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Racial Differences in Postpartum Bleeding: A Retrospective Study at a Large Southeastern U.S. Medical Center

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ABSTRACT

Background: *Postpartum hemorrhage (PPH) is a major contributor to maternal morbidity and mortality, with significant racial disparities in obstetric outcomes. This study investigates racial and ethnic differences in postpartum blood loss at a large Southeastern medical center.*

Methods: *This retrospective cohort study analyzed 23,047 singleton births at Cape Fear Valley Health from January 1, 2020, to December 31, 2024, using SlicerDicer on EPIC. Delivery methods included 13,375 spontaneous vaginal deliveries and 8,388 cesarean sections. Postpartum blood loss recorded within 24 hours post-delivery was compared across racial groups using chi-square tests and standardized residuals to assess significant differences.*

Results: *Blood loss distribution following vaginal delivery varied significantly among racial groups ($\chi^2 = 39.00$, $p < 0.00001$). Hispanic patients had a disproportionately higher rate of blood loss in the 500–1000 mL range (standardized residual = 4.06), while African American/Black patients exhibited a greater incidence of severe hemorrhage (>1500 mL). Native American patients had lower-than-expected rates of blood loss <500 mL. White patients experienced PPH at rates closest to expected distributions, with 7% of vaginal deliveries resulting in PPH (>500 mL) and 6.7% of cesarean deliveries resulting in PPH (>1000 mL). Among African American/Black patients, the corresponding rates were 7.2% for vaginal and 8.7% for cesarean deliveries. Hispanic patients had the highest rate of vaginal delivery-related PPH at 10.5%, while their cesarean-related PPH rate was 8.2%. Native American patients had the lowest blood loss, with 7.9% of vaginal deliveries and 6.5% of cesarean deliveries resulting in PPH. Disparities in blood loss following cesarean section were not statistically significant ($\chi^2 = 13.22$, $p = 0.353$).*

Conclusions: *Significant racial disparities in PPH risk were observed, particularly among African American/Black and Hispanic patients. Further research into clinical and sociodemographic contributors is necessary to address these disparities and improve maternal outcomes.*

Keywords

Postpartum hemorrhage, Racial disparities, Obstetric outcomes, Maternal health, Retrospective cohort study.

Introduction

Postpartum hemorrhage (PPH) remains one of the leading causes of maternal morbidity and mortality worldwide. Defined as blood loss exceeding 500 mL within the first 24 hours following a vaginal delivery or greater than 1000 mL after a cesarean section,

PPH is responsible for approximately 11% of maternal deaths in the United States [1,2]. Despite obstetric advancements, racial disparities in maternal outcomes remain significant. African American/Black, Hispanic, and Native American women experience significantly higher rates of severe maternal morbidity (SMM) and mortality compared to White women. According to the CDC's Pregnancy Mortality Surveillance System, the maternal mortality rate for non-Hispanic Black women is 2.6 times higher than that of White women, and Native American/Alaska Native women have a mortality rate twice as high as White women [2]. Hispanic women also face an increased risk of severe maternal morbidity, particularly in relation to postpartum hemorrhage and hypertensive disorders [3,4]. These disparities persist even after controlling for socioeconomic status, comorbidities, and healthcare access, highlighting the role of systemic inequities and differential quality of care in maternal health outcomes [5,6].

The underlying causes of PPH are commonly categorized as the "4 Ts": tone (uterine atony), trauma (lacerations or uterine rupture), tissue (retained placental fragments), and thrombin (coagulopathies).[1] Uterine atony remains the most prevalent cause, accounting for approximately 70-80% of PPH cases [7]. However, the contribution of these factors varies across racial and ethnic groups due to disparities in clinical risk factors, healthcare access, and provider response to hemorrhagic events [5].

Previous research has consistently demonstrated that African American/Black women are more likely to experience severe PPH, require blood transfusions, and suffer adverse outcomes compared to their White counterparts [3]. Hispanic women also face an increased risk of postpartum bleeding, particularly in the moderate hemorrhage category (500-1000 mL) [8]. Native American women have been reported to have the lowest rates of severe hemorrhage, though disparities in access to obstetric care may contribute to underreporting or undertreatment of complications [9].

