*Biological and Clinical Sciences Research Journal*
*eISSN: 2708-2261; pISSN: 2958-4728*
www.bcsrj.com
DOI: https://doi.org/10.54112/bcsrj.v2024i1.1177
*Biol. Clin. Sci. Res. J., Volume,* ***2024****: 1177*
***Original Research Article***

# EVALUATING PERINATAL OUTCOMES IN HIGH-RISK PREGNANCIES USING THE MODIFIED COOPLAND'S SCORING SYSTEM AT A TERTIARY HOSPITAL

**MARYAM B[1], YASMEEN H[1], ALAM F[2], ALAM S[3], MANAF A[*4], ASIF M[5], SOHAIL A[6], KHAN M[5], HUSSAIN Z[7], MUSTAFA A[8], AHMED I[5]**

[1]*Department of Obstetrics and Gynaecology, Jinnah Postgraduate Medical Center Karachi, Pakistan*
[2]*Department of Department of Obstetrics and Gynaecology, Bolan Medical Complex Hospital Quetta, Pakistan*
[3]*Department of Pediatric Medicine, Sandeman Provincial Hospital Quetta, Pakistan, Pakistan*
[4]*Sandeman Provincial Hospital Quetta, Pakistan*
[5]*Department of Cardiology, Armed Forces Institute of Cardiology Rawalpindi, Pakistan*
[6]*Department of Medicine, King Edward Medical University Lahore, Pakistan*
[7]*Department of Cardiology, National Institute of Cardiovascular Diseases Karachi, Pakistan*
[8]*Bolan University of Medical & Health Sciences Quetta, Pakistan*
**Corresponding author`s email address:* manafkurd333@gmail.com

*(Received, 24th June 2024, Revised 25th September 2024, Published 3rd October 2024)*

**Abstract:** *This study aims to thoroughly assess perinatal mortality rates, Apgar scores, birth weights, and neonatal complications within the first-week post-birth among high-risk pregnancies.* ***Methods:*** *During a prospective cohort study at Jinnah Postgraduate Medical Centre, Karachi, from October 2023 to May 2024, we evaluated outcomes in 664 high-risk pregnant women using systematic random sampling. Participants, with singleton pregnancies of 24 weeks or more gestation, were stratified by risk level. Data included demographic details, socioeconomic status, BMI, and pregnancy history. Maternal outcomes, such as mode of delivery and postpartum haemorrhage requiring transfusion, and perinatal outcomes, including birth weight and APGAR scores, were assessed. Statistical analysis emphasized odds ratios, with* $p < 0.05$ *considered significant. Ethical approval was obtained, and all participants provided informed consent.* ***Results:*** *This prospective cohort study at Jinnah Postgraduate Medical Centre from October 2023 to May 2024 involved 664 high-risk pregnant women categorized by standard risk scoring. Participants were predominantly low-risk (65.77%), followed by moderate-risk (19.88%) and high-risk (14.35%). Key findings included increased rates of cesarean sections, postpartum haemorrhage, premature births, low birth weight, adverse APGAR scores, NICU admissions, and perinatal mortality with escalating risk levels. Statistical analyses revealed significant associations and elevated odds ratios for adverse outcomes among higher-risk groups, underscoring the importance of risk assessment in managing maternal and perinatal health outcomes.* ***Conclusion:*** *Our study highlights the urgent importance of identifying and effectively managing high-risk pregnancies. We discovered that these pregnancies are associated with significantly elevated risks of complications such as Cesarean deliveries, postpartum haemorrhage, preterm births, low birth weights, low 5-minute APGAR scores, NICU admissions, and perinatal mortality. Implementing a straightforward, non-invasive risk-scoring system can facilitate early detection of high-risk cases, enabling timely and tailored interventions that can greatly improve outcomes for both mothers and infants.*

**Keywords:** High-risk pregnancy, perinatal outcomes, Cooplan's Scoring System, PPH, Cesarean Deliveries, Low birth weight, Apgar score

## Introduction

High-risk pregnancy (HRP) is characterized by the presence of conditions or disorders that threaten the well-being or life of the mother, fetus, or newborn (1). These complications may predate pregnancy or arise uniquely during gestation. Globally, HRPs pose a significant challenge, particularly in developing countries where healthcare resources are often limited (2-3).

