morbidity, particularly neonatal jaundice and respiratory compromise requiring resuscitation. Although congenital and chromosomal abnormalities were less frequent, the occurrence of perinatal mortality and neurodevelopmental complications underscores the need for comprehensive neonatal monitoring and long-term follow-up.

5.RESULT ANALYSIS OF STUDY POPULATION

5.1 MATERNAL COMPLICATION ASSOCIATION AMONG STUDY POPULATION

5.1.1 Maternal Complications by Maternal Age

The prevalence of pregnancy-related hypertensive and metabolic complications varied across maternal age groups among the 222 participants included in the study.

Gestational hypertension was reported in 42 women (18.9%), with no statistically significant association observed across maternal age groups (P = 0.407), indicating a relatively uniform distribution among the age categories.

Preeclampsia was identified in 13 participants (5.9%) and demonstrated a statistically significant association with maternal age (P < 0.02). The condition was predominantly observed among women aged 30–34 years (n = 9) and ≥35 years (n = 4), whereas no cases were reported among women aged 21–29 years.

Similarly, eclampsia was documented in 10 cases (4.5%) and showed significant variation across maternal age groups (P < 0.04), with the majority of cases occurring among mothers aged 30–34 years.

HELLP syndrome was observed in 10 participants (4.5%); however, no statistically significant association with maternal age was identified (P = 0.083).

Gestational diabetes mellitus (GDM) was the most prevalent maternal complication, affecting 49 women (22.1%), and demonstrated a strong statistically significant association with maternal age (P < 0.005), with the highest prevalence observed among women aged 30–34 years.

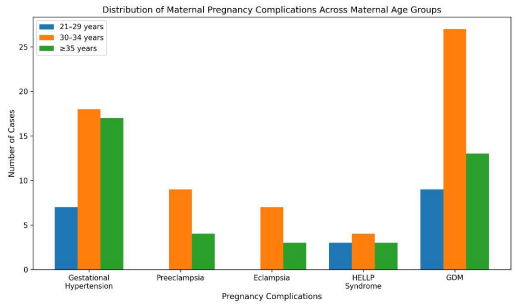


Figure 17: Distribution of maternal complications across the three maternal age groups.

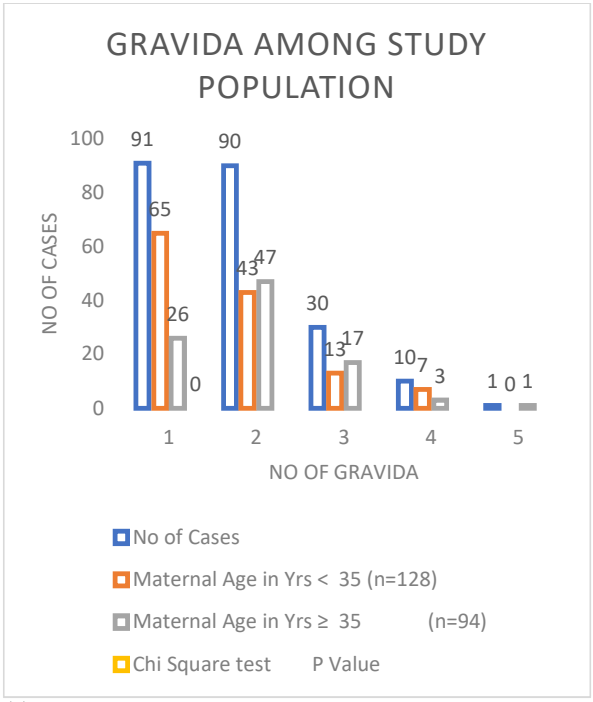
Interpretation: Figure 17 suggests that advancing maternal age is associated with an increased susceptibility to hypertensive and metabolic pregnancy complications, particularly preeclampsia, eclampsia, and gestational diabetes mellitus.

