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Postpartum Hemorrhage (PPH) and Low Birth Weight (LBW) in Anemia in Pregnancy in St. Lucy Catholic Hospital, Tamale, Ghana

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Abstract

This article aimed to explore the relationship between postpartum hemorrhage and low birth weight in pregnant women with anemia at St. Lucy Catholic Hospital in Tamale. The study employed a retrospective descriptive research design with a quantitative approach to analyze records of 165 pregnant women. Additionally, factual information was collected using a self-developed questionnaire administered to participants in the maternal health registry at St. Lucy Catholic Hospital in Tamale between July 2023 and July 2024. A thorough literature review was carried out to compile an inventory of knowledge about low birth weight and postpartum hemorrhage in pregnant women with anemia at the said facility. The study revealed that within one year (2023-2024), 95.8% of the pregnant women who visited the hospital and were anemic had low birth weights. However, 9.1% of the anemic expectant mothers experienced postpartum hemorrhage. The research was informed by the Anemia-PPH-LBW Cascade Theory, which posits that anemia during pregnancy triggers events such as placental insufficiency, uterine atony, and coagulopathy, thereby increasing the risk of postpartum hemorrhage and low birth weight. Midwives should consciously implement the active management of the third stage of labor. Through education on diet and adherence to medications, anemia could be reduced, positively affecting low birth weight and minimizing postpartum hemorrhage.

Keyword: Pregnancy, Anemia, Low birth weight, Postpartum Hemorrhage

Introduction

Anemia, as defined by the World Health Organization (WHO) 2023 ^[1], is a decreased number of red blood cells (RBCs) or a hemoglobin (HGB) level within RBCs that falls below a specified reference range (less than 12 g/dL for non-pregnant women and less than 13 g/dL for men). This

condition results in a reduced ability to transport oxygen, which affects the tissues' physiological needs.

Globally, anemia affects an estimated 40% of younger children (aged 6-59 months), approximately 30% of women aged 15-49, and 37% of pregnant women (World Health Organization [WHO], 2023) ^[1]. Deaths through pregnancy-

related issues affect women in low-income countries as compared to higher-income countries. For example, in Sub-Saharan Africa, the lifetime risk ranges from one in 41 women to one in 3,300 in countries with higher incomes (UNICEF, 2021) [2]. Higher rates of morbidity and mortality in children and pregnant women are associated with anemia (Centers for Disease Control and Prevention [CDC], 2022) [3].

In Ghana, two out of ten girls become pregnant before they turn 18 years old (UNICEF 2021) [2]. During pregnancy, women undergo significant anatomical and physiological changes (Gangakhedkar & Kulkarni, 2021) [4]. These physiological changes during pregnancy increase susceptibility to anemia (Vinturache & Khalil, 2021) [5].

Some primary causes of anemia in pregnancy include inadequate RBC production or abnormal RBC loss during pregnancy, already existing medical cases, an unhygienic setting, and low socioeconomic status of the individual or household level, in particular, low education, unemployment, and limited access to quality healthcare often precede this (International Federation of Gynecology and Obstetrics, 2023) [6].

Anemia in pregnant women is a crucial health crisis that has led to 50 million Disability-Adjusted Life Years (DALYs) in 2019, and worldwide, it afflicted 500 million females aged 15 to 49 years in that coeval year. From this number, 32 million were expectant females (WHO, 2023) [1]. Anemia is suspected when a pregnant woman's hemoglobin concentration is less than 10 gm/dl. (Lewkowitz & Tuuli 2023) [7].

The burden of anemia among pregnant women is higher in low- and middle-income countries than in high-income countries (WHO, 2023) [1]. WHO reiterated that the Eastern Hemisphere and Africa are regions heavily impacted by anemia in pregnancy, affecting 244 million and 106 million women of reproductive age, respectively. In Ghana, according to the 2022 GDHS, 41% of women are affected by anemia, with 23% experiencing mild cases, 17% moderate, and 1% severe. Nonetheless, anemia affects 51% of pregnant women compared to 40% of women without children.