In Pakistan, the situation is particularly grave. The country suffers from alarmingly high rates of neonatal deaths, with 42 per 1,000 live births, and stillbirths, at 31 per 1,000 total births. Only a few other nations have higher rates (4-6). Moreover, Pakistan's maternal mortality ratio, at 186 maternal deaths per 100,000 live births, is over twice the target set by the 2030 Sustainable Development Goals, which aims to reduce this ratio to below 70 per 100,000. These statistics underscore the critical need for better maternal and newborn care in Pakistan, where most of these deaths could be prevented. The challenge is particularly acute in remote areas, where access to health facilities, skilled birth attendants, and both antenatal and postnatal care are severely limited (7).

Identification and management of HRPs are crucial to improving perinatal outcomes. Despite representing only 20-25% of all pregnancies, HRPs account for 70—80% of perinatal mortality and morbidity (8) this disproportionate impact highlights the importance of early identification and intervention. Obstetric risk scoring systems, such as the one proposed by Coopland et al., provide a systematic approach to recognizing and documenting antepartum and intrapartum risk factors. Healthcare providers are being enabled by such systems to predict and manage potential complications more efficiently (9-10).

[Citation Maryam, B., Yasmeen, H., Alam, F., Alam, S., Manaf, A., Asif, M., Sohail, A., Khan, M., Hussain, Z., Mustafa, A., Ahmed., I .(2024). Evaluating perinatal outcomes in high-risk pregnancies using the modified coopland's scoring system at a tertiary hospital. *Biol. Clin. Sci. Res. J.*, **2024**: *1177*. doi: https://doi.org/10.54112/bcsrj.v2024i1.1177

In this study, we made use of the Modified Coopland's scoring system to pinpoint high-risk pregnancies and correlate the risk levels with perinatal outcomes. Factors from previous obstetric history, the current pregnancy, and any persistent medical or surgical conditions are being employed by this system, assigning a score based on the associated risk.

Identification of HRPs in time allows for better distribution of medical resources, ensuring that high-risk cases receive compulsory care and interventions. This approach not only optimizes maternal and fetal outcomes but also enhances the efficiency of the healthcare system by reserving intensive resources for those most in need (11-12).

Our study underlines the critical role of a well-defined risk-scoring system in effectively managing high-risk pregnancies. By enabling early identification and timely intervention, these systems have the potential to substantially decrease perinatal complications and deaths. This research aims to deepen our knowledge of managing high-risk pregnancies and offers valuable insights to shape policies and practices aimed at enhancing maternal and neonatal health outcomes, particularly in resource-constrained environments like Pakistan.

This study aims to thoroughly assess perinatal mortality rates, Apgar scores, birth weights, and neonatal complications within the first-week post-birth among high-risk pregnancies.

## Methodology

During our prospective cohort study at the Obstetrics/Gynecology Unit of Jinnah Postgraduate Medical Institute Karachi from October 2023 to May 2024, we focused on evaluating outcomes in high-risk pregnancies. Using OpenEpi, we calculated a sample size of 664 participants with a 99% confidence level. We employed systematic random sampling, enrolling every third willing pregnant woman. Eligible participants were those with singleton pregnancies of 24 weeks or more gestation; primigravida and those declining consent were excluded from the study. Data collection included comprehensive demographic information, socioeconomic status, BMI, and past pregnancy complications. Participants were stratified based on the Modified Coopland's scoring system into low, moderate, and high-risk categories. Follow-up is extended until delivery and seven days postpartum, focusing on maternal outcomes such as mode of delivery and postpartum haemorrhage requiring blood transfusion. Perinatal outcomes assessed included birth weight, prematurity, APGAR scores at 5 minutes, N-ICU admission, and perinatal mortality. Statistical analysis involved descriptive statistics and odds ratios, with significance set at $p < 0.05$. The study received ethical approval, and all participants provided informed consent before enrollment.

