

**SCHOOL OF PUBLIC HEALTH
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**FACTORS INFLUENCING STILLBIRTHS IN THE WEST GONJA HOSPITAL
OF NORTHERN REGION**

BY

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DECLARATION


I hereby declare that, this dissertation is the result of my own original research, all references made to related literature prepared by other people have been duly cited and acknowledged. This piece has not been presented for an award of any certificate in this university or elsewhere.

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DEDICATION

With humility and gratitude, I wish to dedicate this work to my family especially my late mother, to the Sisters of Mary Immaculate for their support and encouragement and to all those who have contributed in one way or another towards the realization of my dream.

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First of all, I wish to express my profound gratitude to the Almighty God for keeping me under his shadow during stressful moments in life and in this work.

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I owe gratitude to the management of West Gonja District Health Directorate and West Gonja Hospital for allowing me to use their records for this study. I wish to specially thank Dr. Chrysantus Kubio former Director of Health Services, West Gonja District and Medical Superintendant of the West Gonja Hospital for his immense encouragement and support throughout my course of study in the School of Public Health and most especially in the dissertation write-up.

ABSTRACT

Background: Stillbirth remains a public health issue of global concern particularly in developing countries like Ghana. Stillbirth rates continue to remain high in West Gonja Hospital Damongo though preventable. However, the factors influencing stillbirths in the hospital remain unknown. The purpose of this study was to determine the factors influencing stillbirths in the hospital. Specifically, the study determined the proportion of stillbirth, assessed the health facility and obstetric factors associated with stillbirths.

Methods: A retrospective analysis of secondary data from delivery registers of the hospital was carried out. All 893 deliveries that met the inclusion criteria from 1st January to 31st December 2015, were extracted using a data extraction tool adapted from UNICEF. Statistical analysis was done using Stata version 14.1 software. Chi square test, simple and multiple logistics regression were performed.

Results: The hospital based stillbirth rate was 23.5/1,000 total births. The odds of stillbirths were higher among low birth weight babies ($p < 0.001$) compared to normal birth weight babies. Referred cases had high odds of stillbirths ($p = 0.001$). Foetal distress ($p < 0.001$) and APH ($p = 0.002$) were significantly associated with high odds of stillbirths. Stillbirths were more likely to occur among mothers who had inadequate ANC visits at the facility, mothers who received inadequate doses of malaria prophylaxis and among labour cases that were not monitored using the partograph.

Conclusion: Stillbirth rate was unacceptably high in the West Gonja Hospital. The study found that stillbirths were associated with low birth weight and referred cases had high odds of stillbirth. The observation highlights the significant contribution of obstetric complications, foetal distress and APH to stillbirths.

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LIST OF ACRONYMS

ANC:	Antenatal Care
APH:	Antepartum Hemorrhage
IPTp:	Intermittent Preventive Treatment of malaria in pregnancy
SP:	Sulfadoxine Pyrimethamine
UNICEF:	United Nations Children's Fund
WHO:	World Health Organization
WIFA:	Women in their Fertile Age
UN:	United Nations
GDHS:	Ghana Demographic and Health Survey

DEFINITION OF TERMS

Antepartum hemorrhage: is bleeding per vagina any time after the 28th week of pregnancy and before the delivery of the baby.

Adequate ANC visits: this four (4) or more visits during the antenatal period

Adequate doses of malaria prophylaxis: is 3 or more doses of SP received.

Pre-eclampsia: an obstetric complication in pregnancy characterized by increased blood pressure, presence of protein in the urine and edema of the feet.

Eclampsia: presence of seizures in a woman with pre-eclampsia.

Pre-term baby: a baby born any time after the 28 weeks of pregnancy and before 37 completed weeks.

Post-term baby: a baby born after 42 weeks of pregnancy.

Low birth weight baby: a baby born weighing less than 2.5kg.

Normal birth weight baby: is a baby born weighing between 2.5kg to 3.9 kg.

Macrosomic baby: a baby with a birth weight of 4.0kg or above

Stillbirth: is a baby born with no heart beat or respiratory efforts after 28 weeks of pregnancy.

Caesarean section: is an operation performed to deliver a baby.

Vacuum extraction: is the application of vacuum pressure on the head of the baby and with gentle traction to deliver the baby.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Stillbirth is the death of a foetus before delivery after 28 weeks of gestation. The stillbirth is said to be macerated when the death occurs up to 24 hours before delivery where the foetus begins to decompose and fresh stillbirth is when the death happens less than 24 hours before delivery in which case the body of the foetus does not show any changes.

Globally, it is estimated that 3 million babies are born dead every year (Beyrer, 2011). According to Lawn *et al.*; (2010), the Millennium Development Goal (MDG) tracking and global policies did not capture stillbirths. However, it is estimated that 3 million babies are born dead annually with 99% of them occurring in low and middle income countries (World Health Organisation, 2016). Despite these high stillbirths, there is little attention globally on stillbirths as observed by Lawn *et al.*, (2016). The MDGs did not specifically address stillbirths and they are not tracked by neither the UN nor the Global Burden of Disease, both of which focus attention on neonatal and under five deaths (Lawn *et al.*, 2016).

