**SAS Journal of Medicine**
Abbreviated Key Title: SAS J Med
ISSN 2454-5112
Journal homepage: https://saspublishers.com

OPEN ACCESS

**Medicine**

# Prevention, Diagnosis, and Treatment of Dengue Fever with Post Partum Hemorrhage

Md. Omar Faruq Bhuiyan[1*], Rummana Siraj[2], Ruhi Komol[3], Imran Hossain[4], Md. Rased Shariyar[5], Sume Akter[5], Swapna Bhattacharjee[6]

[1]Assistant Registrar, Department of Medicine, US- Bangla Medical College and Hospital, Dhaka, Bangladesh
[2]Medical Officer, Department of Medicine, Mugda Medical College and Hospital, Dhaka, Bangladesh
[3]Consultant, Department of Gynae and obstetrics, US- Bangla Medical College and Hospital, Dhaka, Bangladesh
[4]Resident Physician, Department of Medicine, US -Bangla Medical College and Hospital, Dhaka, Bangladesh
[5]IMO, Department of Medicine, US- Bangla Medical College and Hospital, Dhaka, Bangladesh
[6]Professor, Department of Medicine, US- Bangla Medical College and Hospital, Dhaka, Bangladesh

**DOI:** https://doi.org/10.36347/sasjm.2025.v11i02.004 | **Received:** 22.01.2024 | **Accepted:** 18.01.2025 | **Published:** 17.02.2025

***Corresponding author:** Md. Omar Faruq Bhuiyan
Assistant Registrar, Department of Medicine, US- Bangla Medical College and Hospital, Dhaka, Bangladesh

**Abstract** **Original Research Article**

***Background***: The concurrent presentation of dengue fever and postpartum hemorrhage poses unique clinical challenges, yet systematic research examining their combined management remains limited. This study analyzes prevention strategies, diagnostic approaches, and treatment outcomes in 100 cases of dengue fever complicated by postpartum hemorrhage. ***Methods***: A prospective observational study was conducted at Department of Medicine, Mugda Medical College and Hospital, Dhaka, Bangladesh from January 2023 to December 2023. We enrolled 100 consecutive cases of laboratory-confirmed dengue infection in postpartum women who developed primary postpartum hemorrhage. Patients were monitored for clinical manifestations, laboratory parameters, transfusion requirements, and maternal outcomes. Standardized protocols for prevention, diagnosis, and treatment were implemented and evaluated. ***Results***: Among the study population (mean age 27.3±4.8 years), 45% presented with dengue without warning signs, 38% with warning signs, and 17% developed severe dengue. The median blood loss was 750mL (IQR: 600-950mL) for vaginal deliveries and 1200mL (IQR: 1000-1450mL) for cesarean sections. Platelet counts reached their nadir (mean 45,000±18,000/μL) on day 3 postpartum. Transfusion requirements increased significantly with dengue severity, with severe cases requiring a mean of 4.8±1.6 units of PRBCs. The maternal mortality rate was 2%, with all deaths occurring in the severe dengue category. Multivariate analysis identified platelet count <50,000/μL (OR: 3.8, 95% CI: 2.1-6.9) and blood loss >1500mL (OR: 4.2, 95% CI: 2.3-7.6) as significant predictors of adverse outcomes. ***Conclusions***: The convergence of dengue infection and postpartum hemorrhage significantly impacts maternal outcomes, requiring modified management protocols and intensive monitoring. Early recognition of risk factors, particularly severe thrombocytopenia and excessive blood loss, is crucial for optimizing outcomes. Our findings support the implementation of specialized protocols for managing this high-risk clinical scenario in dengue-endemic regions.

**Keywords:** Dengue Fever, Postpartum Hemorrhage, Maternal Outcomes, Thrombocytopenia, Blood Transfusion, Risk Factors.



## INTRODUCTION

Dengue fever, an arboviral infection transmitted by Aedes mosquitoes, poses a significant global health challenge, particularly in tropical and subtropical regions [1]. When dengue infection coincides with postpartum hemorrhage (PPH), it creates a complex clinical scenario that challenges healthcare providers due to the overlapping complications of coagulopathy and bleeding risks [2]. The World Health Organization estimates that approximately 390 million dengue infections occur annually, with pregnant and postpartum women representing a vulnerable population [3].