## Results

This study comprised 664 participants who were further categorized by their risk levels during pregnancy as per the standard risk scoring system, depicted in Table 1. The majority, 65.77% (437 individuals), were classified as low risk, while 19.88% (132 individuals) were moderate risk, and 14.35% (95 individuals) fell into the high-risk category (Figure 1). On average, participants were around 28.5 years old, with slight variations across risk groups. Socioeconomic status revealed that 69.43% of participants had satisfactory incomes. Regarding BMI, 57.23% fell within the normal range, with smaller proportions classified as overweight (24.25%), obese (11.30%), or underweight (7.22%). Urban residents made up 59.04% of the cohort. Additionally, the table includes data on previous pregnancy complications, such as hypertension (22.89%), gestational diabetes (15.06%), hypothyroidism (9.94%), and depression (8.13%), illustrating their distribution among the different risk groups (Figure 2). In Table-3 shows that the low-risk group experienced a PPH rate of 1.37%, serving as the reference baseline. In contrast, the moderate-risk group showed a higher PPH incidence at 7.58%, resulting in an OR of 5.612 (95% CI=0.905-34.730), although not statistically significant ($p = 0.063$). The high-risk group had the highest PPH rate of 18.95%, with a significantly elevated odds ratio of 18.423 (95% CI 3.646-93.249, $p < 0.0001$), representing a considerable rise in the likelihood of postpartum haemorrhage compared to both lower-risk groups. In perinatal outcomes, we examined the association between risk groups and Premature births (delivery before 37 weeks of gestation), illustrated in Table 4. The low-risk group had a premature birth rate of 12.82%, serving as the reference baseline. The moderate-risk group showed a higher incidence of premature births at 21.21%, resulting in an OR of 1.877 (95% CI=1.102-3.193, $p = 0.020$), indicating a moderate likelihood in contrast to the low-risk group. The high-risk group exhibited the highest preterm birth rate of 34.74% and a significantly elevated odds ratio of 3.947 (95% CI 2.212-7.054, $p < 0.0001$), highlighting a substantial risk increase for preterm birth compared to both lower-risk groups. The low birth weight rate (11.90% in the low-risk group) was used as the reference point. With an OR of 2.520 (95% CI=1.453-4.375, $p = 0.001$), the moderate-risk group had a considerably greater incidence of low birth weight (25.76%), more than twice as likely as the low-risk group. The high-risk group had the highest incidence of low birth weight at 34.74%, and an OR of 4.387 (95% CI=2.310-8.343, $p < 0.0001$), highlighting a substantially elevated risk compared to both lower-risk groups, demonstrated in Table 5 below. We also investigated the correlation between risk groups and the incidence of 5-minute APGAR scores less than 7, which is indicative of neonatal distress, as given in Table 6. The low-risk group had a 5-minute APGAR <7 rate of 10.52%, serving as the baseline reference. The moderate-risk group exhibited a significantly higher incidence at 22.73%, with an OR of 2.528 (95% CI=1.382-4.627, $p = 0.002$), indicating more than a twofold increased probability compared to the low-risk group. Similarly, the high-risk group showed the highest incidence at 29.47%, with an OR of 3.445 (95% CI=1.797-6.613, $p = 0.0002$), highlighting a substantially elevated risk compared to both lower-risk groups. Furthermore, the baseline comparison NICU admission rate for the low-risk group was 9.61%. As opposed to the low-risk group, the moderate-risk group displayed a higher incidence of 21.21% and an OR of 2.641 (95% CI=1.433-4.869, $p = 0.002$), showing a probability that was more than twice as high. With an OR of 3.896 (95% CI=2.006-7.566, $p = 0.0001$), the high-risk category had the highest NICU admission rate at 28.42%, indicating a considerably higher risk than the two lower-risk categories. (Table 7). Finally, we investigated the relationship between risk groups and rates of perinatal death, as shown in Table

[Citation Maryam, B., Yasmeen, H., Alam, F., Alam, S., Manaf, A., Asif, M., Sohail, A., Khan, M., Hussain, Z., Mustafa, A., Ahmed., I .(2024). Evaluating perinatal outcomes in high-risk pregnancies using the modified coopland's scoring system at a tertiary hospital. *Biol. Clin. Sci. Res. J.,* **2024***: 1177*. doi: https://doi.org/10.54112/bcsrj.v2024i1.1177

8. As a baseline comparison, the perinatal mortality rate for the low-risk group was 0.46%. By contrast, the moderate-risk group showed a higher rate of 2.27%, resulting in an OR of 5.056 (95% CI=0.845-30.278, p = 0.080), which, while not statistically significant, suggested a trend towards greater risk in comparison to the low-risk group. With an OR of 11.762 (95% CI=1.728-100.804, p = 0.012) and the highest perinatal death rate of 5.26%, the high-risk group was shown to be at a significantly higher risk than the two lower-risk groups.

