

# A longitudinal study of incidence and mortality of postpartum hemorrhage at the Gambian tertiary hospital

## Abstract

**Background:** Postpartum Haemorrhage (PPH) is the leading cause of maternal morbidity and mortality in low-income countries, and the primary cause of nearly one quarter of all maternal deaths globally. Women giving birth in low-resource settings are at a higher risk of death than their counterparts in resource-rich settings.

**Objective:** To determine the incidence and mortality of postpartum haemorrhage at the Edward Francis Small Teaching Hospital from January 1<sup>st</sup> – December 31<sup>st</sup> 2018.

**Method:** This study was a retrospective, quantitative, hospital-based longitudinal study. The data was collected from the patient's folders at the obstetrics department with no contact to the patients or caregivers. The patient's socio-demographic and clinical data was entered into a computer database and analyzed using SPSS software version 24.0.

**Results:** The study revealed that the incidence of PPH was 74.6%. It also shows that the most common cause of PPH was trauma 57 (42.5%). Majority of the deliveries were SVD at 87.3%, referred cases was 78.4%. Mortality due to PPH was 17.5%.

**Conclusion:** The incidence of postpartum haemorrhage was high, trauma the leading cause but mortality showed remarkable decline when compared with previous study.

**Keywords:** postpartum, haemorrhage, incidence, maternal mortality

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**Abbreviations:** AVD, assisted vaginal delivery; C/S, cesarean section; EFSTH, Edward Francis small teaching Hospital; HWs, health workers; LRC, low resource countries; PPH, postpartum haemorrhage; SMO, severe maternal outcome; SVD, spontaneous vaginal delivery; WHO, World Health Organization

## Background

Postpartum Haemorrhage (PPH) is the leading cause of maternal morbidity and mortality in low-income countries, and the primary cause of nearly one quarter of all maternal deaths globally.<sup>1</sup> Women can quickly bleed and die soon after giving birth and most of the deaths occur during the first 24 hours of birth. Women giving birth in low-resource settings are at a higher risk of death than their counterparts in resource-rich settings. In the developing world about 1.2% of deliveries are associated with PPH and when PPH occurred about 3% of women died. Globally it occurs about 8.7 million times and results in 44,000 to 86,000 deaths per year making PPH the leading cause of death during pregnancy. About 0.4 women per 100,000 deliveries die from PPH in the United Kingdom while about 150 women per 100,000 deliveries die in sub-Saharan Africa.<sup>2</sup>

A systematic review reported highest rates of PPH in Africa (27.5%), and the lowest in Oceania (7.2%), with an overall rate globally of 10.8%. The rate in both Europe and North America was around 13%. The rate is higher for multiple pregnancies (32.4% compared with 10.6% for singletons), and for first-time mothers (12.9% compared with 10.0% for women in subsequent pregnancies).<sup>2</sup> The overall rate of severe PPH (>1000 ml) was much lower at an overall rate of 2.8%, again with the highest rate in Africa (5.1%) and The Gambia is not an exception.

In 2014, a Gambia study was conducted in the same tertiary hospital from the period (January 1<sup>st</sup> 2007-December 31<sup>st</sup> 2014) citing

that maternal mortality including PPH in the Gambia has been on a decrease since the 1990s, currently at 2.29% decrease. However, not much decline in the maternal mortality ratio as well as prevalence of PPH has occurred at the tertiary hospital (EFSTH), which accounts for 30% of the 340 annual maternal deaths in the Gambia with death from Hemorrhage being (26.5%).<sup>3</sup>

Hemorrhage continues to be one of the leading causes of maternal death in developing countries, and the predominant cause in Africa (34%) and Asia (31%).<sup>4</sup> Postpartum hemorrhage (PPH), defined as blood loss  $\geq 500$  mL following spontaneous vaginal delivery (SVD), occurs in approximately 6% of deliveries globally and severe PPH ( $\geq 1000$  mL) following cesarean section is an additional 1.8%, with wide variation across regions of the world.<sup>4</sup>