5.1.2 Association of Maternal Factors by Maternal Age (<35 years and >35years)

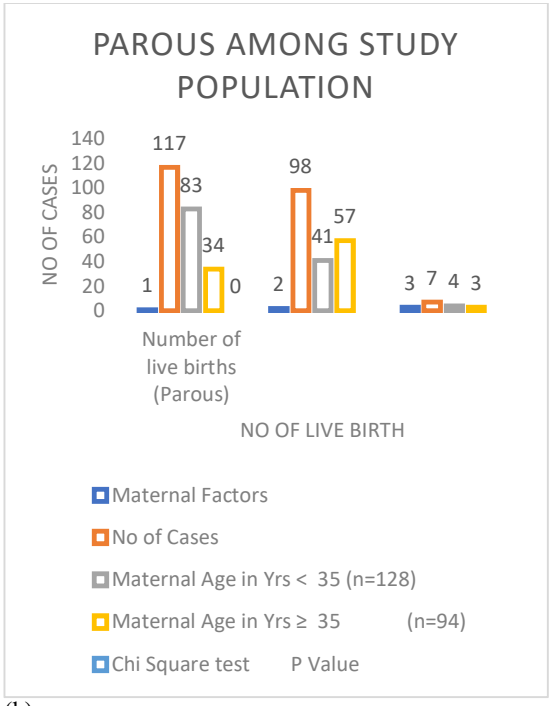
The analysis of maternal reproductive characteristics revealed significant differences according to maternal age category, particularly among women aged ≥35 years. Gravidity was considerably associated with maternal age (P = 0.004), with women in the advanced maternal age group demonstrating a higher prevalence of multigravidity (≥2 pregnancies), suggesting greater cumulative reproductive exposure over time. Similarly, parity showed a highly significant

association with maternal age (P < 0.001), as women aged ≥35 years were more likely to have higher parity (≥2 live births), whereas younger women (<35 years) were predominantly primiparous or had lower parity.

In contrast, no statistically significant association was observed between maternal age and history of miscarriage (P = 0.414), indicating a comparable prevalence of prior abortions across both age groups. Likewise, the occurrence of ectopic pregnancies did not differ significantly by maternal age (P = 0.104), although slightly higher frequencies were noted among older women. This lack of significance may be attributable to the relatively low number of ectopic pregnancy cases in the study population.



(a)



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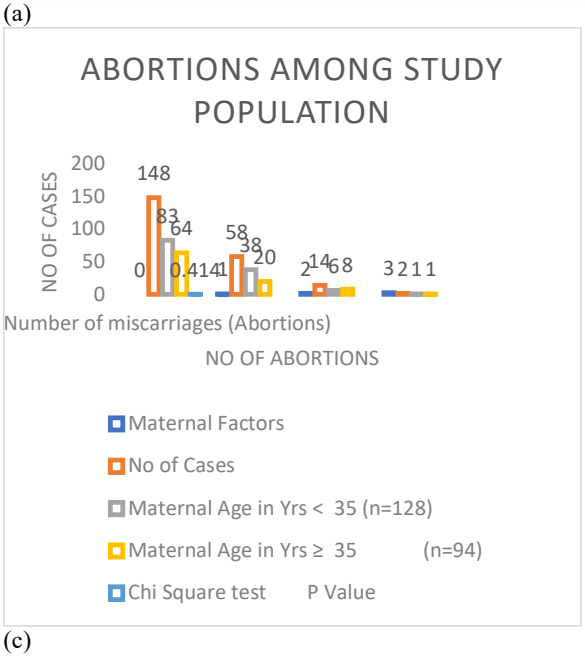

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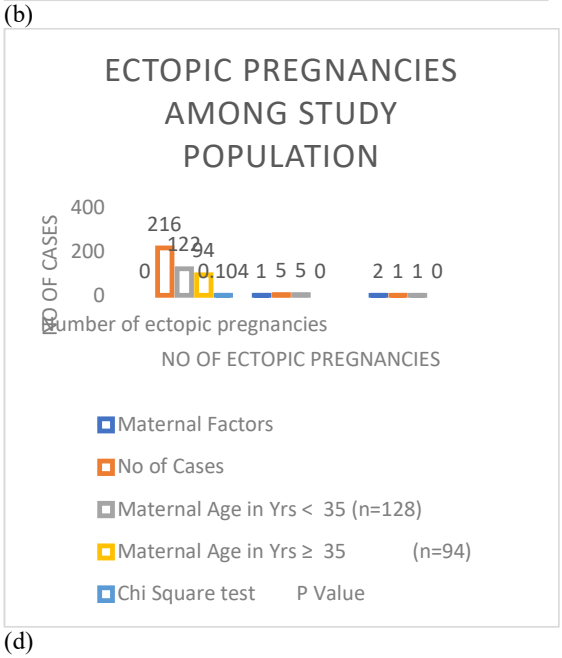