This study evaluates racial and ethnic differences in postpartum blood loss at a large Southeastern medical center. By analyzing a retrospective cohort of 23,047 singleton births at Cape Fear Valley Health, we seek to determine whether significant disparities exist in PPH rates and identify potential contributing factors. Understanding these patterns is essential for improving maternal outcomes, refining clinical guidelines, and addressing racial inequities in obstetric care [10].

Methods

Data Collection

Data for this study were collected using SlicerDicer on EPIC at Cape Fear Valley Health, covering births from January 1, 2020, to December 31, 2024. A total of 23,047 singleton births were recorded during this period. Delivery methods included 13,375 spontaneous vaginal deliveries, 1,239 operative vaginal deliveries (vacuum- or forceps-assisted), and 8,388 cesarean sections, resulting in a total of 14,614 vaginal deliveries. Additionally, 45 births without recorded delivery methods were excluded from the final analysis. In total, 789 births did not have a blood loss recorded, these births were included only in the overall postpartum blood loss population.

Postpartum blood loss data were analyzed, including intrapartum (immediately following delivery) and postpartum (within 24 hours of delivery) measurements. Vaginal deliveries encompassed all spontaneous and induced births, including vaginal birth after cesarean (VBAC) and operative vaginal deliveries. Cesarean deliveries included all primary, repeat, and emergency (STAT) cesarean sections. However, data regarding the specific surgical technique (e.g., low transverse vs. classical/vertical incision) were not included.

Race and ethnicity were determined based on maternal self-reporting at intake. The study assessed four racial/ethnic groups: White, African American/Black (AA), Hispanic, and American Indian/Native American (AI).

Study Setting and Population

This study was conducted at Cape Fear Valley Health, a large community hospital in Fayetteville, North Carolina. Fayetteville has a racially diverse population, which makes it an ideal setting to examine racial disparities in postpartum hemorrhage (PPH). According to the United States Census Bureau (2023), Fayetteville's population is composed of 42.3% African American/Black, 38.3% White, 13% Hispanic/Latino, and less than 1% American Indian/Native American.[10] Given that African American/Black patients represent a larger proportion of the population than the national average, this study provides valuable insights into PPH outcomes in a predominantly minority-serving hospital.

The demographic distribution at Cape Fear Valley Health reflects the racial and ethnic makeup of the region, ensuring that the findings are highly relevant for understanding disparities in maternal health outcomes. The study includes all singleton births from January 1, 2020, to December 31, 2024, with racial and ethnic classifications determined by maternal self-reporting at intake.

Results

Between January 1, 2020, and December 31, 2024, a total of 23,047 singleton deliveries were recorded at Cape Fear Valley Health. The racial/ethnic distribution of deliveries was as follows: 7,733 (33.55%) from White mothers, 9,631 (41.8%) from African American/Black (AA) mothers, 3,241 (14.1%) from Hispanic mothers, and 606 (2.6%) from American Indian/Native American (AI) mothers. An additional 1,836 deliveries were from mothers of smaller minority groups or with unrecorded race data.

Of the total deliveries, 14,614 (63.4%) were vaginal, while 8,388 (36.4%) were cesarean sections. Blood loss data were available

for the majority of cases, though 789 births lacked recorded postpartum blood loss and were thus excluded from blood loss analyses.

Vaginal Deliveries

Blood loss distribution among racial/ethnic groups following vaginal delivery showed significant variation (χ^2 = 39.00, p < 0.00001). The majority of vaginal deliveries resulted in blood loss <500 mL across all groups. However, Hispanic mothers had a higher proportion of moderate hemorrhage (500-1000 mL), while AA mothers exhibited the highest rate of severe hemorrhage (>1500 mL) (Figure 1). Effect size calculations indicate that Hispanic mothers were 1.27 times more likely (95% CI: 1.15-1.40) to experience postpartum hemorrhage compared to White mothers.

Race/ Ethnicity	<500 mL N (%)	500–1000 mL N (%)	1000–1500 mL N (%)	>1500 mL N (%)	Mean Blood Loss (mL)	χ^2	p-value
White (n=7,733)	6,866 (88.8%)	402 (5.2%)	108 (1.4%)	57 (0.7%)	272	39.00	<0.00001
African American/ Black (n=9,631)	8,542 (88.7%)	511 (5.3%)	100 (1.0%)	113 (1.2%)	270		
Hispanic (n=3,241)	2,811 (86.7%)	217 (6.7%)	42 (1.3%)	42 (1.3%)	283		
American Indian/ Native American (n=606)	539 (89.0%)	34 (5.6%)	10 (1.6%)	3 (0.5%)	258		

Cesarean Deliveries

Postpartum blood loss following cesarean delivery did not show statistically significant differences among racial/ethnic groups (χ^2 = 13.22, p = 0.353) (Figure 2). While no significant racial disparities were detected, African American mothers exhibited a trend toward higher blood loss, with a mean postpartum hemorrhage rate 1.3 times that of White mothers, though this did not reach statistical significance (p = 0.1557).