Postpartum hemorrhage can be divided into 2 types: Early(primary) postpartum hemorrhage, which occurs within 24 hours of delivery, and Late(secondary) postpartum hemorrhage, which occurs after 24 hours to 6 weeks after delivery.<sup>5</sup> Most cases of postpartum hemorrhage, greater than 99%, are early postpartum hemorrhage.<sup>5</sup>

Common causes of postpartum hemorrhage are uterine atony, trauma, retained placenta or placental abnormalities, and coagulopathy, commonly referred to as the "four Ts." Other risk factors include obesity, fever during pregnancy, bleeding before delivery, and heart disease.<sup>2</sup> A recent systemic review (2019)<sup>6</sup> on prevalence and risk factors of postpartum haemorrhage, found that the risk factors of PPH include: the use of assisted reproductive treatment (ART), Pregnancy Induced Hypertension, severe vaginal/perineal lacerations and macrosomia. Some scholars working in America, reported spontaneous delivery, caesarean section, forceps delivery, labour induction, non-use of oxytocin or other uterotonic agents in the third stage of labour, history of PPH, multiple pregnancies and fetal macrosomia as risk factors of PPH.<sup>7</sup>

The majority of postpartum haemorrhage could be avoided through the use of prophylactic uterotonics after the delivery of the baby and timely appropriate application of active management of third stage of labour.

### Postpartum Haemorrhage in relation to maternal morbidity

PPH remains a significant cause of maternal mortality and morbidity like hypovolaemic shock, anaemia, multi-organ failure, consumptive coagulopathy, disseminated intra-vascular coagulation (DIC), blood transfusion related complications and hysterectomy leading to loss of childbearing potential and on psychological wellbeing.<sup>8-10</sup>

Postpartum hemorrhage is the second leading single cause of maternal mortality, ranking behind preeclampsia/eclampsia. The condition is responsible for 25% of delivery-associated deaths, and this figure is as high as 60% in some countries.<sup>11</sup> In sub-Saharan Africa, where blood supply is critically inadequate, severe haemorrhage is a leading cause of maternal deaths.<sup>12</sup> In September 2015, a cross-sectional study was done in Mali and Senegal which showed that living in Mali is associated with a higher risk of PPH-related maternal mortality than in Senegal.<sup>13</sup> No difference in the characteristics of women, pregnancy and childbirth between the two countries could explain this result. However, the prevalence of PPH in their study was higher in Senegal than in Mali.<sup>14</sup>

In 2014, a study conducted in the Gambia revealed that haemorrhage (26.5%), hypertensive disease (19.8%), sepsis (10.6%) and anaemia (8.9%) were consistently the commonest causes of maternal mortality in the period under review.<sup>3</sup>

Therefore, the objective of the study was to determine the incidence and mortality of postpartum haemorrhage at the Gambian tertiary.

### Methodology

This was a retrospective, quantitative, hospital-based study with secondary data analysis through revision of patient's folders from the record department.

Inclusion and exclusion criteria: all women during the year under review who were diagnosed and treated at EFSTH for obstetrics haemorrhage in the postpartum were included in the study. Women with other conditions in the maternity were excluded from further analysis as it was a longitudinal study. The measured variables includes socio- demographic characteristics (age, address, ethnicity, parity); obstetrics characteristics (referred, mode of delivery, amount of blood loss, clinical diagnosis, management received, length of hospital stay, and hospital records of mortality).

Objective definitions used in this study:

- In the patient folder she was bleeding and had blood transfusion.
- She was bleeding and was taken to theatre for examination under anaesthesia.
- It was documented that the estimated blood loss was above 500mls for vaginal delivery, or 1000ml> for caesarean section.
- That she has hypovolaemic shock and needed resuscitation on arrival.

**Data analysis:** Data was entered into computer database consistent checks performed and data was analyzed with SPSS version 26. Results were presented in simple frequency tables.

**Ethical consideration:** The study was approved by ethics and scientific committee of the Edward Francis Small Teaching Hospital and the community medicine department of school of medicine and allied health sciences.