(d)

Figure 18. Distribution of maternal factors by maternal age group: (a) Gravidity, (b) Parity, (c) Abortion history, and (d) Ectopic pregnancies. Values above bars indicate number of cases. P-values derived from Chi-square test

Interpretation: Figure 18(a–d) demonstrates that advanced maternal age is significantly associated with increased gravidity and parity, reflecting accumulated reproductive experience among older

mothers. However, maternal age does not appear to significantly influence the prevalence of previous miscarriage or ectopic pregnancy in this cohort.

5.1.3 Placental Complications by Maternal Age

Analysis of placental complications demonstrated a significant association with advanced maternal age (≥35 years).

Placentaprevia:
All reported cases occurred exclusively among women aged ≥35 years, with no cases identified in women aged <35 years, indicating a strong age-related predisposition (**P < 0.005**).

Placentalabruption:
A substantially higher frequency was observed among women aged ≥35 years (n = 38) compared with those aged <35 years (n = 20). This difference was highly statistically significant (**P < 0.001**), suggesting increased placental risk with advancing maternal age.

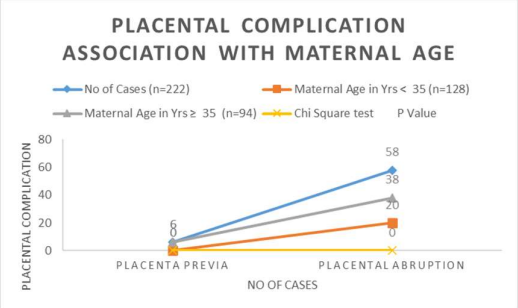


Figure 19: Association between placental complications and maternal age (<35 years vs ≥35 years)

Interpretation: Figure 19 reinforces the association between advanced maternal age and an increased risk of placental complications, particularly placenta previa and placental abruption.

5.1.4 Working Environment During Pregnancy

The analysis of occupational characteristics during pregnancy revealed significant associations between maternal age and workplace exposure variables, particularly regarding working hours and shift patterns.

Average working hours per week:
A statistically significant association was observed between maternal age and weekly working hours (P < 0.02). Women aged ≥35 years were more likely to report longer working durations (30–50 hours/week), whereas women aged 21–29 years were predominantly represented in the <30 hours/week category.

Night or rotating shifts:
Exposure to night or rotating shifts also showed a statistically significant association with maternal age (P < 0.05). Although most participants reported no shift work exposure, women aged 30–34 years and ≥35 years demonstrated relatively higher proportions of occasional shift work.

Perceived job stress during pregnancy:
No statistically significant association was observed between maternal age and perceived occupational stress levels (P = 0.318). Stress scores were similarly distributed across age groups, with the majority reporting moderate stress levels (scores 2–3 on a 5-point scale).

Table 3: Association of working environment factors with maternal condition during pregnancy.

Working environment		No of Cases (n=122)	Maternal Age in Yrs			Chi Square test P Value
			21 - 29 (n=53)	30 - 34 (n=75)	≥ 35 (n=94)	
Average working hours per week during pregnancy	<30 hours	104	32	37	35	P<0.02
	30–40 hours	85	18	29	38	
	41–50 hours	28	1	8	19	
	> 50 hours	5	2	1	2	
Night shifts or rotating shifts during pregnancy	Frequently	3	1	1	1	P<0.05
	Occasionally	15	0	10	5	
	Never	204	52	64	88	
Stressful job during pregnancy Linear scale (1–5):	1	51	11	18	22	0.318
	2	52	17	13	22	
	3	87	21	34	32	
	4	29	3	10	16	
	5	3	1	0	2	

Interpretation: Table 3 suggests that older pregnant women are more likely to experience greater occupational demands in terms of workload and shift exposure; however, perceived occupational stress appears to be comparable across maternal age groups.

5.1.5 Association of Lifestyle Habits with Maternal Condition

Lifestyle-related behaviours during pregnancy demonstrated limited variation across maternal age groups.