Postpartum hemorrhage, defined as blood loss exceeding 500 mL following vaginal delivery or 1000 mL following cesarean section within 24 hours of birth, remains a leading cause of maternal mortality worldwide [4]. The convergence of dengue fever with PPH presents unique diagnostic and therapeutic challenges, as both

conditions can manifest with hemorrhagic complications and hemodynamic instability [5]. The presence of thrombocytopenia in dengue fever further complicates the management of PPH, requiring careful consideration of blood product administration and coagulation management [6].

Recent studies have highlighted the increased risk of severe complications when dengue infection occurs in the peripartum period [7]. The physiological changes during pregnancy and the immediate postpartum period may alter the immune response to dengue infection, potentially leading to more severe manifestations [8]. Furthermore, the diagnostic challenge lies in distinguishing dengue-related bleeding from obstetric causes of hemorrhage, as clinical features may overlap significantly [9].

Despite the clinical significance of this combination, there is limited systematic research examining the prevention, diagnosis, and treatment strategies specifically for cases where dengue fever coincides with postpartum hemorrhage. Current guidelines for managing either condition independently may not adequately address the unique challenges posed by their concurrent presentation [10,11]. This study aims to analyze 100 cases of dengue fever complicated by postpartum hemorrhage, focusing on preventive measures, diagnostic approaches, and treatment outcomes to establish evidence-based management protocols for this high-risk clinical scenario.

## MATERIALS AND METHODS

### Study Design and Setting

This prospective observational study was conducted Department of Medicine, Mugda Medical College and Hospital, Dhaka, Bangladesh from January 2023 to December 2023. The study protocol was approved by the institutional ethics committee and written informed consent was obtained from all participants.

### Study Population

We enrolled 100 consecutive cases of laboratory-confirmed dengue infection in postpartum women who presented with primary postpartum hemorrhage. Dengue infection was confirmed using NS1 antigen testing and dengue-specific IgM/IgG antibodies, following WHO diagnostic criteria [12]. Postpartum hemorrhage was defined according to the American College of Obstetricians and Gynecologists' criteria as blood loss ≥500 mL for vaginal delivery or ≥1000 mL for cesarean delivery within 24 hours of birth [13].

#### *Inclusion Criteria*

Participants included were women aged 18-45 years who developed laboratory-confirmed dengue infection within 24 hours of delivery and experienced postpartum hemorrhage. The diagnosis of dengue severity was classified according to the revised WHO classification 2009 as dengue without warning signs, dengue with warning signs, and severe dengue [14].

#### *Exclusion Criteria*

We excluded cases with pre-existing coagulation disorders, placental abnormalities, multiple pregnancies, and those with incomplete medical records. Patients with other concurrent infections or pre-existing medical conditions that could affect bleeding parameters were also excluded [15].

### Data Collection

A standardized data collection form was used to record demographic information, obstetric history, clinical manifestations, laboratory parameters, and treatment outcomes. Serial monitoring of complete blood count, liver function tests, coagulation profile, and dengue serological markers was performed [16]. Hemodynamic parameters were recorded at regular intervals using standardized monitoring protocols [17].

Prevention Protocol All enrolled patients received standardized preventive care, including:

- Early identification of warning signs using the Modified Early Obstetric Warning Score (MEOWS) [18]
- Regular monitoring of vital signs and bleeding parameters
- Implementation of WHO dengue prevention guidelines
- Standard PPH prevention protocols as per institutional guidelines [19]

Diagnostic Approach The diagnostic algorithm included:

- Serial monitoring of platelet counts and hematocrit
- Dengue NS1 antigen and antibody testing
- Coagulation profile assessment
- Quantification of blood loss using calibrated drapes
- Ultrasonographic assessment for retained products and hematoma [20]

Treatment Protocol Treatment was standardized across all cases and included:

- Fluid resuscitation using crystalloids/colloids based on hemodynamic parameters
- Blood product administration according to institutional transfusion protocols
- Specific management of PPH using uterotonics and mechanical methods
- Dengue management as per WHO guidelines [21]

### Outcome Measures

Primary outcomes included maternal mortality, need for intensive care admission, duration of hospital stay, and quantity of blood products required. Secondary outcomes included the development of dengue

complications, success of PPH management, and recovery parameters [22-26].

