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Epidemiology of Immediate Postpartum Hemorrhage in District Hospitals in Burkina Faso, West Africa

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Abstract

Background: Immediate postpartum hemorrhage is a serious obstetric complication. It is responsible for significant mortality and morbidity. **Objectives:** To study the epidemiological, clinical, therapeutic and prognostic aspects of immediate postpartum hemorrhage in district hospitals in Burkina Faso from 1 January 2021 to 31 December 2022. **Methodology:** This was a descriptive and analytical multicenter cross-sectional study with retrospective data collection over a two-year period from 1 January 2021 to 31 December 2022. The study was conducted in ten district hospitals in Burkina Faso. The study included patients treated for immediate postpartum hemorrhage in the ten selected district hospitals. **Results:** The incidence of postpartum hemorrhage observed in our study was 3.42%. The mean age of patients was 25.2 ± 7 years, with extremes of 14 and 49 years. The majority of patients were housewives (79.80%) and resided in rural areas (73.40%). The main reason for admission was hemorrhage (66.18%), and 56.29% of patients were admitted by referral. We recorded a morbidity rate of 53.77% and a mortality rate of 0.81%. The factors statistically associated with the occurrence of complications were age under 20 years, admission by referral or evacuation, fewer than four prenatal contacts, and preterm delivery. **Conclusion:** Immediate postpartum hemorrhage remains a common obstetric complication in district hospitals in Burkina Faso. Identifying prognostic factors in our study is an important step towards improving patient care.

Keywords

Immediate Postpartum Hemorrhage, Epidemiology, District Hospitals

1. Introduction

Postpartum hemorrhage (PPH) is defined as blood loss greater than 500 mL at the time of delivery, regardless of the mode of delivery [1] [2]. It is considered immediate or primary when it occurs within the first 24 hours following childbirth. PPH is a frequent and serious obstetric complication, responsible for high maternal morbidity and mortality. According to the WHO, 303,000 women die each year from complications related to pregnancy and childbirth, and 25% of these deaths are due to postpartum hemorrhage [3]. It therefore represents the leading cause of maternal mortality worldwide. In Burkina Faso, Ouattara *et al.* reported a morbidity rate of 40.41% and a case fatality rate of 23.07% in a hospital-based study conducted at the University Hospital Center of Bogodogo in 2023 [4]. While the International Federation of Gynecology and Obstetrics (FIGO), in collaboration with the Society of Gynecologists and Obstetricians of Burkina (SOGOB), introduced clinical charts in 2022 aimed at optimizing the management of this obstetric emergency, few studies have assessed the actual situation in peripheral health facilities in Burkina Faso prior to their implementation, to our knowledge. In this context, we undertook this study to investigate the epidemiology of postpartum hemorrhage and to identify prognostic factors influencing the clinical outcomes of patients managed in district hospitals in Burkina Faso. The aim of this study is to provide an objective overview, to guide the strategies for implementing FIGO/SOGOB tools, and to contribute to strengthening national maternal health policies.

2. Methodology

This was a multicenter cross-sectional study with descriptive and analytical purposes, involving retrospective data collection over a two-year period from January 1, 2021, to December 31, 2022. The study was conducted in the district hospitals of Burkina Faso. Ten hospitals were selected for this study, namely the district hospitals of Nanoro, Boussé, Saponé, Kombissiri, Sapouy, Yako, Zorgho, Réo, Nongr-Massom, and Boulmiougou. The selection of these district hospitals was based on two main criteria: geographical accessibility and logistical and financial feasibility. Although the choice of sites was non-random, it aimed to ensure a minimum representativeness of hospital realities in Burkina Faso regarding maternal health.

The study population consisted of all patients who delivered or were admitted in the immediate postpartum period in the selected hospitals. Patients were included if the diagnosis of immediate postpartum hemorrhage (IPPH) was established, regardless of the mode of delivery, and if they were managed in the ten

selected district hospitals. Patients whose medical records were unusable were not included in the study.

Data were collected from medical records, consultation and hospitalization registers, delivery room registers, and operative report registers. Data processing and analysis were performed using Microsoft Excel 2021 and the statistical analysis software SPSS version 26. First, a descriptive study was carried out by calculating frequencies and means; second, an analytical study was conducted in which patients were subdivided into two groups depending on whether they presented complications or not. Chi-square or Fisher's Exact tests were used in bivariate analysis to determine variables associated with the occurrence of complications related to postpartum hemorrhage. A p-value < 0.05 was considered statistically significant. All variables with a p-value < 0.05 in bivariate analysis were included in a multivariate logistic regression model to identify factors associated with the occurrence of complications.