Smoking:
Smoking prevalence was low overall, reported in only 4 participants. However, smoking demonstrated a statistically significant association with maternal age (**P < 0.047**). Most smoking cases were observed among women aged 21–29 years (n = 3), while no cases were reported in the 30–34 years group, and only one case was identified among women aged ≥35 years.

Alcohol consumption:
Alcohol consumption was negligible, with only one reported case in the study population. No statistically significant association was observed between alcohol use and maternal age (**P = 0.202**).

Physical activity during pregnancy:
Physical activity patterns were broadly comparable across maternal age groups, with no statistically significant association identified between maternal age and exercise frequency (**P = 0.075**). However, women aged ≥35 years showed relatively higher representation in the daily exercise category (n = 22) compared with younger age groups.

Across all age categories, the majority of participants reported low or irregular exercise frequency, with the **"rarely exercised"** category accounting for the largest proportion.

Table 4: Distribution of Lifestyle habits during pregnancy across Maternal age groups

Habits during pregnancy	No of Cases (n=222)	Maternal Age in Yrs			Chi Square Test P-values
		21-29 Yrs (n = 53)	30-34 Yrs (n = 75)	>= 35 Yrs (n = 94)	
Smoking	4	3	0	1	P< 0.047
Consume alcohol	1	1	0	0	0.202
Physical activity	No of Cases	Maternal Age in Yrs			Chi Square
during pregnancy	(n=222)	21 – 29 Yrs (n = 53)	30 – 34 Yrs (n = 75)	>= 35 Yrs (n = 94)	Test P-values
Daily	34	6	6	22	0.075
1–2 times per week	61	17	22	22	
3–4 times per week	25	6	6	13	
Rarely exercised	102	24	41	37	

Interpretation: Table 4 illustrates that lifestyle habits during pregnancy were largely comparable across maternal age categories, with smoking representing the only lifestyle factor significantly associated with maternal age.

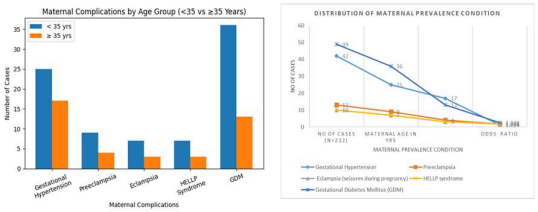
5.1.6 Comparing maternal complications between women aged <35 years and ≥35 years

Among the 222 study participants, maternal complications demonstrated differential prevalence between women aged <35 years and ≥35 years, with advanced maternal age showing stronger associations with several adverse pregnancy outcomes.

Gestational diabetes mellitus (GDM) was the most common maternal complication, affecting 49 women overall. Although the absolute number of cases was higher among women aged <35 years (n = 36) compared with women aged ≥35 years (n = 13), the calculated odds ratio indicated a stronger relative risk association with advanced maternal age (**OR = 2.438**).

Gestational hypertension was reported in 42 participants and showed a relatively similar distribution between women aged <35 years (n = 25) and ≥35 years (n = 17), indicating only a modest association with maternal age (**OR = 1.099**).

Preeclampsia, observed in 13 women, and both **eclampsia** and **HELLP syndrome**, each documented in 10 participants, demonstrated elevated odds ratios ranging from **1.702 to 1.755**, indicating an increased likelihood of severe hypertensive disorders among women of advanced maternal age.



(a) (b)

Figure 20(a) & (b): **Prevalence of major pregnancy-related complications among women aged <35 years and ≥35 years**

Interpretation: Collectively, the findings presented in Figure 20(a) and 25(b) indicate that women aged ≥35 years have a higher likelihood of developing major pregnancy-related complications, particularly gestational diabetes mellitus and hypertensive disorders, compared with younger women. These results highlight advanced maternal age as an important risk factor for adverse maternal outcomes and underscore the need for intensified antenatal monitoring, early risk stratification, and timely clinical interventions in this high-risk population.

5.1.7 Association of Postpartum Complications with Maternal Age

Postpartum complications demonstrated variable associations with maternal age among the 222 study participants.

ICU/HDU admission: ICU or HDU admission was reported in 30 women, with slightly higher occurrence among mothers aged <35 years (n = 21) compared with those aged ≥35 years (n = 9). However, this association was not statistically significant (P = 0.141).