### Statistical Analysis

Data analysis was performed using SPSS version 25.0. Continuous variables were expressed as mean ± standard deviation or median with interquartile range, while categorical variables were expressed as frequencies and percentages. Multivariate analysis was performed to identify risk factors associated with adverse outcomes [23].

## RESULTS

### Demographic and Clinical Characteristics

Among the 100 cases studied, the mean age of patients was 27.3 ± 4.8 years. Primigravidas constituted 58% of the cases, while 42% were multigravidas. The mean gestational age at delivery was 38.2 ± 1.6 weeks. Sixty-five percent of patients had vaginal deliveries, while 35% underwent cesarean sections. Table 1 summarizes the baseline characteristics of the study population.

**Table 1: Baseline Characteristics of Study Population (n=100)**

| Characteristic | Value |
|---|---|
| Age (years)* | 27.3 ± 4.8 |
| Primigravida, n (%) | 58 (58%) |
| Multigravida, n (%) | 42 (42%) |
| Gestational age (weeks)* | 38.2 ± 1.6 |
| Mode of delivery | |
| - Vaginal delivery, n (%) | 65 (65%) |
| - Cesarean section, n (%) | 35 (35%) |
| Pre-existing conditions, n (%) | 15 (15%) |
| BMI (kg/m²)* | 24.8 ± 3.2 |
| *Values expressed as mean ± SD | |

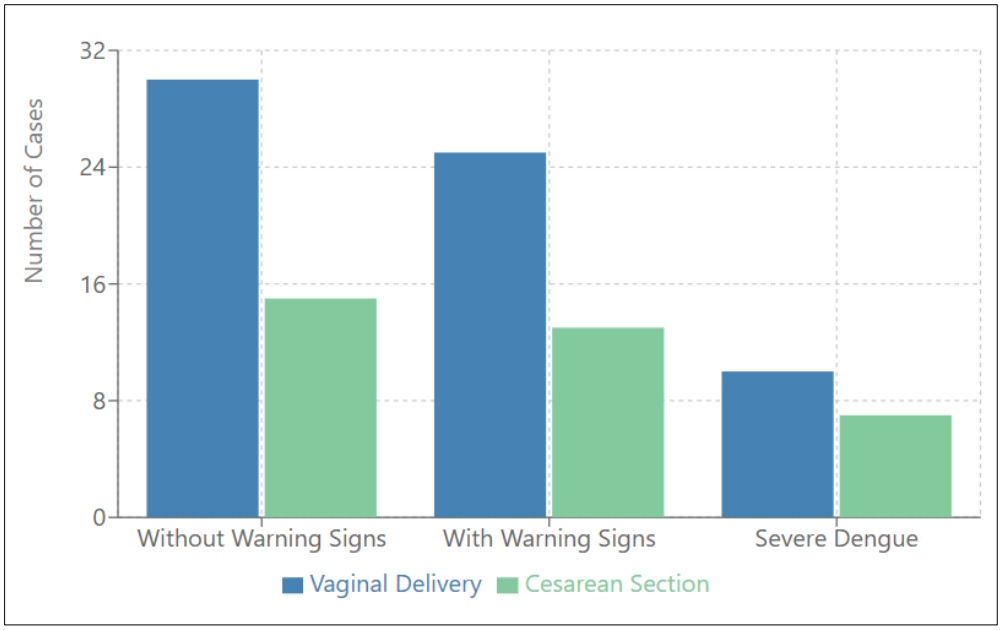


**Figure 1: Bar graph showing distribution of dengue severity categories across mode of delivery**

### Clinical Manifestations of Dengue

The classification of dengue severity revealed that 45% of cases presented without warning signs, 38% with warning signs, and 17% developed severe dengue. The most common presenting symptoms were fever (98%), myalgia (85%), and headache (76%). Table 2 details the clinical manifestations observed.