3. Results

3.1. Frequency

During the study period, 36,036 patients were admitted. We recorded 1233 cases of IPPH, corresponding to a hospital frequency of 3.42%.

3.2. Socio-Demographic Characteristics

The mean age of the patients was 25.2 ± 7 years, with extremes of 14 and 49 years. Patients under the age of 20 were the most represented, accounting for 32.44%. Housewives represented 79.80% of the sample, followed by pupils and students (12.98%). In our sample, 73.40% of the patients lived in rural areas, while those residing in urban areas accounted for 26.60%. Primigravidae and primiparous women represented 36.50% and 40.23% of our sample, respectively. The distribution of patients according to socio-demographic characteristics is presented in Table 1.

Table 1. Distribution of patients according to socio-demographic characteristics (n = 1233).

Socio-demographic characteristics	Number	Percentage (%)
Age groups (years)		
<20	400	32.44
[20 - 35]	709	57.50
>40	124	10.06
Occupation		
Housewife	984	79.80
Pupil/Student	160	12.98
Informal sector	32	2.60
Trader	21	1.70
Civil servant	21	1.70
Farmer	15	1.22

Continued

Residence		
Rural	905	73.40
Urban	328	26.60
Gravidity		
Primigravida	450	36.50
Paucigravida	362	29.36
Multigravida	421	34.14
Parity		
Primiparous	496	40.23
Pauciparous	367	29.76
Multiparous	370	30.01

3.3. Clinical and Paraclinical Aspects

Reason for consultation

In our study, 66.18% of patients were admitted for hemorrhage and 18.33% for labor. Prolonged labor and retained placenta accounted for 9.33% and 2.35% of admissions, respectively. Genital tract lacerations represented 1.38%, and anemia also accounted for 1.38%.

Mode of admission

The majority of patients (56.29%) were referred from primary health care facilities. Evacuated patients and those admitted directly represented 33.25% and 10.46% of our sample, respectively.

Gynecological history

In our sample, 13.71% of patients had used at least once a modern contraceptive method. The most commonly used methods were implants (47.92%), injectables (20.71%), and pills (17.75%). Intrauterine devices accounted for 7.10% of contraceptive methods used. Furthermore, 11.92% of women had experienced at least one abortion.

Medical history

Regarding medical history, 14.04% of patients presented with a specific pathological antecedent. Hypertension, hepatitis B infection, and asthma were the most frequent medical conditions, with respective rates of 60.69%, 10.40%, and 1.73%. There was also one patient with diabetes and another with heart disease.

Surgical history

With respect to surgical history, 12% of patients reported having previously undergone a surgical intervention. Among these patients, 21.62% had a history of cesarean section and 18.24% a history of myomectomy.

Prenatal care

In our sample, 5.19% of patients had not attended any prenatal consultations.

Nearly half (47.12%) attended between one and three consultations, and 45.58% attended between four and seven. Only 2.11% of patients completed the eight prenatal contacts recommended by WHO. In addition, 7.38% did not benefit from iron and folic acid supplementation during pregnancy.

General Examination

At admission, 88.24% of patients presented with a good general condition, 11.43% with a fairly good condition, and 0.32% with a poor condition. The state of consciousness was normal in 93.67% of patients. Regarding conjunctival examination, 39.66% were normally colored, 37.71% moderately colored, and 22.63% were pale.

Hemoglobin level

The mean hemoglobin level was 8.6 ± 2 g/dl, with extremes of 1.8 and 16 g/dl. Among the patients, 23% had a level below 7 g/dl, 40.8% had a level between 7 and 10 g/dl, and 13.9% had a level between 10 and 11 g/dl. Patients with a level greater than or equal to 11 g/dl represented 22.3% of our sample.

Delivery and Causes of Postpartum Hemorrhage

Delivery occurred at term in 90.35% of cases and prematurely in 8.27%. Patients who delivered in a post-term context represented 1.3%. Vaginal delivery was performed in 92.94% of cases and cesarean section in 7.06%. An episiotomy was performed in 18.09% of patients. The most frequent causes of postpartum hemorrhage were retained placental fragments (46.80%) and uterine atony (28.22%). Perineal tears were observed in 15.49% of patients, cervical tears in 15.41%, and vaginal tears in 9.33%.

3.4. Therapeutic Aspects

Medical treatment

Medical treatment consisted of the administration of oxytocin (57.02%), misoprostol (33.82%), and hemostatic agents (1.70%). Intravenous fluid infusions and blood transfusions were performed in 18.33% and 43.55% of patients, respectively.