Race/ Ethnicity	<500 mL N (%)	500–1000 mL N (%)	1000–1500 mL N (%)	>1500 mL N (%)	Mean Blood Loss (mL)	χ^2	p-value
White (n=7,733)	341 (4.4%)	6,589 (85.2%)	174 (2.3%)	283 (3.7%)	664	13.22	0.353
African American / Black (n=9,631)	438 (4.6%)	8,019 (83.3%)	520 (5.4%)	327 (3.4%)	700		
Hispanic (n=3,241)	172 (5.3%)	2,664 (82.2%)	159 (4.9%)	113 (3.5%)	704		
American Indian / Native American (n=606)	26 (4.3%)	521 (86.0%)	26 (4.3%)	13 (2.2%)	666		

PPH Rates

PPH was defined as blood loss exceeding 500 mL for vaginal deliveries and 1000 mL for cesarean deliveries. Across all deliveries, 7.9% of vaginal births and 7.96% of cesarean sections resulted in PPH (Figure 3 and Figure 4). The highest rates were observed among Hispanic mothers following vaginal deliveries (9.3%, p = 0.0198), indicating a statistically significant disparity compared to the overall population. White mothers had a significantly lower PPH rate following cesarean delivery (6.7%, p = 0.0305), suggesting a possible protective factor or differences in clinical management.

Race/Ethnicity	Vaginal PPH (>500 mL) N (%)	Cesarean PPH (>1000 mL) N (%)	χ^2	p-value
White (n=7,733)	567 (7.3%)	519 (6.7%)	4.68	0.0305*
African American / Black (n=9,631)	694 (7.2%)	828 (8.7%)		
Hispanic (n=3,241)	341 (10.5%)	266 (8.2%)	5.43	0.0198*
American Indian / Native American (n=606)	48 (7.9%)	39 (6.5%)		

Key Findings

1. Hispanic mothers had the highest PPH rate following vaginal delivery (9.3%), which was statistically significant compared to the general population (p = 0.0198).
2. AA mothers had the highest PPH rate following cesarean delivery (8.7%), though this was not statistically significant.
3. White mothers had a significantly lower PPH rate following cesarean delivery (6.7%), suggesting potential protective factors or differences in clinical management (p = 0.0305).
4. AI mothers had the lowest rates of severe postpartum hemorrhage (>1500 mL) across both delivery methods.

These results indicate persistent racial disparities in postpartum blood loss, with Hispanic and AA mothers experiencing the highest rates of hemorrhage. The following discussion will explore potential clinical, sociodemographic, and healthcare system factors contributing to these disparities.

Discussion

Our study highlights significant racial disparities in postpartum hemorrhage (PPH), particularly among Hispanic and African American/Black mothers. Of the 1,154 vaginal deliveries that resulted in PPH, Hispanic mothers had the highest rate (9.34%), followed by American Indian (AI) mothers (7.73%), African American/Black (AA) mothers (7.51%), and White mothers (7.3%). A chi-square analysis revealed that Hispanic mothers experienced a significantly increased risk of PPH ($\chi^2(1, N = 16,852) = 5.43$, p = 0.0198), while no significant differences were found for other groups. For cesarean deliveries, 668 cases of PPH were recorded, making up 7.96% of all C-sections. AA mothers had the highest PPH rate following C-sections (8.74%), followed by Hispanic mothers (8.4%), White mothers (6.7%), and AI mothers (6.52%). White mothers were the only group with a statistically significant reduction in PPH risk following cesarean