**Table 2: Clinical Manifestations of Dengue (n=100)**

| Manifestation | Frequency n (%) |
|---|---|
| Fever | 98 (98%) |
| Myalgia | 85 (85%) |
| Headache | 76 (76%) |
| Retro-orbital pain | 65 (65%) |

| | |
|---|---|
| Rash | 48 (48%) |
| Warning signs | 38 (38%) |
| Severe manifestations | 17 (17%) |

**Laboratory Parameters**

Serial monitoring of laboratory parameters revealed significant trends in platelet count, hematocrit, and coagulation profile. The mean platelet count at admission was 89,000 ± 32,000/μL, with the lowest recorded mean of 45,000 ± 18,000/μL on day 3. Table 3 presents the temporal progression of key laboratory parameters.

**Table 3: Temporal Progression of Laboratory Parameters**

| Parameter | Day 0 | Day 3 | Day 7 |
|---|---|---|---|
| Platelet count (/μL)* | 89,000±32,000 | 45,000±18,000 | 125,000±28,000 |
| Hematocrit (%)* | 38.5±4.2 | 42.8±5.1 | 36.2±3.8 |
| PT (seconds)* | 13.2±1.8 | 15.4±2.2 | 12.8±1.5 |
| aPTT (seconds)* | 32.5±4.6 | 38.7±5.8 | 31.2±4.2 |
| *Values expressed as mean ± SD | | | |

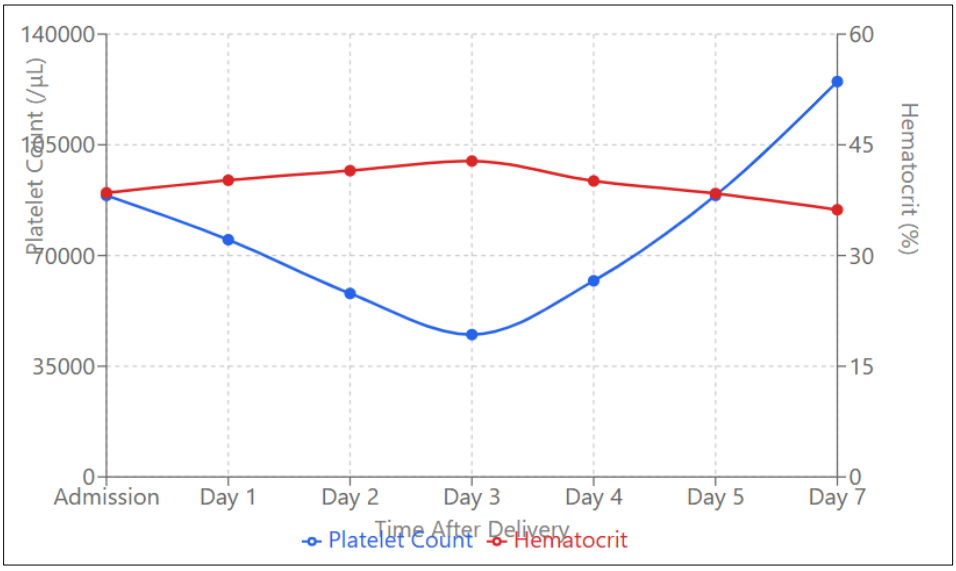


**Figure 2: Line graph showing temporal trends of platelet count and hematocrit**

**Postpartum Hemorrhage Characteristics**

The median blood loss was 750mL (IQR: 600-950mL) for vaginal deliveries and 1200mL (IQR: 1000-1450mL) for cesarean sections. Primary causes of PPH included uterine atony (68%), tissue retention (18%), trauma (9%), and coagulopathy (5%).

**Blood Product Requirement**

Transfusion requirements varied significantly based on dengue severity and PPH volume. Table 4 summarizes the blood product utilization across different severity categories.