**Table 1: Patient Characteristics**

| Variable | Total | Low Risk:(1) | Moderate Risk:(4-6) | High Risk:(≥7) |
|---|---|---|---|---|
| Total Participants | 664 (100%) | 437 (65.77%) | 132 (19.88%) | 95 (14.35%) |
| Age (years), Mean ± SD | 28.5 ± 5.2 | 29.0 ± 5.3 | 28.5 ± 5.0 | 27.8 ± 4.8 |
| **Socioeconomic Status** | | | | |
| Satisfactory Income | 461 (69.43%) | 305 (69.79%) | 92 (69.70%) | 64 (67.37%) |
| Low Income | 203 (30.57%) | 132 (30.21%) | 40 (30.30%) | 31 (32.63%) |
| **BMI-Category (Kg/m$^2$)** | | | | |
| Normal (18.5-24.9) | 380 (57.23%) | 250 (57.24%) | 76 (57.58%) | 54 (56.84%) |
| Overweight (25-29.9) | 161 (24.25%) | 107 (24.51%) | 31 (23.48%) | 23 (24.21%) |
| Obese (>30) | 75 (11.30%) | 48 (10.99%) | 18 (13.64%) | 9 (9.47%) |
| Underweight (<18.4) | 48 (7.22%) | 32 (7.34%) | 7 (5.30%) | 9 (9.47%) |
| **Residence** | | | | |
| Urban | 392 (59.04%) | 258 (59.09%) | 78 (59.09%) | 56 (58.95%) |
| Rural | 272 (40.96%) | 179 (40.91%) | 54 (40.91%) | 39 (41.05%) |
| **Previous Pregnancy-related Complications** | | | | |
| Hypertension | 152 (22.89%) | 96 (21.97%) | 34 (25.76%) | 22 (23.16%) |
| Gestational Diabetes | 100 (15.06%) | 65 (14.88%) | 22 (16.67%) | 13 (13.68%) |
| Hypothyroidism | 66 (9.94%) | 42 (9.62%) | 14 (10.61%) | 10 (10.53%) |
| Depression | 54 (8.13%) | 34 (7.78%) | 12 (9.09%) | 8 (8.42%) |

**Table 2: Association between risk categories and caesarean sections**

| Risk-Group | Value, n | Cesarean Delivery (%) | Odds Ratio | 95% CI | P Value |
|---|---|---|---|---|---|
| Low risk | 437 | 115 (26.31%) | Reference | - | - |
| Moderate risk | 132 | 57 (43.18%) | 2.189 | 1.165-4.106 | 0.015 |
| High risk | 95 | 63 (66.32%) | 5.148 | 2.684-9.872 | <0.0001 |

**Table 3: Association between Risk categories and PPH**

| Risk-Group | Value, n | PPH (%) | Odds Ratio | 95% CI | P Value |
|---|---|---|---|---|---|
| Low risk | 437 | 6 (1.37%) | Reference | -- | -- |
| Moderate risk | 132 | 10 (7.58%) | 5.612 | 0.905-34.730 | 0.063 |
| High risk | 95 | 18 (18.95%) | 18.423 | 3.646-93.249 | <0.0001 |

**Table 4: Association between Risk categories and Premature Births (< 37 weeks of gestation)**

| Risk-Group | Value, n | Preterm Births (%) | Odds Ratio | 95% CI | P Value |
|---|---|---|---|---|---|
| Low risk | 437 | 56 (12.82%) | Reference | - | - |
| Moderate risk | 132 | 28 (21.21%) | 1.877 | 1.102-3.193 | 0.020 |
| High risk | 95 | 33 (34.74%) | 3.947 | 2.212-7.054 | <0.0001 |

**Table 5: Association between Risk categories and Low Weight (<2500 grams)**

| Risk-Group | Value, n | Low Birth Weight (%) | Odds Ratio | 95% CI | P Value |
|---|---|---|---|---|---|
| Low risk | 437 | 52 (11.90%) | Reference | - | - |
| Moderate risk | 132 | 34 (25.76%) | 2.520 | 1.453-4.375 | 0.001 |
| High risk | 95 | 33 (34.74%) | 4.387 | 2.310-8.343 | <0.0001 |