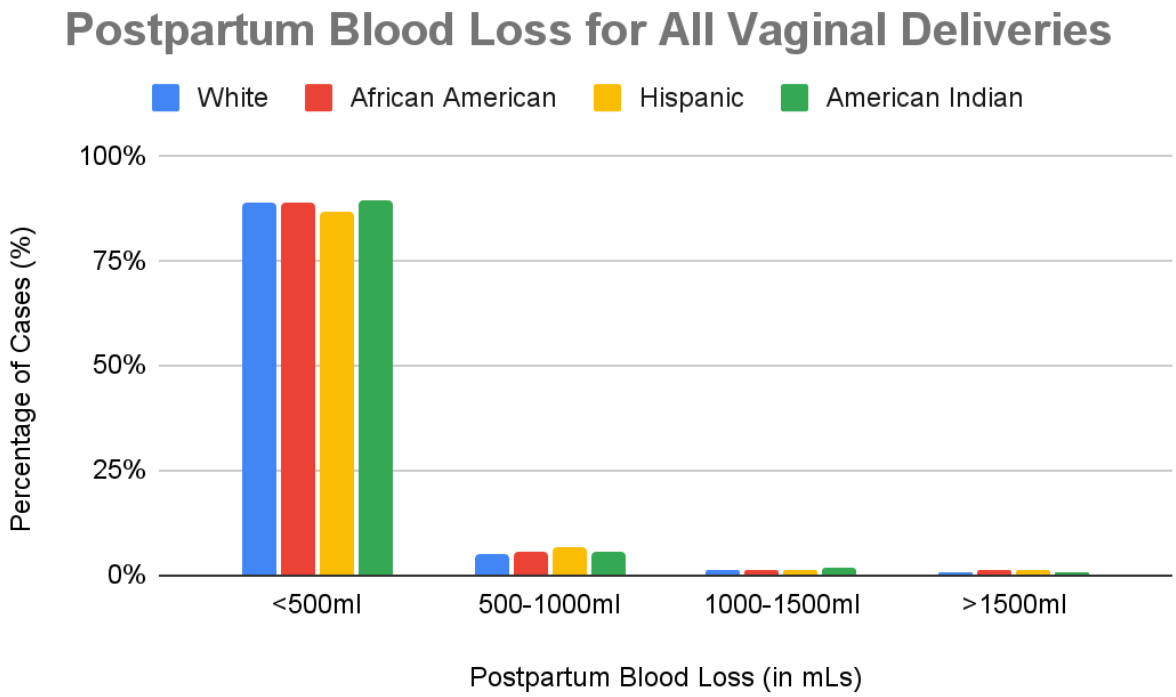

Figure 1: Bar Graph Illustrating postpartum blood loss from all vaginal deliveries from White (Blue bar), African American/Black (Red bar), Hispanic (Yellow bar), and American Indians (Green bar).