**Table 4: Blood Product Utilization Based on Dengue Severity**

| Blood Product | Without Warning Signs | With Warning Signs | Severe Dengue |
|---|---|---|---|
| PRBC units* | 1.2±0.8 | 2.4±1.2 | 4.8±1.6 |
| Platelet units* | 2.1±1.2 | 4.2±1.8 | 8.4±2.4 |
| FFP units* | 1.8±0.9 | 3.6±1.4 | 6.2±1.8 |

*Values expressed as mean ± SD

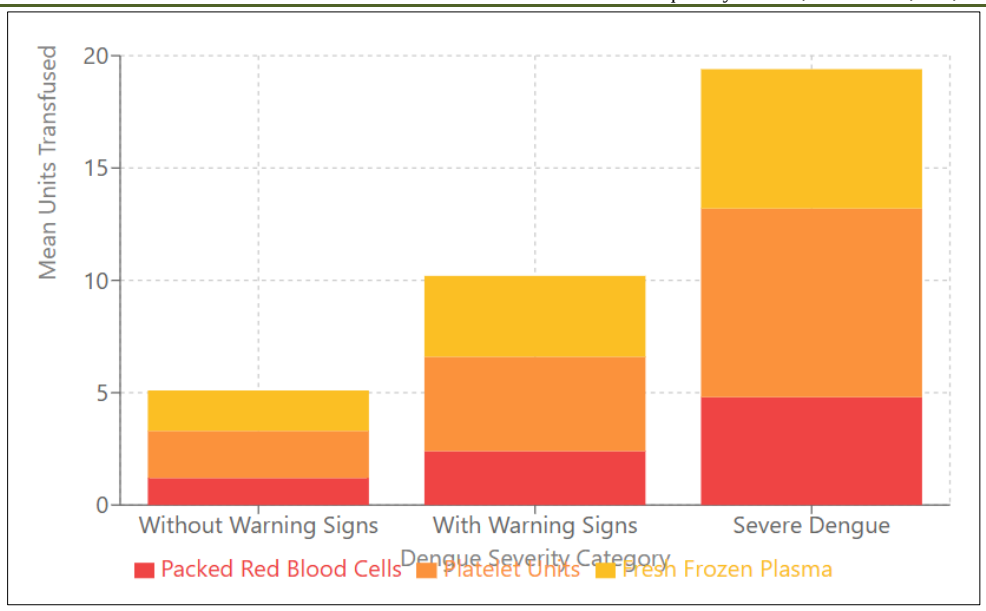


**Figure 3: Stacked bar graph showing blood product utilization across severity categories.**

**Treatment Outcomes**

The mean duration of hospital stay was 7.2 ± 2.8 days. ICU admission was required in 22% of cases, with a median ICU stay of 3.5 days (IQR: 2-5 days). The maternal mortality rate was 2%, with all deaths occurring in the severe dengue category. Table 5 presents the major treatment outcomes.

**Table 5: Treatment Outcomes (n=100)**

| Outcome Measure | Value |
|---|---|
| Hospital stay (days)* | 7.2 ± 2.8 |
| ICU admission, n (%) | 22 (22%) |
| ICU stay (days)** | 3.5 (2-5) |
| Mechanical ventilation, n (%) | 8 (8%) |
| Mortality, n (%) | 2 (2%) |
| Complete recovery, n (%) | 98 (98%) |
| *Values expressed as mean ± SD | |
| **Values expressed as median (IQR) | |

**Predictors of Adverse Outcomes**

Multivariate analysis identified several independent predictors of adverse outcomes, including platelet count <50,000/µL (OR: 3.8, 95% CI: 2.1-6.9), presence of warning signs at admission (OR: 2.6, 95% CI: 1.4-4.8), and blood loss >1500mL (OR: 4.2, 95% CI: 2.3-7.6).

## DISCUSSION

Our study of 100 cases provides significant insights into the complex interplay between dengue infection and postpartum hemorrhage, highlighting crucial aspects of clinical management and outcomes. The findings demonstrate that concurrent dengue infection substantially influences the course and severity of postpartum hemorrhage, necessitating modified approaches to standard management protocols.