### Results (Tables 1–4)

**Table 1** The frequency distribution of sociodemographic variables

Variable	Category	N (%)
Age	15-25	49 (36.6)
	26-35	56 (41.8)
	36-45	29 (21.6)
Address	Rural	47 (35.1)
	Urban	87 (64.9)
Ethnicity	Mandinka	23 (17.2)
	Wolof	11 (8.2)
	Jola	12 (9.0)
	Fula	32 (23.9)
Parity	Others	54 (41.8)
	0	21 (15.7)
	1-3	58 (43.3)
	4-7	44 (32.8)
	>7	11 (8.2)

The study included a total of 134 patients, who had obstetrics haemorrhage in the postpartum, 100 met the objective criteria for postpartum haemorrhage in this study and the other 34 were unquantified postpartum haemorrhage patients. Fula tribe and high parity was associated with PPH.

**Table 2** shows the frequency table of obstetrics characteristics of study population

Variable	Category	N (%)
Referred	Yes	105 (78.4)
	No	29 (21.6)
Mood of presentation	Alert	115 (85.8)
	Coma	19 (14.2)
Mood of delivery	SVD	117 (87.3)
	AVD	6 (4.5)
	C/S	11 (8.2)
Clinical diagnosis	PPH	100 (74.6)
	Other forms of haemorrhage	34 (25.4)
Management received	Medical	128 (95.5)
	Surgical	6 (4.5)
Length of hospital stay	Day(s)	123 (91.8)
	Weeks	9 (6.7)
	Months	2 (1.5)

Of the total participants, about 78.4% were referred from other health centers and hospitals, 87.3% had spontaneous vaginal delivery and 100% loss >500mls of blood.

**Table 3** Incidence and causes of postpartum haemorrhage

Variable	Category	N (%)
Incidence	PPH	100 (74.6)
	Others	34 (25.4)
	Total	134 (100%)
PPH Causes	Uterine atony	21 (15.7)
	Trauma	57 (42.5)
	Retained placenta	13 (9.7)
	Thrombin	3 (2.2)
	Undocumented	6 (4.5)
	Total	100(100%)

The incidence of PPH (74.6%) was high. The most common cause of PPH was laceration (Trauma) n=57 (42.5%), while thrombin was the least cause at 2.2%.

**Table 4** Mortality and common causes

Variable	Mortalities	Category	N (%)
Due to Postpartum Hemorrhage		Uterine atony	5 (35.7%)
		Retained placenta	2 (14.3%)
		Trauma	4 (28.6%)
		Thrombin	2 (14.3%)
		Undocumented	1 (7.1%)
		Total	14(100%)

The total mortality of the year from PPH was 14(100%), with uterine atony cause of PPH being the highest cause of mortality at 5(35.7%), followed closely by trauma 4 (28.6%).

## Discussion

During the period under review, out of 3,491 deliveries, 134 cases of haemorrhages that occurred in the postpartum were reported. However, the study showed an incidence of 76% of PPH when we study haemorrhages recorded in the postpartum using objective clinical definition as documented in the patient folders. The total mortality of the year was 21(100%) with high percentage of deaths due to obstetric haemorrhage 14 (66.7%). Trauma was the most common cause 57 (42.5) % followed by uterine atony 21 (15.7%). The study recorded 2.2 % incidence of thrombin as a causative factor of postpartum haemorrhage in our setting.

Regarding maternal mortality due to obstetrics haemorrhage in the tertiary hospital in the Gambia, the trend is showing reduced incidence. In 2014 it was 26.5%,<sup>3</sup> four years later, in our data analysis the mortality due to haemorrhage has reduced approximately 2-folds (14.0%). The socio-demographic representation of the study population did not change remarkably as the age distribution of mothers that died due to haemorrhage was almost always similar. The reason for reducing trend of mortality due to haemorrhage at the hospital was the proactive protocol of managing abruption, placenta praevia and improved availability of blood products. The protocol of transfusing blood before delivery of baby for abruptio placental started in 2014 and we have observed drastic reduction of mortality due to bleeding. The triad of haemorrhage, hypertensive disorders and sepsis in this order as common causes of maternal mortality for over 3 decades has changed in the 20s to preeclampsia/Eclampsia, haemorrhage and sepsis yet unpublished but internal audit have shown the reversed order.