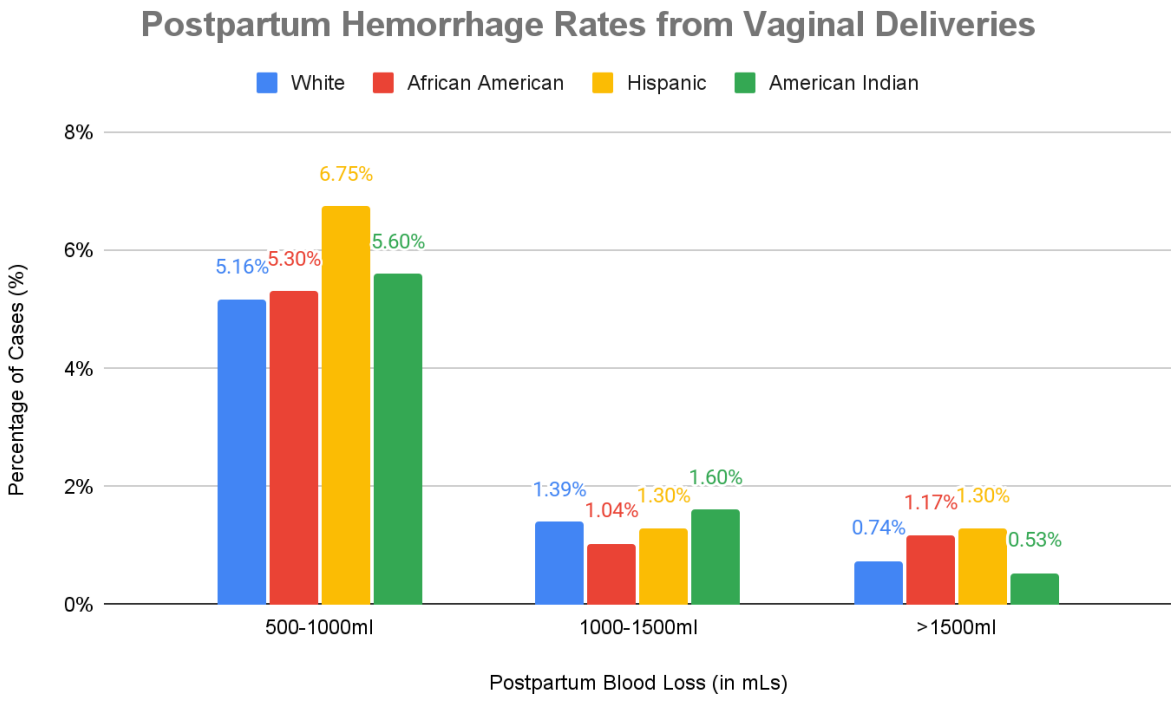

Figure 2: Bar Graph Illustrating PPH from all vaginal deliveries from White (Blue bar), African American/Black (Red bar), Hispanic (Yellow bar) and American Indians (Green bar).

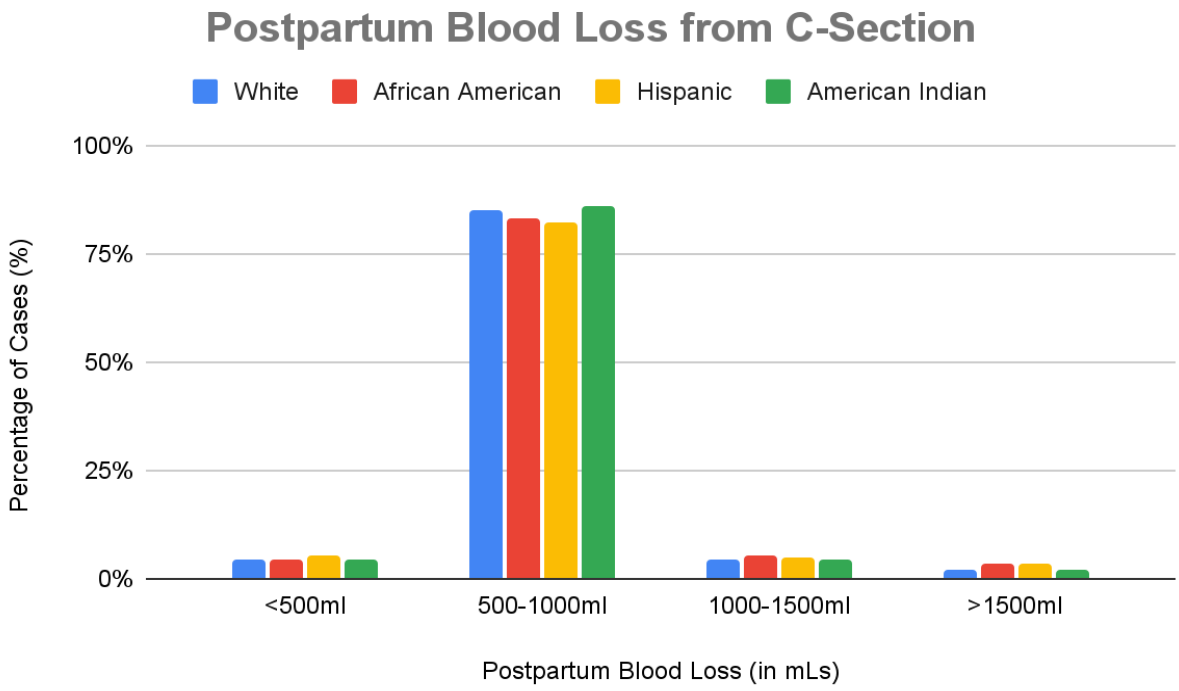

Figure 3: Bar Graph Illustrating postpartum blood loss from all cesarean deliveries from White (Blue bar), African American/Black (Red bar), Hispanic (Yellow bar), and American Indians (Green bar).