Obstetric and surgical treatment

Uterine revision was performed in 69.50% of patients. Intrauterine tamponade and bimanual compression were carried out in 5.43% and 1.14% of cases, respectively. Surgical treatment included speculum examination with suturing of lesions in 27.17% of cases. Five patients underwent uterine artery ligation, and another five underwent subtotal hemostatic hysterectomy.

3.5. Prognostic Aspects

The outcome was favorable in 46.23% of patients. However, 53.77% of patients presented complications such as moderate anemia (28.95%), severe anemia (26.93%), and shock (4.22%). Among these patients with complications, 16.14% were referred to higher-level health facilities. We recorded 10 cases of in-hospital maternal deaths, corresponding to a fatality rate of 0.81%.

3.6. Factors Associated with the Occurrence of Complications

Bivariate analysis

In bivariate analysis at a 5% significance threshold of socio-demographic, gynecological, and obstetric characteristics, patient age (p = 0.019), mode of admission (p = 0.001), number of antenatal consultations (p = 0.05), and gestational age at delivery (p = 0.008) were factors statistically associated with the occurrence of complications. The bivariate analysis of socio-demographic and obstetric factors is presented in Table 2.

Table 2. Bivariate analysis of socio-demographic and obstetric factors associated with complications (n = 1233).

Socio-demographic and obstetric factors	Complications		p-value
	No	Yes	
Age			**0.019**
<20	165	235	
[20 - 35]	349	360	
>35	56	68	
Residence			0.9
Urban	151	177	
Rural	419	486	
Gravidity			0.2
Multigravida	192	229	
Paucigravida	182	180	
Primigravida	196	254	
Parity			0.3
Multiparous	169	201	
Paucipararous	181	186	
Primiparous	220	276	
Number of antenatal consultations			**0.05**
0	24	40	
[1 - 3]	249	332	
≥4	238	350	
Mode of admission			**0.001**
Direct admission	89	40	
Evacuation	229	181	
Referral	252	442	
Gestational age at delivery			**0.008**
Term	499	615	
Preterm	60	42	
Post-term	11	6	
Mode of delivery			0.80
Vaginal	531	615	
Cesarean	39	48	

Multivariate Analysis

The multivariate analysis identified several factors statistically associated with an increased risk of complications. These included maternal age under 20 years (OR = 1.38, 95% CI [1.12 - 1.70], p = 0.002), absence of antenatal consultation (OR = 1.80, 95% CI [1.25 - 2.60], p = 0.002), a number of antenatal consultations between 1 and 3 (OR = 1.30, 95% CI [1.00 - 1.65], p = 0.045), and admissions by referral (OR = 3.60, 95% CI [2.90 - 4.50], p = 0.001) or evacuation (OR = 1.70, 95% CI [1.30 - 2.25], p = 0.001). Preterm delivery was associated with a 30% reduction in the risk of developing complications related to postpartum hemorrhage (OR = 0.70, 95% CI [0.48 - 1.00], p = 0.05). The multivariate analysis of factors associated with the occurrence of complications related to immediate postpartum hemorrhage is presented in Table 3.

Table 3. Multivariate analysis of socio-demographic, gynecological, and obstetric factors associated with the occurrence of complications (n = 1233).

Socio-demographic and obstetric factors	Complications		OR [IC to 95%]	p-value
	No	Yes		
Age				
<20	165	235	1.38 [1.12 - 1.70]	**0.002**
[20 - 35]	349	360	-	-
>35	56	68	1.20 [0.90 - 1.60]	0.2
Number of antenatal consultations				
0	24	40	1.80 [1.25 - 2.60]	**0.002**
[1 - 3]	249	332	1.30 [1.00 - 1.65]	**0.045**
≥4	238	350	-	-
Mode of admission				
Direct admission	89	40	-	-
Evacuation	229	181	1.70 [1.30 - 2.25]	**0.001**
Referral	252	442	3.60 [2.90 - 4.50]	**0.001**
Gestational age at delivery				
Term	499	615	-	-
Preterm	60	42	0.70 [0.48 - 1.00]	**0.050**
Post-term	11	6	0.60 [0.25 - 1.40]	0.230

4. Discussion

4.1. Study Limitations

This study presents certain limitations that should be highlighted. First, the selection of district hospitals was based on criteria of geographical accessibility and logistical and financial feasibility. This non-random selection, although it allowed

for a minimal representativeness of the hospital realities in Burkina Faso, may limit the generalization of the results, particularly for more remote or under-resourced facilities. Second, the study period extended until the end of 2022, during which the International Federation of Gynecology and Obstetrics (FIGO), in collaboration with the Society of Gynecologists and Obstetricians of Burkina (SOGOB), introduced clinical charts aimed at improving the management of postpartum hemorrhage. The potential impact of this intervention on the results observed in the latter part of the data collection period was not specifically assessed in our analysis. This development may have influenced certain indicators, which constitutes an additional limitation to be considered in the interpretation of the results.