Pregnancy-related acute kidney injury (AKI): AKI was identified in 23 participants and demonstrated a highly significant association with maternal age (P < 0.001). The majority of AKI cases occurred among women aged ≥35 years (n = 18), compared with only 5 cases among women aged <35 years.

Postpartum haemorrhage (PPH): PPH was documented in 8 women and was predominantly observed among older mothers, with 7 cases occurring in the ≥35 years group compared with only 1 case among women aged <35 years. This association was statistically significant (P < 0.01).

Blood transfusion requirement: Blood transfusion was required in 21 participants, with a similar distribution between women aged <35 years (n = 11) and ≥35 years (n = 10), indicating no statistically significant association with maternal age (P = 0.607).

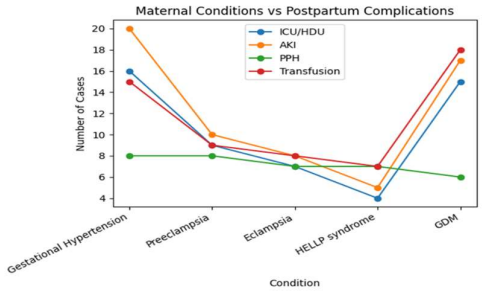


Figure 21: Distribution of postpartum complications according to maternal age categories (<35 and ≥35 years).

Interpretation: The findings presented in Figure 21 indicate that advanced maternal age is significantly associated with an increased risk of severe postpartum complications, particularly acute kidney injury and postpartum haemorrhage. These results suggest that women aged ≥35 years may be more vulnerable to adverse postnatal outcomes, highlighting the importance of close postpartum monitoring and timely management in this high-risk group.

5.1.8 **Association of chronic hypertension after pregnancy with maternal age**

Among the 19 women diagnosed with chronic hypertension following pregnancy, a statistically significant association was observed between prior gestational hypertension and maternal age (**P < 0.05**).

Among women with a history of gestational hypertension, the majority of chronic hypertension cases occurred in the advanced maternal age group (≥35 years), accounting for 11 of 13 cases. In comparison, only one case each was reported among women aged 21–29 years and 30–34 years.

Among women without gestational hypertension, chronic hypertension was more frequently observed in the 30–34 years age group (n = 5), whereas only one case was recorded among women aged ≥35 years, and no cases were identified in women aged 21–29 years.

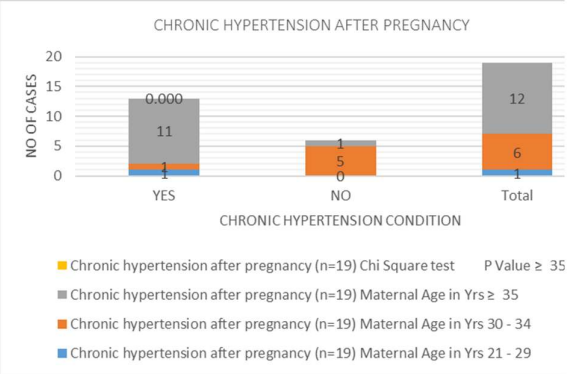


Figure 22: Stacked bar chart illustrating the distribution of chronic hypertension after pregnancy across maternal age groups stratified by history of gestational hypertension.

Interpretation: The findings presented in Figure 22 suggest that women aged ≥35 years with a prior history of gestational hypertension are at a significantly increased risk of developing chronic hypertension following pregnancy. This highlights the potential long-term cardiovascular implications associated with advanced maternal age and emphasizes the importance of extended postpartum follow-up, regular blood pressure monitoring, and early preventive cardiovascular care in this high-risk subgroup.

5.2 NEONATAL CONDITION BASED ON MATERNAL CONDITION

5.2.1 Baby's birth weight across maternal age groups

Among the 222 neonates included in the study, the majority (**74.8%**) had **normal birth weight (2500–3999 g)** across all maternal age groups.

Low birth weight (<2500 g) was observed in 52 neonates (23.4%), with relatively higher frequencies among mothers aged 30–34 years and ≥35 years compared with the youngest maternal age group (21–29 years).

Macrosomia (≥4000 g) was uncommon, reported in only 4 neonates, all of whom were born to mothers aged 30 years and above.