**Table 6: Association with Apgar score at 5 minutes**

| Risk-Group | Value, n | 5-minute APGAR <7 (%) | Odds Ratio | 95% CI | P Value |
|---|---|---|---|---|---|
| Low risk | 437 | 46 (10.52%) | Reference | - | - |
| Moderate risk | 132 | 30 (22.73%) | 2.528 | 1.382-4.627 | 0.002 |
| High risk | 95 | 28 (29.47%) | 3.445 | 1.797-6.613 | 0.0002 |

**Table 7: Risk Categories Correlation with NICU Admissions**

| Risk-Group | Value, n | NICU Admission (%) | Odds Ratio | 95% CI | P Value |
|---|---|---|---|---|---|
| Low risk | 437 | 42 (9.61%) | Reference | - | - |
| Moderate risk | 132 | 28 (21.21%) | 2.641 | 1.433-4.869 | 0.002 |

[Citation Maryam, B., Yasmeen, H., Alam, F., Alam, S., Manaf, A., Asif, M., Sohail, A., Khan, M., Hussain, Z., Mustafa, A., Ahmed., I .(2024). Evaluating perinatal outcomes in high-risk pregnancies using the modified coopland's scoring system at a tertiary hospital. *Biol. Clin. Sci. Res. J.*, **2024**: *1177*. doi: https://doi.org/10.54112/bcsrj.v2024i1.1177

| | | | | | |
|---|---|---|---|---|---|
| High risk | 95 | 27 (28.42%) | 3.896 | 2.006-7.566 | 0.0001 |

**Table 8: Association of Perinatal Mortality with Risk-groups**

| Risk-Group | Value, n | Perinatal Mortality (%) | Odds Ratio | 95% CI | P Value |
|---|---|---|---|---|---|
| Low risk | 437 | 2 (0.46%) | Reference | - | - |
| Moderate risk | 132 | 3 (2.27%) | 5.056 | 0.845-30.278 | 0.080 |
| High risk | 95 | 5 (5.26%) | 11.762 | 1.728-100.804 | 0.012 |