Cross-sectional research was undertaken in the Northern part of Ghana at the Tamale Teaching Hospital in 2016 on fact-finding to assess the frequency and to determine the attributes of anemia in expectant mothers in pre-birth care attendants. The findings showed that 50.8% of pregnant women were diagnosed with anemia, and its frequency was linked to an increase with gestational age and the trimester of pregnancy. The study recommended that education on anemia should be amplified (Wemakor, 2019) [8]. The findings suggest that if anemia education should be intensified in Tamale Metropolis, the St Lucy Catholic Hospital is no exception. Thus, Postpartum Hemorrhage (PPH) and Low Birth Weight (LBW) in Anemia in Pregnancy was carried out to ascertain what pertains in the said hospital.

Problem Statement

Anemia in expectant women, linked to postpartum hemorrhage and low birth weight, is a significant concern in public health and an indicator related to morbidity and mortality. Every health institution worldwide is likely to face this public health challenge, including developing countries like Ghana, specifically Tamale and its health facilities. It is against this backdrop that the study sought to investigate postpartum hemorrhage and low birth weight concerning

anemia among expectant women at St. Lucy Catholic Hospital in Tamale.

Literature Review

In 2017, Geller *et al.* [9] proposed a theory that placental insufficiency, uterine atony, and coagulopathy are among the events triggered by anemia during pregnancy, increasing the risk of both postpartum hemorrhage (PPH) and low birth weight (LBW). Additionally, a theory by Kavle in 2018 [10] on anemia and adverse pregnancy outcomes showed that hypoxia resulting from maternal anemia hinders fetal growth and raises the chance of LBW. Thus, anemia impairs uterine contractions and leads to coagulopathy, which heightens the risk of PPH.

Postpartum Hemorrhage in Anemia in Pregnancy

Primary PPH is characterized by the World Health Organization [WHO] (2017) [11] as blood loss of at least 500 milliliters within 24 hours following vaginal delivery and at least 1000 milliliters within 24 hours following cesarean delivery or any amount of blood loss that can lead to hemodynamic instability.

The risk of postpartum hemorrhage is greatly increased by maternal anemia. (Nair *et al.*, 2018) [12]. Huwaida's theory (2024) [13] supports the idea that there is a link between postpartum hemorrhage and maternal anemia. Therefore, evidence shows that expectant mothers with low hemoglobin levels are more likely to experience PPH. Anemia before pregnancy may even worsen PPH outcomes (Huwaida, 2024; Kofie *et al.*, 2019; Rahmati *et al.*, 2017) [13-15].

A study conducted by Selo-Ojeme and Okonofua [16] in 1997 at Obafemi Awolowo University in Nigeria examined the risk factors associated with postpartum hemorrhage. The research indicated no connection between postpartum hemorrhage and anemia during pregnancy in Nigeria. However, more recent studies by Omotayo *et al.* (2021) [17] reported that while severe anemia was linked to PPH, mild and moderate anemia were not. PPH accounts for as much as 30 percent of all maternal fatalities (Sinha *et al.*, 2021) [18].

A study conducted in Ghana, by the Ghana Statistical Service (GSS), Ghana Health Service (GHS), and Macro International between the years 2005 and 2009 showed that the maternal mortality ratio was 310 per 100,000 live births (Ghana Statistical Service, 2017) [19]. According to a 2008 report by the Ghana Statistical Service, PPH is accountable for 24 percent of maternal fatalities in Ghana.

Low Birth Weight in Anemia in Pregnancy

Low birth weight (LBW) is defined by the World Health Organization (2017) as any newborn baby, regardless of gestational age, measuring less than 2,500 g at birth. Low birth weight (below 2500 g), very low birth weight (below 1500 g), and extremely low birth weight (under 1000 g) are further classifications of low birth weight. In the Northern Region of Ghana, the mean birth weight was found to be 3.2kg (Abubakari *et al.*, 2015) [20].