4.2. Epidemiological Aspects

The hospital frequency of immediate postpartum hemorrhage (IPPH) observed in our study was 3.42%. This prevalence is similar to those reported by Belhaj *et al.* [5] in Morocco (3.25%) and by Hien *et al.* [6] at the University Hospital of Tengandogo in Burkina Faso (3.4%). However, Ouattara *et al.* reported a lower prevalence of 1.6% in a study conducted at the University Hospital of Bogodogo in Burkina Faso [4]. Essiben *et al.* in Cameroon reported a higher frequency, reaching 6.3% [7]. This variability between countries and health facilities may be explained by several factors, including differences in management protocols, availability of qualified human resources, access to technical equipment, and the overall quality of obstetric care. Furthermore, this observed disparity may also be related to heterogeneity in the diagnosis of IPPH. Indeed, the assessment of blood loss remains difficult during vaginal delivery and even more so during cesarean section, where distinguishing blood from amniotic fluid is complex. This difficulty may lead to underestimation of blood loss and partly explain the differences in prevalence reported in the literature.

The mean age of patients in our study was 25.2 ± 7 years. Similar results were reported by Ouattara *et al.* [8], with a mean age of 26.3 ± 6.1 years, and by Hien *et al.* [6], who found a mean age of 28.2 ± 6.7 years. This relatively young patient profile may be explained by the demographic structure of Burkina Faso, characterized by a predominantly young population [9]. It may also reflect a particular vulnerability of young women, who are at increased risk of obstetric complications. This risk is linked to physiological immaturity, but also to insufficient antenatal follow-up due to limited decision-making autonomy.

In our study, the majority of patients were housewives (79.80%). Comparable observations were made by Essiben *et al.* [7] in Cameroon, who reported a predominance of housewives with a rate of 73.3%. In the study by Mba Edou *et al.* [10] in Gabon, 80.1% of women were unemployed. Several national studies in Burkina Faso have also confirmed this trend [6] [8]. The absence of stable income limits women's financial and decision-making autonomy, reducing their access to information and health care. This situation increases their exposure to obstetric complications, particularly IPPH.

Women residing in rural areas were the most represented, with a rate of 73.40%. This predominance may be explained by the fact that the hospitals involved in this study serve as direct referral structures for health and social promotion centers in rural areas. Moreover, limited access to emergency care, shortage of qualified personnel, and delays in the management of obstetric complications in rural settings may contribute to the occurrence and severity of immediate postpartum hemorrhage.

4.3. Clinical Aspects

In our study, 5.19% of patients had not undergone any antenatal follow-up, and only 2.11% had achieved the eight contacts recommended by the WHO. This low antenatal coverage is comparable to that observed in several sub-Saharan African countries, where financial, geographical, and sociocultural barriers limit access to antenatal care and contribute to the persistence of obstetric complications [11] [12].

Regarding the mode of admission, more than half of the patients (56.29%) were referred and 33.25% evacuated, which illustrates the role of district hospitals as referral structures for peripheral health centers.

At admission, the majority of patients presented with good consciousness status (93.67%), but nearly a quarter had pale conjunctivae, indicating pre-existing anemia. Antepartum maternal anemia is recognized as a major aggravating factor, as it not only increases the risk of postpartum hemorrhage but also maternal morbidity and mortality associated with it [13] [14]. It therefore appears necessary to pay particular attention to the prevention and management of anemia in pregnant women.

In our series, the main causes of immediate postpartum hemorrhage were retained placental fragments (46.80%) and uterine inertia (28.22%). While uterine atony is reported as the leading cause in several studies [6] [15], the high rate of placental retention observed in our study highlights the need to strengthen staff training and to promote the systematic application of WHO recommendations regarding the Active Management of the Third Stage of Labor (AMTSL). However, adherence to this practice was not specifically monitored in our study and could represent a challenge in the settings studied, which may partly explain the high frequency of placental retention observed.

4.4. Therapeutic Aspects

Medical treatment was mainly based on the administration of oxytocin (57.02%) and misoprostol (33.82%). These results are consistent with WHO recommendations, which advocate the systematic use of uterotonics in the prevention and treatment of immediate postpartum hemorrhage [16]. Blood transfusion was performed in 43.55% of patients, reflecting the severity of the blood loss observed. However, the irregular availability of blood products in hospitals constitutes a major challenge already reported in several African studies [17] [18].