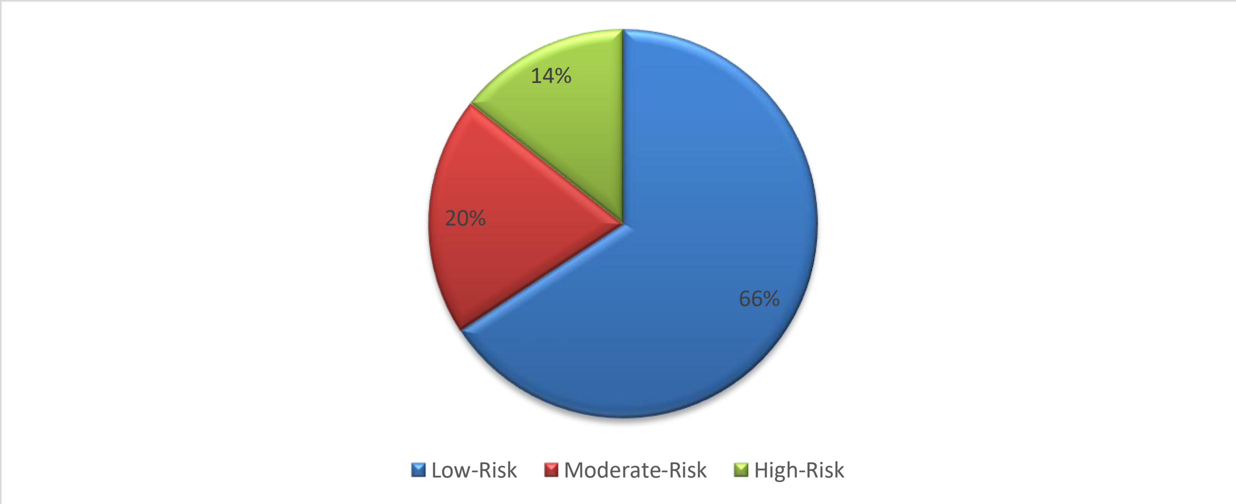


**Figure 1: Risk-Categorization of Pregnancies as per Modified Coopland's Scoring System**

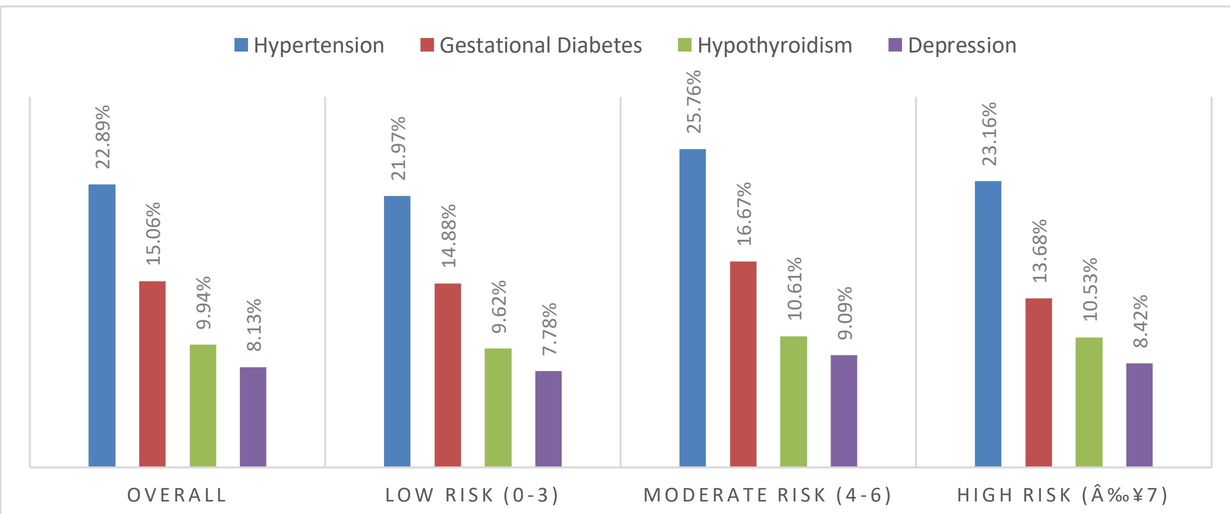


**Figure 2: Distribution of Pregnancy-related Complications in previous Pregnancies**

**Discussion**

High-risk pregnancies necessitate exceptional individualized care and focused attention, as they account for the majority of perinatal mortality and morbidity despite representing a small fraction of the overall population. Our study highlights the critical importance of specialized care for these high-risk cases to mitigate adverse outcomes.

In our study, we identified 95 patients (14.32%) in the high-risk category, similar to the results from Mufti et al. (15%) and Anand et al. (11.5%), though slightly higher than Kaur et al. (9.2%). This consistency shows that our risk-scoring system is reliable for identifying high-risk pregnancies (13-15).

The high-risk group had a significant correlation with adverse maternal outcomes. Specifically, 66.32% of these patients required operative deliveries, and 18.95% experienced PPH. These findings align with Anand et al., who also reported high incidences of operative interventions and PPH in high-risk pregnancies (14). The statistically significant odds ratios of 5.148 for operative deliveries and 18.423 for PPH indicate the elevated risks in this group, highlighting the need for increased medical attention.

We found that 34.74% of high-risk pregnancies resulted in preterm births, with an odds ratio of 3.947, and 34.74% of

[Citation Maryam, B., Yasmeen, H., Alam, F., Alam, S., Manaf, A., Asif, M., Sohail, A., Khan, M., Hussain, Z., Mustafa, A., Ahmed., I .(2024). Evaluating perinatal outcomes in high-risk pregnancies using the modified coopland's scoring system at a tertiary hospital. *Biol. Clin. Sci. Res. J.*, **2024**: *1177*. doi: https://doi.org/10.54112/bcsrj.v2024i1.1177

neonates had low birth weights, with an odds ratio of 4.387. These results are in line with previous research by Mufti et al. and Pillai et al., which also demonstrated strong links between high-risk pregnancies and these adverse outcomes (13-16). Early identification and intervention are crucial for improving neonatal health in high-risk pregnancies.

Babies from high-risk pregnancies had significantly lower 5-minute APGAR scores, with 29.47% scoring less than 7 (OR 3.445), and 28.42% requiring NICU admission (OR 3.896). These findings are supported by studies from Datta et al., Kolluru et al., and Kaur et al., indicating that poor neonatal outcomes are common in high-risk groups (17-18, 15). Effective prenatal care and early intervention can help improve these outcomes and reduce the need for intensive neonatal care.

The mortality rate perinatally in our high-risk group was 5.26% (OR 11.762), significantly higher compared to low and moderate-risk groups. This finding aligns with Coopland et al., who reported a perinatal mortality rate of 112/1000 in high-risk categories.9 although our mortality rate is lower, the trend is consistent, underscoring the importance of specialized care for high-risk pregnancies.