Low birth weight is an issue that arises during pregnancy in women with anemia and is known to harm the neonate's health (Nair *et al.*) [12]. Figueiredo *et al.* (2019) [21] indicated that anemia during pregnancy increases the likelihood of low birth weight in the offspring. Pregnancy-related anemia is associated with a higher risk of low-birth-weight babies (Rahmati *et al.*, 2017) [15]. However, according to Msuya *et al.* 2011 [22], it is not always the case with some newborns. LBW is a serious health consequence that continues into later life and significantly impairs an

individual's ability to function normally (Vinturache & Khalil, 2021) [5].

The initial weight measurement of a newborn is their birth weight, which should ideally be taken within an hour of delivery. Birth weight serves as a valuable summary of various public health concerns, including chronic illness, long-term maternal malnutrition, and inadequate prenatal care (Central Statistical Agency [CSA] & ICF, 2016) [23].

According to WHO (2017) [11], low birth weight affects 17 percent of all births worldwide in low-income nations, which is more than twice the rate in developed nations, at seven percent. He *et al.* (2018) [24], in a study on the prevalence of low birth weight and its association with maternal body mass index in selected countries in Africa, indicated that 10.2 percent of Ghanaian births are underweight.

Approximately 20 million LBW infants and 15 million preterm babies are born each year, and their prevalence is a global public health concern, especially in developing nations. Despite widespread collaborative efforts and enhanced interventions for mothers' and children's healthcare worldwide, these numbers continue to rise (Iams *et al.*, 2008) [25].

Research Methodology

The research design was a case study. The study was a case study because the study was focused on pregnant women with anemia and their maternal and neonatal outcomes in a particular hospital (St Lucy Catholic Hospital, Tamale-Kpalsi). The population of this study was all pregnant women who had anemia in their third trimester. This study employed both purposive and convenience sampling. Secondary data was used from the hospital's maternity health register on pregnant women. A self-made questionnaire was used to extract the age, hemoglobin levels, blood loss during pregnancy, and low birth weights in the neonates from the cases. Microsoft Excel was used to organize the data, and the Statistical Package for Social Sciences (SPSS) was used to analyze it. Descriptive statistics in frequencies, percentages, and cross-tabulations were used. The dependent variable was hemoglobin level, and the independent variables were blood loss during pregnancy and low birth weights.

Results and Discussion

Postpartum Hemorrhage in Anemia in Pregnancy

A cross-tabulation was used to analyze the blood loss during delivery and the hemoglobin levels to ascertain postpartum hemorrhage in anemia in pregnancy. The results are presented in Table 1.

Table 1: Postpartum Hemorrhage in Anemia in Pregnancy.

Outcome	Hemoglobin Levels		
	Mild	Moderate	Total
Blood loss <500 mls	99(91.7%)	51(89.5%)	150(90.9%)
Blood loss >500 mls	9(8.3%)	6(10.5%)	15(9.1%)
Total	108(100%)	57(100%)	165(100%)

Note: Figures not in parentheses are the frequencies, those in parentheses are the percentages

As shown in Table 1, the number of pregnant women with blood loss of less than 500mls, moderate anemia was 51(89.5%), and those with mild anemia were 99(91.7%). The number of pregnant women with blood loss greater than 500mls, those with moderate anemia, was 6(10.5%), and those with mild anemia had 9(8.3%).

The pregnant women who experienced greater blood loss than 500 mL were 15(9.1%). This suggests that postpartum hemorrhage is associated with anemia in pregnancy. It aligns

with a study in Ghana by Kofie *et al.* (2019) [14] which stated that the prevalence of postpartum hemorrhage was 5%. This may be because the pregnant women at St. Lucy had mild to moderate anemia and not severe anemia, as supported by Omotayo *et al.* (2021) [17], who indicated that while severe anemia was linked to postpartum hemorrhage (PPH), mild and moderate anemia were not.

A crosstabulation was used to analyze the number of women who had cesarean sections and the amount of blood loss during their deliveries to ascertain postpartum hemorrhage in women who had cesarean sections.

Table 2: Postpartum Hemorrhage During Cesarean Section in Anemia in Pregnancy.