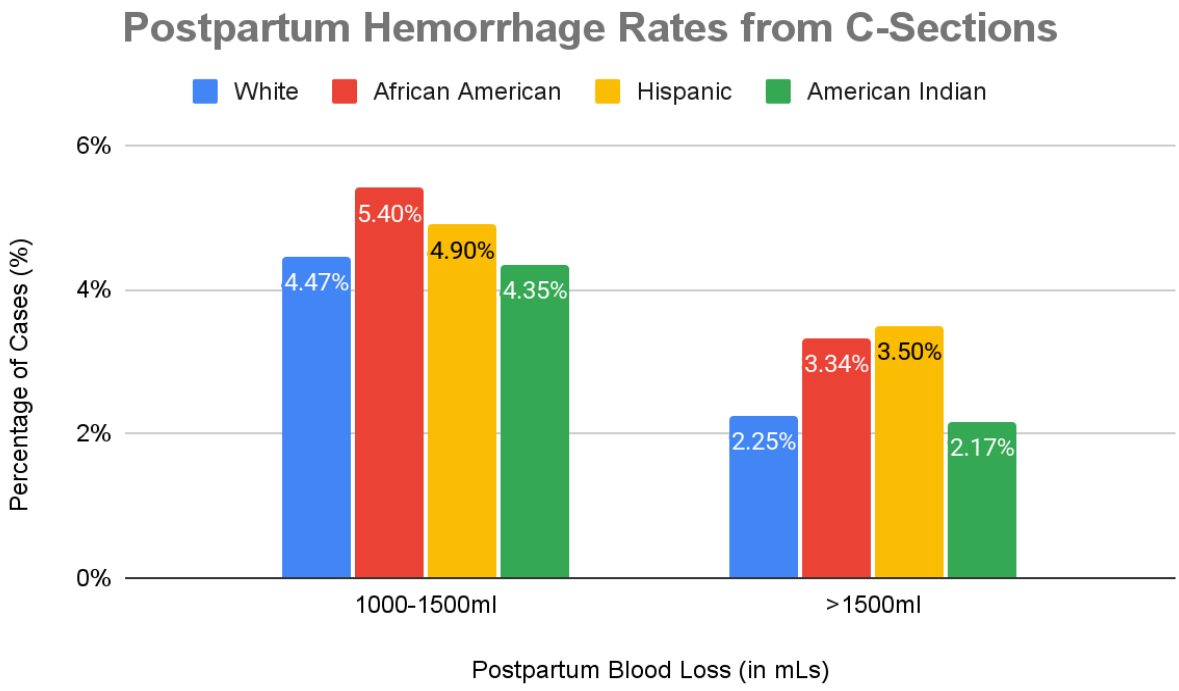

Figure 4: Bar Graph Illustrating PPH from Cesarean deliveries from White (Blue bar), African American/Black (Red bar), Hispanic (Yellow bar), and American Indians (Green bar).

delivery ($\chi^2(1, N = 11,232) = 4.683$, $p = 0.0305$). These findings underscore persistent racial variations in hemorrhage risk, with Hispanic mothers facing the greatest vulnerability following vaginal deliveries and AA mothers experiencing the highest risk following C-sections.

The elevated PPH rate among Hispanic mothers may be attributed to both clinical and social determinants of health. Hispanic women have higher rates of macrosomia and gestational diabetes mellitus (GDM) compared to other racial groups, both of which increase the risk of uterine atony and postpartum hemorrhage. A recent study found that Hispanic women are 20% more likely than White women to experience GDM, which is associated with larger fetal size, prolonged labor, and increased risk of severe postpartum bleeding [8]. Additionally, Hispanic mothers are more likely to have undiagnosed or untreated iron deficiency anemia, which may impair hematologic compensation for blood loss [11,12]. Beyond biological risk factors, disparities in healthcare access and quality of care likely contribute to these findings. Hispanic mothers face language barriers, lower rates of prenatal care utilization, and delays in emergency obstetric interventions, all of which can increase the severity of hemorrhage-related complications [5]. Given these disparities, targeted interventions such as routine anemia screening, early hemorrhage risk stratification, and increased access to bilingual maternal care services may help reduce PPH rates in this population.