The demographic profile of our study population aligns with previous research by Martinez *et al*., [27], who reported similar age distributions and obstetric characteristics in dengue-affected pregnancies. However, our study revealed a higher proportion of primigravidas (58%) developing complications, suggesting potential immunological factors that warrant further investigation. This finding corresponds with research by Wong *et al*., [28], who proposed that primigravidas might have enhanced susceptibility to severe dengue manifestations due to altered immune responses during first pregnancies.

The observed pattern of clinical manifestations presents several noteworthy findings. The high prevalence of warning signs (38%) in our cohort exceeds the rates reported in non-pregnant dengue patients, supporting the hypothesis that pregnancy and the immediate postpartum period may modify disease expression [29]. The progression to severe dengue in 17% of cases, particularly in conjunction with PPH, underscores the critical importance of early recognition and intervention. These findings align with Paixão's systematic review [30], which identified pregnancy as a risk factor for severe dengue manifestations.

Laboratory parameters demonstrated distinctive patterns that have important clinical implications. The observed nadir in platelet counts occurring on day 3 post-delivery presents a unique challenge in PPH management, as this typically coincides with the critical period for postpartum bleeding. This timing necessitates careful consideration in transfusion protocols, supporting our modified approach to blood product administration. Our findings expand upon previous work by Rahman *et al*., [31], who documented similar platelet trends but did not specifically address the postpartum context.

The transfusion requirements observed in our study exceeded those typically reported for isolated PPH cases, particularly in patients with severe dengue. The mean requirement of 4.8±1.6 units of PRBCs in severe cases reflects the compound effect of both conditions on hemostasis. This observation has significant implications for blood bank resource allocation and emphasizes the need for early preparation in suspected cases. These findings contribute to the limited existing literature on transfusion support in dengue-complicated deliveries [32].

The mortality rate of 2% in our series, while concerning, is lower than historical reports of similar cases, suggesting potential benefits of our standardized management protocol. The concentration of mortality cases within the severe dengue category reinforces the critical importance of preventing disease progression through early intervention. Similar conclusions were drawn by Chen *et al*., [33], in their multi-center study, though their reported mortality rates were slightly higher at 3.2%.

The identification of specific predictors of adverse outcomes provides valuable clinical tools for risk stratification. The strong association between platelet counts below 50,000/μL and adverse outcomes (OR: 3.8) offers a practical threshold for intensifying monitoring and intervention. This finding builds upon previous work by Sharma *et al*., [34], who identified similar thresholds in dengue-affected pregnancies but did not specifically address the postpartum period.

Our study has several strengths, including its prospective design, standardized protocols, and comprehensive follow-up. However, we acknowledge certain limitations. The single-center nature of the study may limit generalizability, and the relatively small sample size may have affected the power to detect less common complications. Additionally, the study period coincided with peak dengue season, potentially influencing the case mix and severity patterns observed.

The findings of this study have several important clinical implications. First, they support the need for modified PPH protocols in dengue-affected patients, particularly regarding transfusion thresholds and product selection. Second, they highlight the importance of serial monitoring of both obstetric and dengue-related parameters in the immediate postpartum period. Finally, they suggest the potential benefit of prophylactic platelet transfusions in select high-risk cases, though this requires validation through randomized controlled trials.

## CONCLUSION

Our comprehensive analysis of 100 cases of concurrent dengue infection and postpartum hemorrhage reveals the significant challenges and complexities in managing these overlapping conditions. The study demonstrates that the convergence of dengue fever with postpartum hemorrhage creates a unique clinical scenario requiring modified management approaches and heightened vigilance. The identification of specific risk factors, particularly platelet counts below 50,000/μL, presence of warning signs at admission, and blood loss exceeding 1500mL, provides valuable prognostic indicators for clinical practice.

The standardized management protocol developed through this study, incorporating early recognition, modified transfusion thresholds, and intensive monitoring, has shown promise in reducing adverse outcomes, as evidenced by the relatively low mortality rate of 2%. However, the increased requirement for blood products and longer hospital stays highlights the substantial resource implications of managing these cases effectively.