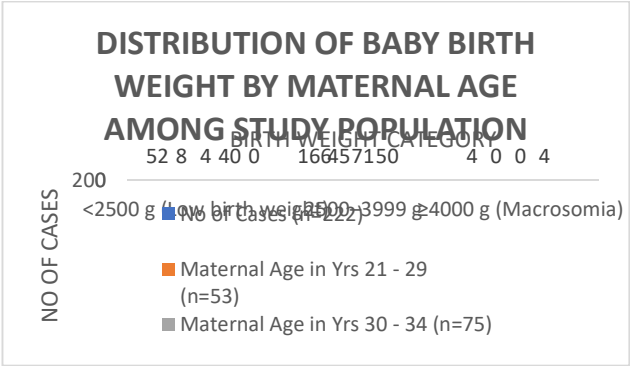


Figure 23: Distribution of baby's birth weight across maternal age groups.

Interpretation: Figure 23 illustrates that, despite minor variations observed across maternal age groups, no statistically significant association was identified between maternal age and neonatal birth weight distribution (Chi-square test, P = 0.181). These findings indicate relatively consistent birth weight patterns across maternal age categories within the study population.

5.2.2 Gestational Age at Birth by Maternal Age

The association between gestational age at birth and maternal age demonstrated statistically significant differences in pregnancy outcomes.

Extremely preterm births (<32 weeks) and **late preterm births (32–36 weeks)** were significantly more frequent among women aged ≥35 years compared with younger maternal age groups (**P < 0.001**). The majority of extremely preterm deliveries occurred in the advanced maternal age group, suggesting increased susceptibility to early delivery complications.

Post-term births (≥42 weeks), although less frequent overall, were also predominantly observed among women aged ≥35 years and showed a statistically significant association with maternal age (**P < 0.001**).

In contrast, **term deliveries (37–41 weeks)** represented the largest proportion of births across all maternal age groups and demonstrated no statistically significant difference between groups (**P = 0.779**).

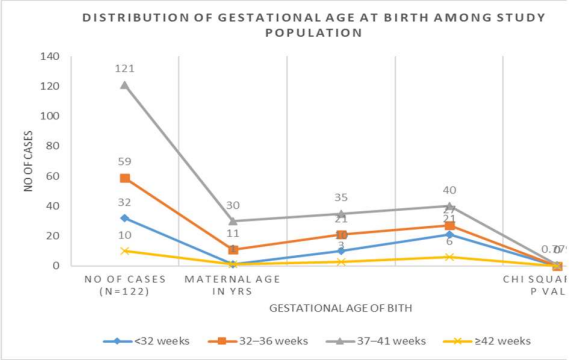


Figure 24: Distribution of Gestational Age among Maternal Age group

Interpretation: The findings presented in Figure 24 suggest that advanced maternal age is significantly associated with an increased risk of both preterm and post-term delivery. This indicates that women aged ≥35 years may be more susceptible to deviations from optimal gestational age at birth, thereby emphasizing the need for closer antenatal surveillance and timely obstetric management in this high-risk group.

5.2.3 Small for Gestational Age (SGA)/IUGR by Maternal Age

Among the 222 pregnancies analysed, 54 neonates (24.3%) were diagnosed with **small for gestational age (SGA)** or **intrauterine growth restriction (IUGR)**, whereas 152 pregnancies (68.5%) had no reported fetal growth restriction.

A statistically significant association was observed between maternal age and occurrence of SGA/IUGR (**Chi-square test, P < 0.001**).

In the 21–29 years age group (n = 53), 15 cases of SGA/IUGR were identified. The highest frequency was observed among women aged 30–34 years (n = 21), followed by mothers aged ≥35 years (n = 18).

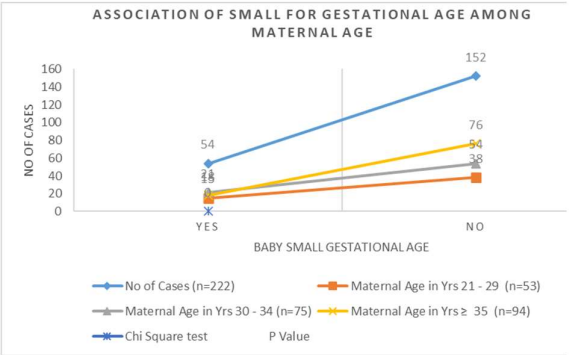


Figure 25: Distribution of small for gestational age/intrauterine growth restriction across maternal age groups.