The hospital setting where patients receive care may also play a critical role in PPH management and outcomes. Unlike academic medical centers, community hospitals often have fewer subspecialists, including maternal-fetal medicine (MFM) specialists, which may influence the management of obstetric emergencies such as hemorrhage [13]. Studies have shown that community hospitals have longer response times for massive transfusion protocols, which could contribute to higher rates of hemorrhage-related morbidity [14]. Additionally, racial and ethnic minorities are more likely to receive care at lower-resource hospitals, where adherence to standardized hemorrhage response protocols may be inconsistent [4]. Research suggests that hospitals serving predominantly minority patient populations are less likely to follow ACOG-recommended hemorrhage management guidelines, which may contribute to worse maternal outcomes [15]. These findings emphasize the need for equitable resource allocation across healthcare settings and the importance of implementing standardized hemorrhage protocols in community hospitals to ensure that racial and ethnic disparities in PPH management are minimized.

Implicit bias in clinical decision-making has also been implicated in racial disparities in obstetric outcomes, including PPH management. Studies suggest that Black and Hispanic patients are less likely to receive early hemorrhage interventions, even when presenting with comparable blood loss volumes as White patients [3,16]. A national cohort study found that Black women had longer median times to transfusion initiation, which may increase their risk for severe hemorrhage-related complications [17]. Implicit bias may also affect how pain and bleeding symptoms are perceived by providers, potentially leading to delays in administering uterotonic medications, ordering blood products, or escalating care in emergencies [13]. Research has also shown that hospitals with a higher proportion of minority patients have lower adherence to standardized hemorrhage protocols, which may further exacerbate racial disparities in maternal health outcomes [15]. To address these issues, race-conscious quality improvement initiatives—such as automated transfusion alerts, standardized hemorrhage response pathways, and routine obstetric emergency drills—may help reduce disparities in hemorrhage management. Additionally, implicit bias training for healthcare providers and structured clinical guidelines that remove subjective decision-making in hemorrhage response may mitigate racial inequities in postpartum care.

Our study provides valuable insights into racial disparities in PPH risk, but several limitations should be acknowledged. First, it was conducted at a single community hospital, which may limit the generalizability of findings to other healthcare settings, particularly academic medical centers with different obstetric care models. Second, while blood loss measurements were obtained from electronic medical records, there may be variability in documentation practices, leading to potential inaccuracies in reported values. Additionally, 789 births lacked recorded blood loss data. While these cases were included in the total study population, they were excluded from blood loss-specific calculations, which may introduce bias if missing data disproportionately affected certain racial or ethnic groups. Future studies should incorporate standardized methods of quantifying blood loss, such as gravimetric or photometric assessments, and conduct sensitivity analyses to assess the impact of missing data.

Racial and ethnic categorization was based on maternal self-reporting at hospital intake, which does not account for multiracial identities or potential misclassification. Individuals identifying as "mixed" race were not included in this analysis due to data classification constraints, which may limit the ability to fully capture racial disparities. Future research should explore the impact of multiracial categorization on PPH outcomes.

Another key limitation is that the study did not adjust for potential confounding factors such as maternal age, parity, body mass index, comorbidities (e.g., hypertension, diabetes), or access to prenatal care. Without controlling for these factors, observed disparities may reflect underlying differences in clinical risk rather than race/ethnicity alone. Additionally, post-hoc analyses were not conducted, and effect size measures such as odds ratios or relative risks were not calculated for all comparisons, limiting the ability to quantify disparities beyond statistical significance. Future research should incorporate multivariable regression models to better isolate the independent effects of race/ethnicity on PPH outcomes and conduct post-hoc analyses to explore subgroup differences in greater detail.

By addressing these limitations, future studies can further elucidate the underlying mechanisms driving racial disparities in postpartum hemorrhage and inform targeted interventions to improve maternal outcomes.

Conclusion

Racial disparities in postpartum hemorrhage (PPH) remain a critical maternal health concern, with Hispanic and African American/Black mothers experiencing the highest risk, even after adjusting for socioeconomic and clinical factors [4,13]. Systemic inequities, including delays in hemorrhage recognition, variations in transfusion response times, and implicit bias in clinical decision-making, contribute to these disparities [3,15]. Community hospitals serving minority populations often face resource limitations, exacerbating PPH-related maternal morbidity [13,14]. Addressing these inequities requires standardized hemorrhage management protocols, quality improvement initiatives, racial bias training, and expanded Medicaid coverage for prenatal and postpartum care [1,15,16]. Implementing evidence-based, equity-driven strategies through coordinated efforts among healthcare providers, policymakers, and public health leaders is essential to ensuring all mothers receive high-quality, life-saving care during childbirth [4,5].

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