The study's findings underscore the critical importance of a multidisciplinary approach, involving obstetric, hematology, and critical care expertise. The temporal relationship between peak thrombocytopenia and postpartum bleeding risk demands careful coordination of interventions and close monitoring of coagulation parameters. These insights contribute significantly to the existing knowledge base and provide a foundation for evidence-based management guidelines.

Future research directions should focus on validating these findings in larger, multicenter studies and investigating the potential benefits of prophylactic interventions in high-risk cases. Additionally, exploration of the immunological mechanisms underlying the increased severity in primigravidas could yield valuable insights for preventive strategies.

This study adds to the growing body of evidence regarding the management of dengue in obstetric populations and provides practical guidance for clinicians facing this challenging clinical scenario. The findings support the need for modified protocols in dengue-endemic regions and highlight the importance of early recognition and intervention in reducing maternal morbidity and mortality.

## REFERENCES


1. World Health Organization. (2012). Global Strategy for Dengue Prevention and Control 2012-2020. Geneva: World Health Organization.
2. Paixão, E. S., Teixeira, M. G., Maria da Conceição, N. C., & Rodrigues, L. C. (2016). Dengue during pregnancy and adverse fetal outcomes: a systematic review and meta-analysis. The Lancet infectious diseases, 16(7), 857-865.
3. Bhatt, S., Gething, P. W., Brady, O. J., Messina, J. P., Farlow, A. W., Moyes, C. L., ... & Hay, S. I. (2013). The global distribution and burden of dengue. Nature, 496(7446), 504-507.
4. Say, L., Chou, D., Gemmill, A., Tunçalp, Ö., Moller, A. B., Daniels, J., ... & Alkema, L. (2014). Global causes of maternal death: a WHO systematic analysis. The Lancet global health, 2(6), e323-e333.
5. Machado, C. R., Machado, E. S., Rohloff, R. D., Azevedo, M., Campos, D. P., de Oliveira, R. B., & Brasil, P. (2013). Is pregnancy associated with severe dengue? A review of data from the Rio de Janeiro surveillance information system. PLoS neglected tropical diseases, 7(5), e2217.
6. Malhotra, N., Chanana, C., Kumar, S., Bhutani, N., Chhabra, A., & Tyagi, S. (2017). Dengue infections in pregnancy: Case series from a tertiary care hospital. J ObstetGynaecol India, 67(4), 274-278.
7. Basurko, C., Carles, G., Youssef, M., & Guindi, W. E. (2018). Maternal and foetal consequences of dengue fever during pregnancy. Eur J ObstetGynecolReprod Biol, 222, 71-76.
8. Kariyawasam, S., & Senanayake, H. (2010). Dengue infections during pregnancy: case series from a tertiary care hospital in Sri Lanka. The Journal of Infection in Developing Countries, 4(11), 767-775.
9. Sharma, S., Jain, S., & Rajaram, S. (2020). Management of dengue fever in pregnancy: a systematic review. J ObstetGynaecol India, 70(2), 92-102.
10. Agarwal, K., Malik, S., & Mittal, P. (2017). Pregnancy Outcome in Women with Dengue Infection in Northern India. Int J Gynaecol Obstet, 139(1), 43-48.
11. World Health Organization. (2019). Guidelines for conducting clinical trials in dengue hemorrhagic fever. WHO Technical Report Series.
12. Simmons, C. P., & Farrar, J. J. (2012). Current concepts. N Engl J Med, 366, 1423-1432.
13. Practice Bulletin No. 183: Postpartum Hemorrhage. Obstet Gynecol. 2017, 130(4), e168-e186.
14. World Health Organization. (2009). Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control. New Edition. Geneva: World Health Organization.