Interpretation: Figure 25 illustrates that although the highest absolute number of SGA/IUGR cases was observed among women aged 30–34 years, maternal age overall demonstrated a statistically significant association with fetal growth restriction outcomes. These findings suggest that advancing maternal age may influence the risk of impaired fetal growth and highlight the importance of close antenatal fetal growth surveillance and timely obstetric intervention in pregnancies involving older mothers.

5.2.4 Large for Gestational Age (LGA) by Maternal Age

A total of 11 pregnancies (5.0%) were classified as **large for gestational age (LGA)**, while the majority of pregnancies (n = 199; 89.6%) had no LGA diagnosis.

Maternal age demonstrated a statistically significant association with LGA occurrence (**Chi-square test, P < 0.001**).

Only one case of LGA was observed among mothers aged 21–29 years, compared with 3 cases in the 30–34 years group. The highest frequency was identified among mothers aged ≥35 years, accounting for 7 cases.

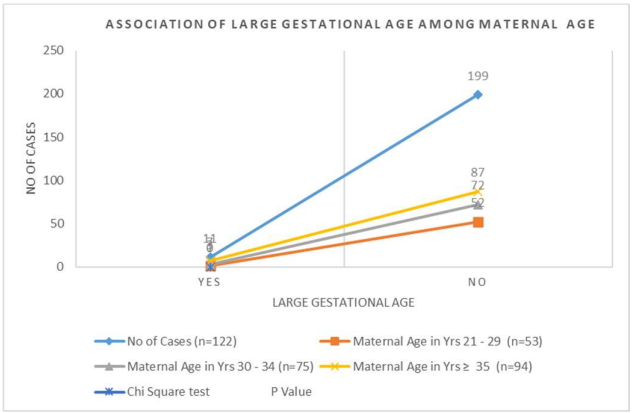


Figure 26: Distribution of Large Gestational Age among Maternal Age group

Interpretation: The findings presented in Figure 26 suggest that advancing maternal age may be associated with an increased risk of fetal overgrowth. This relationship may potentially reflect age-related metabolic alterations, including a higher prevalence of gestational diabetes mellitus and impaired glucose regulation among older pregnant women. These findings emphasize the importance of metabolic monitoring and appropriate fetal growth assessment in pregnancies complicated by advanced maternal age.

5.2.5 NICU Admission by Maternal Age

Among the 222 neonates studied, **42.3%** required admission to the **neonatal intensive care unit (NICU)**.

NICU admissions were most frequently observed among neonates born to mothers aged 30–34 years, followed by those born to mothers aged ≥35 years, whereas the lowest admission rates were observed in the 21–29 years age group.

A statistically significant association was identified between maternal age and NICU admission (**P < 0.026**), indicating that increasing maternal age is associated with greater neonatal intensive care requirements.

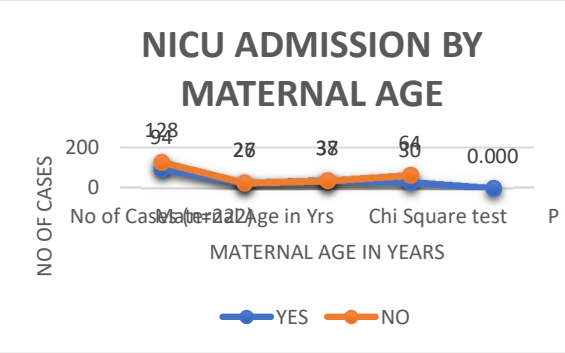


Figure 28: NICU admissions by maternal age group

Interpretation: The findings presented in Figure 28 highlight the importance of enhanced antenatal risk stratification and close perinatal monitoring in pregnancies among women aged ≥30 years to minimize adverse neonatal outcomes and reduce the likelihood of neonatal intensive care unit (NICU) admission.

5.2.6 Child-Related Complications Among Study Participants

Among the 222 pregnancies assessed, neonatal jaundice requiring phototherapy was the most frequently reported child-related complication, affecting 69 neonates, indicating a substantial burden of early neonatal morbidity.

A total of 53 neonates required resuscitation or ventilatory support at birth, reflecting a considerable proportion of infants experiencing immediate postnatal distress requiring critical neonatal intervention.