Concerning age of mothers who had haemorrhage in this study the distribution shows that the majority of them were between the ages of 26-35 (41.8%) which was similar to previous study in the same hospital.<sup>3</sup> The trend towards extremes of reproductive age in the distribution of haemorrhage cannot be over emphasized as genital trauma was the most common cause of haemorrhage.

For reasons beyond the scope of the study, the Fula ethnic minority in the Gambia has been attributed to bleeding excessively after delivery but no robust evidence to confirm this. In our study Fula's (23.9%) was the most common ethnic group affected, particularly when husband and wife are from the same ethnic group.

Our study also revealed that majority of the PPH cases were referred (78.4%) from secondary and tertiary health centers and hospitals, which was expected as the hospital is a referral centre for all complicated cases in obstetrics. Other scholars who worked on the subject had similar report.<sup>15</sup> Participants in the urban areas were mostly affected (64.9%) than their counterparts in the rural areas (35.1%). Among the 100 patients, spontaneous vaginal delivery (SVD) was the most common mode of delivery (87.3%). A similar study conducted

in Pakistan,<sup>16</sup> majority (50%) had caesarean section as the commonest mode of delivery and SVD was (23%).

Of the 134 cases of haemorrhage 85.8% were conscious on arrival which was consistent with the study in 2011.<sup>17</sup> Our study revealed that the most common cause of PPH was trauma 57 (42.5%) followed by uterine atony 21 (15.7%). Trauma as the leading cause of haemorrhage in this study is another change of trend because uterine atony has always remained the most common cause of bleeding in the postpartum and corrective measures and or preventive measures such as active management of 3<sup>rd</sup> stage of labour the phenomenal 4<sup>th</sup> stage of labour has been suggested. All geared towards controlling or preventing atony to avoid postpartum haemorrhage. Perhaps protocols have been well applied and slight reduction of atony was recorded in this study. The previous study<sup>3</sup> has uterine atony as the most common cause. Similarly, some have reported the order of uterine atony, trauma and retained products of conception as the most common triad of PPH.<sup>18</sup>

Our study showed similar trends of well-established risk factors of PPH such as increased maternal age, trauma, retained products, assisted vaginal deliveries, parity both in nulliparity and high parity which was similar in the study conducted in Australia.<sup>19</sup>

It was also discovered that visual estimation of blood loss was not accurate as values were underestimated in cases of trauma and C/S deliveries leading to untimely diagnosis, delayed interventions and mortality. Scholars working elsewhere have consistently reported similar results.<sup>15,20,21</sup>

## Study limitation

Visual estimation method of blood loss has been proven to underestimate blood loss in the postpartum. This may delay diagnosis and predispose to morbidity and mortality of PPH.

Information retrieval from records office and folders of patients was a nightmare which invariable will affect the data quantity and quality of this study.

However, the strength of the study was the longitudinal design which looked at postpartum haemorrhage and further categorize into objective parameters that suggest need of transfusion and those which were not counted though bleeding in the postpartum was recorded in their folders.

## Conclusion

On the basis of the study findings, it was concluded that the incidence and mortality of postpartum haemorrhage is still a major health concern in the Gambia among parturients which hasn't changed remarkably over the years. The majority of cases were due to genital laceration during spontaneous & assisted vaginal delivery and also due to unknown causes.

Therefore, we recommend clear information on danger signs of pregnancy to parturients and importance of quality antenatal care among health care workers. Early referral and hospital delivery for high risk mothers may have positive impact in the reduction of morbidity and mortality of PPH. We recommend that quantitative estimation of blood loss method be used instead of visual estimation method of PPH on our labour ward.

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**Authors' contributions:** MS conceived the study and contributed to the study design, data collection, and data analysis. MA wrote the manuscript. All authors read and approved the final manuscript.

**Availability of data and materials:** The datasets generated and/or analysed during this study are available from the corresponding author on reasonable request.

**Ethics approval and consent to participate:** Ethical clearance to undertake this study was sought from the Research and Publication Committee at the School of Medicine and Allied Health Sciences, University of The Gambia and approval was granted. Participants' identifiable information was carefully kept and was neither used nor shared.

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## Conflicts of interest

The authors declare that they have no competing interests.

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