From an obstetric perspective, uterine revision was performed in 69.50% of patients, reflecting the high rate of placental retention identified as the main cause of IPPH in our study. Surgical treatment was required in 27.17% of cases, mainly through suturing of cervical or perineal lesions. More invasive interventions, such as uterine artery ligation and subtotal hemostatic hysterectomy, were performed in 0.4% of cases each. Hysterectomy remains a radical measure reserved for extreme situations and considered as a last resort.

4.5. Prognostic Aspects

In our study, the outcome was favorable in 46.23% of patients, but more than half (53.77%) presented complications. Hien *et al.* [6] at the University Hospital of Tengandogo and Ouattara *et al.* [4] at the University Hospital of Bogodogo reported lower morbidity rates of 38.1% and 40.41%, respectively. This difference observed within the same country could be explained by the fact that district hospitals, as lower-level structures, have more limited technical facilities and specialized resources. These results highlight the importance of strengthening the technical and human capacities of district hospitals in order to improve patient management.

We recorded 10 cases of maternal death, corresponding to a case fatality rate of 0.81%. Ouattara and Hien *et al.* reported respective rates of 1.7% and 6.1% in the university hospitals of Bogodogo and Tengandogo. This difference could be explained by the fact that district hospitals evacuate severe cases to university hospitals. Thus, patients often arrive in a critical condition at these centers, which contributes to the higher fatality rates recorded in these health facilities.

4.6. Prognostic Factors

At the end of the bivariate and multivariate analysis, several factors associated with the occurrence of complications related to IPPH were identified. Thus, maternal age under 20 years significantly increased the risk of complications (OR = 1.38; p = 0.002), confirming the vulnerability of adolescents, often linked to physiological immaturity and insufficient antenatal follow-up. Studies conducted in sub-Saharan Africa have shown that young mothers are at increased risk of obstetric complications, particularly IPPH [19] [20].

The mode of admission appears to be a determining factor. Patients who were referred (OR = 3.60; p = 0.001) or evacuated (OR = 1.70; p = 0.001) had a significantly higher risk of complications than those admitted directly. This observation may illustrate the negative impact of transfer delays and shortcomings in initial management at peripheral health facilities. The higher risk of complications observed among referred patients compared to evacuated ones could be explained by differences in transfer conditions. Indeed, referred patients, left to themselves, may lose time before reaching the referral facility, which delays management and favors worsening of the clinical condition. In contrast, evacuations are generally medicalized, allowing faster orientation and therapeutic interventions during transport, which helps to limit complications.

The absence of antenatal consultations (OR = 1.80; p = 0.002) or a reduced number of consultations (1 to 3) (OR = 1.30; p = 0.045) increased the risk of complications. These results confirm the crucial role of antenatal care in the prevention and early detection of obstetric risks [21] [22].

Our results indicate that women who delivered preterm had a 30% reduced risk of developing complications related to postpartum hemorrhage compared to those who delivered at term (OR = 0.70; 95% CI [0.48 - 1.00]; p = 0.05). This association could be explained by the lower birth weight generally observed in preterm deliveries, which reduces the mechanical constraints exerted on the perineum at the time of expulsion. This decreased pressure lowers the risk of perineal tears, limits blood loss, and consequently reduces the risk of hemorrhagic complications. However, Whelan *et al.* [23], in a secondary analysis of a large retrospective cohort, reported that preterm deliveries were associated with significantly higher rates of postpartum hemorrhagic complications compared to term deliveries (adjusted RR: 1.42; 95% CI [1.27 - 1.60]). This divergence between our results and those of Whelan *et al.* may be related to contextual factors that could influence the observed association, such as the characteristics of the populations studied, local obstetric practices, or management modalities. Thus, our results should be interpreted with caution. The divergence with the data of Whelan *et al.* highlights the need for further research. Multicenter and prospective studies, including varied obstetric contexts and diverse populations, are essential to confirm or refute this association and to better understand the influence of gestational age on the risk of complications related to IPPH.

5. Conclusion

Immediate postpartum hemorrhage remains a frequent obstetric complication in district hospitals in Burkina Faso. It is responsible for significant maternal mortality and morbidity. The identification of prognostic factors in our study constitutes an essential step toward improving patient management. However, prevention remains a major challenge. It therefore appears necessary to conduct studies aimed at identifying the risk factors for the occurrence of postpartum hemorrhage in order to better anticipate its occurrence and reduce its impact on maternal health.

Authors' Contributions

All authors contributed to the preparation of this manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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