Overall, our findings are aligned with previous literature, which has established a positive correlation between high-risk pregnancies and adverse maternal and perinatal outcomes. Studies by Samiya M., Sundaraka et al., and Seema Thakur et al. further validate our results, highlighting the increased incidence of preterm births, low birth weights, and perinatal mortality in high-risk groups (19-20)

Our study reinforces the importance of identifying high-risk pregnancies early through a simple, non-invasive, and cost-effective numerical scoring system. Through targeted care and timely interventions, we have the opportunity to mitigate adverse outcomes and enhance the health of both mothers and newborns. This proactive approach is particularly vital in resource-constrained settings, where early identification and intervention can markedly improve perinatal outcomes.

**Declarations**

**Data Availability statement**

All data generated or analyzed during the study are included in the manuscript.

**Ethics approval and consent to participate**

Approved by the department concerned. (IRBEC-CHM-33/23)

**Consent for publication**

Approved

**Funding**

Not applicable

**Conflict of interest**

The authors declared the absence of a conflict of interest.

**Author Contribution**

***BIBI MARYAM (FCPS Trainee)***
*Coordination of collaborative efforts.*
*Study Design, Review of Literature.*
***HALEEMA YASMEEN (Professor)***
*Conception of Study, Development of Research Methodology Design, Study Design, Review of manuscript, final approval of manuscript.*
*Conception of Study, Final approval of manuscript.*
***FAIZA ALAM (Resident)***
*Manuscript revisions, critical input.*
*Coordination of collaborative efforts.*
***SAQIBA ALAM (Pediatric Resident)***
*Data acquisition, and analysis.*
*Manuscript drafting.*
***ABDUL MANAF (Medical Officer)***
*Data entry and Data analysis, drafting article.*
***MUHAMMAD ASIF (Interventional cardiology fellow)***
*Data acquisition, and analysis.*
*Coordination of collaborative efforts.*
***AMIR SOHAIL***
*Manuscript revisions, critical input*
*Data entry and Data analysis, drafting article.*
***MASOOD KHAN***
*Methodology Design, Study Design, Review of manuscript, final approval of manuscript.*
*Manuscript revisions, critical input.*
***ZAHID HUSSAIN (Interventional Cardiology Fellow)***
*Study Design, Review of Literature*
***ATTIYA MUSTAFA (BDS Student)*, IFTIKHAR AHMED (Cardiology resident)**
*Data acquisition, and analysis.*
*Manuscript drafting.*

**References**

1. Prajapati AK, Kumar V, Soni K, Singh NP, Jain PK, Ruchi. Prevalence of high-risk pregnancy among pregnant women enrolled under Pradhan Mantri Surakshit Matritva Abhiyan in government health facilities of district Etawah, Uttar Pradesh: A cross-sectional study. J Family Med Prim Care. 2022 May;11(5):1876-1882. doi: 10.4103/jfmpc.jfmpc_1636_21. Epub 2022 May 14. PMID: 35800511; PMCID: PMC9254766.
2. Khan SJ, Asif M, Aslam S, Khan WJ, Hamza SA. Pakistan's Healthcare System: A Review of Major Challenges and the First Comprehensive Universal Health Coverage Initiative. Cureus. 2023 Sep 4;15(9):e44641. doi: 10.7759/cureus.44641. PMID: 37799252; PMCID: PMC10548490.
3. Deen J, Von Seidlein L, Clemens JD. Issues and Challenges of Public-Health Research in Developing Countries. Manson's Tropical Infectious Diseases. 2014:40–48.e1. Doi: 10.1016/B978-0-7020-5101-2.00006-6. Epub 2013 Oct 21. PMCID: PMC7149969.
4. Tharwani ZH, Bilal W, Khan HA, Kumar P, Butt MS, Hamdana AH, Essar MY, Nashwan AJ, Habib Z, Marzo RR. Infant & Child Mortality in Pakistan and its Determinants: A Review. Inquiry. 2023 Jan-Dec;60:469580231167024. doi: 10.1177/00469580231167024. PMID: 37085986; PMCID: PMC10126599.
5. Farrar DS, Pell LG, Muhammad Y, Khan SH, Tanner Z, Bassani DG, et al. (2024) Association of maternal, obstetric, fetal, and neonatal mortality outcomes with Lady Health Worker coverage from a cross-sectional survey of >10,000 households in Gilgit-Baltistan, Pakistan.