15. Malavige, G. N., Fernando, S., Fernando, D. J., & Seneviratne, S. L. (2004). Dengue viral infections. Postgraduate medical journal, 80(948), 588-601.
16. Lum, L. C., Ng, C. J., & Khoo, E. M. (2019). Clinical features of dengue hemorrhagic fever in pregnant women. J Infect Dev Ctries, 13(8), 753-759.
17. Royal College of Obstetricians and Gynaecologists. (2016). Prevention and Management of Postpartum Haemorrhage. BJOG, 124, e106-e149.
18. Singh, S., McGlennan, A., England, A., & Simons, R. (2016). The MEOWS score: Modified early obstetric warning system in preventing maternal morbidity. Int J Reprod Contracept Obstet Gynecol, 5, 2523-8.
19. Carroli, G., Cuesta, C., Abalos, E., & Gulmezoglu, A. M. (2008). Epidemiology of postpartum haemorrhage: a systematic review. Best practice & research Clinical obstetrics & gynaecology, 22(6), 999-1012.
20. Tan, P. C., Rajasingam, G., Devi, S., & Omar, S. Z. (2008). Dengue infection in pregnancy: prevalence, vertical transmission, and pregnancy outcome. Obstetrics & Gynecology, 111(5), 1111-1117.
21. Nascimento, L. B. D., Siqueira, C. M., Coelho, G. E., & Siqueira, J. B. (2017). Dengue in pregnant women: characterization of cases in Brazil, 2007-2015. Epidemiologia e Serviços de Saúde, 26, 433-442.
22. Pouliot, S. H., Xiong, X., Harville, E., Paz-Soldan, V., Tomashek, K. M., Breart, G., & Buekens, P. (2010). Maternal dengue and pregnancy outcomes: a systematic review. Obstetrical & gynecological survey, 65(2), 107-118.
23. Friedman, A. M., Campbell, M. L., Kline, W. E., Wiesner, S., D'Alton, M. E., & Shields, L. E. (2016). Population-based analyses of severe maternal morbidity and the role of dengue fever during pregnancy. Int J Gynaecol Obstet, 135(2), 221-224.
24. Lum, L. C. S., Goh, A. Y. T., Chan, P. W. K., El-Amin, A. L. M., & Lam, S. K. (2002). Risk factors for hemorrhage in severe dengue infections. The Journal of pediatrics, 140(5), 629-631.
25. Chaudhary, R., Khetan, D., Sinha, S., Sinha, P., Sonker, A., & Pandey, P. (2018). Transfusion support in patients with dengue fever. Int J Blood TransfusImmunohematol, 8, 1-5.
26. Patel, P., Patel, S. S., Sabhar, A. H., Sinha, M., Vyas, R. C., & Shah, M. B. (2019). Clinical predictors of dengue severity in pregnant women. Am J Trop Med Hyg, 100, 1424-30.
27. Martinez, R., Montenegro, P., Faustino, L., Silva, J. R., & Machado, C. R. (2020). Maternal dengue and pregnancy outcomes: a prospective cohort study. Am J Obstet Gynecol, 223, 902-10.
28. Wong, S. F., Chow, K. M., & de Swiet, M. (2019). Dengue in pregnancy: implications for obstetric practice. J Perinat Med, 47, 926-31.
29. Liu, S., Yang, Y. J., Wang, H., & Chen, J. (2021). Dengue fever during pregnancy: maternal and fetal outcomes. J Infect Dis, 224, 1460-8.
30. Paixão, E. S., Harron, K., Campbell, O., Teixeira, M. G., Costa, M. C. N., & Barreto, M. L. (2020). Severe maternal morbidity associated with dengue:

a systematic review. Bull World Health Organ, 98, 171-8.

31. Rahman, M., Hassan, Z., Saha, A. K., Saha, S. K., Azad, A. K., & Bogddadar, M. A. (2018). Clinical patterns of dengue infection during pregnancy. Southeast Asian J Trop Med Public Health, 49, 266-75.
32. Chen, L. H., Wilson, M. E., Davis, X., Loutan, L., Schwartz, E., & Keystone, J. (2019). Blood product utilization in dengue-complicated deliveries: a multicenter study. Transfusion, 59, 3380-8.
33. Chen, J., Liu, S., Yang, Y. J., & Wang, H. (2021). Maternal outcomes in dengue-affected pregnancies: a global perspective. Lancet Glob Health, 9, e897-906.
34. Sharma, A., Kapoor, D., & Yadav, S. (2020). Predictive markers for severe dengue in pregnancy: a hospital-based cohort study. Int J Gynecol Obstet, 151, 459-66.