Stillbirth or perinatal death was reported in 23 pregnancies, representing an important adverse perinatal outcome.

Congenital anomalies at birth were identified in 16 neonates, including structural abnormalities such as congenital heart defects and limb anomalies.

Chromosomal abnormalities, including conditions such as Down syndrome, were relatively uncommon and diagnosed in only 3 cases.

Long-term neurodevelopmental issues were reported in 5 children, indicating a smaller but clinically relevant burden of persistent developmental complications.

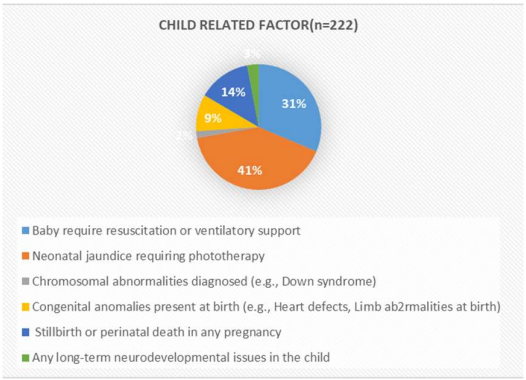


Figure 29: Distribution of child-related complications among study participants

Interpretation: Collectively, the findings presented in Figure 29 demonstrate a considerable burden of both immediate and longer-term neonatal complications. These results underscore the importance of comprehensive neonatal surveillance, timely paediatric intervention, and structured long-term follow-up to facilitate early identification and management of adverse developmental or clinical outcomes.

CONCLUSION

This study demonstrated a marked association between advanced maternal age (≥35 years) and an increased risk of adverse maternal and infant morbidity. Women of advanced maternal age exhibited a higher prevalence of pregnancy-related complications, notably hypertensive disorders such as preeclampsia, eclampsia, and chronic hypertension following pregnancy, in addition to severe postpartum complications including pregnancy-related acute kidney injury and postpartum haemorrhage.

Advanced maternal age was further associated with unfavourable obstetric outcomes, including placental complications, both preterm and post-term delivery, and abnormal fetal growth patterns. Neonates born to older mothers showed increased rates of small for gestational age/intrauterine growth restriction, large for gestational age, neonatal intensive care unit admission, and the need for resuscitation or ventilatory support at birth.

Among neonatal morbidities, jaundice requiring phototherapy was the most frequently observed complication, followed by respiratory support requirements. Although less common, stillbirth, congenital anomalies, chromosomal abnormalities, and long-term neurodevelopmental complications represented clinically significant adverse neonatal outcomes.

Overall, maternal age remains an important determinant of pregnancy risk and perinatal outcome. These findings emphasize the need for enhanced antenatal surveillance, individualized obstetric management, and structured postpartum follow-up for women of advanced maternal age to minimize maternal morbidity and optimize neonatal health outcomes.

FUTURE SCOPE AND ENHANCEMENT

Future research can extend the present findings by integrating advanced computational approaches, particularly deep learning algorithms, to develop predictive models for individualized cardiovascular disease (CVD) as risk. Since this study found a substantial link between advanced maternal age, hypertensive disorders of pregnancy, gestational diabetes mellitus, and postpartum chronic hypertension; these factors might be used as clinically meaningful predictors in machine learning-based risk stratification models.

A deep learning model, hybrid ensemble architecture, could be trained using maternal demographic characteristics, obstetric history, biochemical markers, pregnancy complications, delivery outcomes, and postpartum clinical parameters to predict long-term cardiovascular risk. Incorporating longitudinal follow-up data would further improve temporal risk prediction and enable dynamic patient-specific forecasting.

Such predictive systems could support early identification of high-risk women, facilitate personalized postpartum surveillance, and guide preventive interventions, including blood pressure monitoring, lifestyle modification, and cardiometabolic screening. In clinical settings, integrating these models into electronic health record systems may enhance decision support for obstetricians and cardiologists, thereby improving long-term maternal cardiovascular outcomes. Future multicentre studies with larger and more diverse datasets are recommended to validate model performance, improve generalizability, and support translation into routine clinical practice.

Declarations:
Conflicts of interest: There is no any conflict of interest associated with this study
Consent to participate: We have consent to participate.
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