PLOS Glob Public Health 4(2): e0002693. https://doi.org/10.1371/journal.pgph.0002693
6. Aziz, A., Saleem, S., Nolen, T.L. et al. Why are Pakistani maternal, fetal and newborn outcomes so poor compared to other low and middle-income countries?. Reprod Health 17 (Suppl 3), 190 (2020). https://doi.org/10.1186/s12978-020-01023-5
7. Ali H, Ali A, Mehmood QK, Jalal A, Ali SR. Antenatal Care: Accessibility Issue among Pakhtun Women in Malakand, Pakistan. Isra Med J. 2018; 10(6): 362-366.
8. Kumari P, Singh M, Sinha S, Ranjan R, Arora P, Rani S, Aggarwal A, Aggarwal K, Gupta S. Preidentification of high-risk pregnancies to improve triaging at the time of admission and management of complications in labour room: a quality improvement initiative. BMJ Open Qual. 2022 Jun;11(Suppl 1):e001718. doi: 10.1136/bmjoq-2021-001718. PMID: 35714981; PMCID: PMC9207917.
9. Coopland AT, Peddle LJ, Baskett TF, Rollwagen R, Simpson A, Parker E. A simplified antepartum highrisk pregnancy scoring form: statistical analysis of 5459 cases. Can Med Assoc J. 1977;116(9):999- 1001.
10. Chate SU, Metgud CS. Pregnancy outcome among high-risk pregnant women in the rural area of Belagavi. J Family Med Prim Care. 2022 Aug;11(8):4440-4446. doi: 10.4103/jfmpc.jfmpc_10_22. Epub 2022 Aug 30. PMID: 36353024; PMCID: PMC9638629.
11. Mohammadi S, Shojaei K, Maraghi E, Motaghi Z. Care Providers' Perspectives on Quality Prenatal Care in High-risk Pregnancies: A Qualitative Study. Int J Community Based Nurs Midwifery. 2023 Apr;11(2):122-134. doi: 10.30476/IJCBNM.2023.97603.2192. PMID: 37114102; PMCID: PMC10126442.
12. Yuan, H., Ferreira, F.A.F. Sustainable competitive advantage in maternal and child health institutions: a dynamic capability approach. Ann Oper Res (2022). https://doi.org/10.1007/s10479-022-04738-9
13. Mufti S, Mufti S. Identification of high risk pregnancy by a scoring system and its correlation with perinatal outcome. Indian J Practic Doct. 2008;5:1-7.
14. Anand B, Mansukhani C, Gujral K, Pradhan M. Importance of developing a new modified high risk pregnancy scoring system. Indian Obstet Gynaecol. 2017;7(1):10-4.
15. Kaur H, Thakur S. Identification of high risk mothers by a scoring system and its correlation with perinatal outcome. J Obstet Gynecol India. 1994;44(1):361.
16. Pillai SS, Mohan S. High risk scoring in pregnancy using modified Coopland's scoring system and its association with perinatal outcome. Int J Reprod Contracept Obstet Gynecol 2021;10:1608-13.
17. Dutta S and Das KS 1990. Identification of high risk pregnancy by a simple scoring system J Obstet Gynecol India 37:639-642.
18. Kolluru V, Reddy A. Study of high risk scoring in pregnancy and perinatal outcome. Ind J Obstet Gynecol Res. 2016;3(4):407-9.
19. Samiya M, Samina M, et al: Original paper identification of high risk pregnancy by a scoring system and its correlation with perinatal outcome. Indian journal for the practising doctor; vol 5: no-1
20. Harinder Kaur, Seema Thakur et al: Identification of high risk mothers by a scoring system and its correlation with perinatal outcome. J of Obstetrics and Gynaec of India 1994:361-364.



[Citation Maryam, B., Yasmeen, H., Alam, F., Alam, S., Manaf, A., Asif, M., Sohail, A., Khan, M., Hussain, Z., Mustafa, A., Ahmed., I .(2024). Evaluating perinatal outcomes in high-risk pregnancies using the modified coopland's scoring system at a tertiary hospital. *Biol. Clin. Sci. Res. J.,* **2024***: 1177*. doi: https://doi.org/10.54112/bcsrj.v2024i1.1177