Cesarean section	Blood loss	
	<1000mls	>1000mls
Yes	3(1.8%)	0(0.00%)
No	162(98.2%)	0(0.00%)
Total	165(100%)	0(0.00%)

Note: Figures not in parentheses are the frequencies, those in parentheses are the percentages.

As shown in Table 2, none of the pregnant women had a blood loss greater than 1000 mL during cesarean section. 3(1.8%) of the pregnant women, that is, those who had cesarean sections, had a blood loss of less than 1000mls. None of the pregnant women experienced blood loss greater than 1000 mL during cesarean sections (Table 2). This is likely because none of these women had severe anemia.

Low Birth Weight in Anemia in Pregnancy

The birth weights of the newborns were analyzed with frequencies and percentages. The results are in Table 3

Table 3: The Birth Weights of the Newborns Born to Women with Anemia in Pregnancy

Birth Weight	Frequency	Percentages
2.5	28	17%
2.6	30	18.2%
2.7	31	18.8%
2.8	23	13.9%
2.9	12	7.3%
3.0	30	18.2%
3.1	4	2.4%
3.2	5	3.0%
3.3	2	1.2%
Total	165	100%

As shown in Table 3, the birth weights and the corresponding frequencies, twenty-eight (28) of the birth weights were 2.5, thirty (30) of the birth weights were 2.6, thirty-one (31) of the birth weights were 2.7, twenty-three (23) of the birth weights were 2.8, twelve (12) of the birth weights were 2.9, thirty (30) of the birth weights were 3. Four (4) of the birth weights were 3.1, five (5) of the birth weights were 3.2, and two (2) of the birth weights were 3.3.

Table 3 also shows that 165 out of 165 women had babies with normal birth weights. This indicates that none of the babies born to women with anaemia had low birth weight. However, 28 of these babies had weights clustered at the lower end of the normal birth weight range (≥ 2.5 kg).

Ghana follows the WHO definition of low birth weight, which is a birth weight of less than 2.5 kg. Abubakari *et al.* (2015) [20] revealed that the average birth weight is 3.2 kg in Northern Ghana. Comparing this data to the average birth weight of 3.2 kg, babies < 3.2 kg were 156 out of 165 (94.5%), and babies ≥ 3.2 kg were 9 out of 165 (5.5 %)

Even though none of the babies had a birthweight of less than 2.5kg, the fact that over 94% of this sample is below the average 3.2kg shows a striking leftward shift of the entire birth weight distribution curve. This shift is a clinical sign of fetal growth restriction and the paucity of babies in the optimal weight range (3.2 kg - 3.5 kg).

These findings are consistent with the GDHS (2022) assertion regarding the prevalence of low birth weight in the Northern Region. However, the results do not categorically agree with the claims made by Msuya *et al.* (2011) [23] that pregnancy-related anemia is associated with an increased risk of low-birth-weight newborns.

Conclusion

According to this study's findings, postpartum haemorrhage (PPH) is a concern for women with both mild and moderate anaemia. This anaemic cohort's PPH rate shows that the condition is still a major risk factor that needs to be closely watched and managed during delivery. In this study, maternal anaemia caused suboptimal fetal growth. But this was not severe enough to cause low birth weight, possibly because of antenatal interventions that had commenced.

Policy Implications

The Ministry of Health should ensure a steady supply of high-quality iron and folic acid (IFA) supplements, and train medical professionals to aggressively handle women with moderate-to-severe anaemia. The hospital should establish procedures requiring all anaemic pregnant women in the third trimester to have repeated ultrasound evaluations (such as fundal height and estimated foetal weight). This could facilitate prompt delivery or in-utero management by assisting in the early detection of fetal growth restriction.

Recommendations

- The midwives should consciously implement the active management of the third stage of labor to prevent postpartum hemorrhage by giving uterotonics, performing controlled cord traction, and rubbing the uterus.
- At the ANC clinic, the expectant mother should be directly observed while taking the iron supplements.
- The midwives can also invite the expectant mother's family to the ANC at least once to hear about the advantages of iron supplementation for both the expectant mother and the developing fetus.

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