However, stillbirths in low and middle income countries and for that matter Sub-Saharan Africa according to Ntuli and Ntambwe, (2012), is disproportionately higher than that of the developed countries. In a study carried out in a tertiary hospital in Limpopo Province in South Africa, stillbirth rate was estimated to be 38.4 per 1,000 total births, which according to these researchers, was unacceptably high. McClure and Goldenberg, (2014),

observed that under reporting of stillbirths was a significant problem and reliable data about rates and causes were unavailable.

However, they estimated stillbirth rate as 3 million annually in developing countries. In Nigeria, the stillbirth rate was estimated as 46 per 1,000 total deliveries in the Federal Medical Centre in Katsina (Suleiman, Ibrahim, & Abdulkarim, 2015). Evidence supports the fact that stillbirth is a problem of significant magnitude (Jammeh *et al.*, 2010; Zhu *et al.*, 2016 and Afulani, 2016). According to McClure and Goldenberg, (2014) despite the large number of stillbirths worldwide, the topic of stillbirths in developing countries has received very little research, programmatic or policy attention.

Likewise, stillbirths in Ghana according to Afulani (2016), is higher than the World Health Organization's (WHO) target of less than 12 per 1,000 total deliveries. A study on the determinants of stillbirths found that stillbirth rate was 15 per 1,000 total births (Afulani, 2016). The Ghana Demographic and Health survey report indicates that out of 5,776 pregnancies of 28 weeks and more, 81 of them ended in a stillbirth resulting in a stillbirth rate of 14.0 per 1,000 (GSS, 2014). Similarly, the burden of stillbirths in the Northern Region and in West Gonja District is not different. Der *et al.*, (2016) found stillbirth rate in the West Gonja District to be 33.2 per 1,000 total births, which is much higher than the national rate.

A pregnancy, which results in stillbirth is a bad experience for families, the service provider and the entire health system. Stillbirths like neonatal deaths, under five child deaths and maternal deaths to some extent measure the performance of a health system. Kiguli *et al.*, (2016), described stillbirth as a public health as well as a development problem of global

concern, especially in low-income and middle-income countries. According to these researchers, the high rates of stillbirth result from poor maternal health and inadequate antenatal and perinatal care. Serour, Cabral and Lynch (2011), stated that birth outcomes are sensitive indicators of the status of the health systems. They also indicated that the availability of quality care to manage maternal and foetal life threatening complications require a rapid skilled response and access to comprehensive obstetric care as well as a well-coordinated health team which are all indicators of a functioning health system.

Stillbirth is preventable using interventions targeting the mother during pregnancy and delivery such as comprehensive Ante Natal Care (ANC) and skilled attendance at delivery. Other strategies for preventing stillbirths includes auditing these deaths to ascertain their causes and learn lessons that would aid prevention of future occurrence of such deaths. But how can intervention on prevention be instituted when knowledge of the factors influencing stillbirths in the West Gonja District remain unknown?

1.2 Problem statement

Stillbirths in the West Gonja District has been unacceptably high over the years with an average of 33.2 per 1,000 total births (Der *et al.*, 2016), compared to about 15 per 1,000 total births nationally (Afulani, 2016) and 12 per 1,000 total births, which is the WHO's target (Mullan, 2016).

The factors contributing to these stillbirths in the West Gonja District have not been fully discussed. However, literature have documented the determinants of stillbirths to include; maternal age, grand multi-parity, pre-eclampsia/eclampsia, obstetric hemorrhage,

prolonged/obstructed labour, malaria, other maternal infections, poor nutrition, obesity, lack of skilled personnel, inadequate antenatal care, congenital malformation, prematurity, intrauterine growth retardation (Lawn *et al.*, 2011; Afulani, 2016; Suleiman *et al.*, 2015).

In the West Gonja District, the focus of studies has always concentrated on maternal deaths, neonatal and under five child deaths. Whilst some work (Der *et al.*, 2016), has been done on the trends of still births in the District, no work has looked at the determinants of stillbirths in the West Gonja District.

In this study, the researcher assessed the service/facility factors and maternal/obstetric factors influencing stillbirths in the West Gonja District.

1.3 Justification

Stillbirth has a significant impact on families. It also measures access and quality of perinatal care services and health system's performance to some extent. The unacceptable high rates of stillbirths in West Gonja Hospital could be an indication of lack of access or poor quality of perinatal care or inadequate responsiveness to stillbirths.

Additionally, earlier work on trends of stillbirths at the West Gonja Hospital by Der *et al.*, (2016), recommended further research to determine the factors influencing stillbirths hence the necessity of this study. This study was therefore, necessary to unearth the factors influencing stillbirths to inform policy direction for prevention.

The results of this study would provide the West Gonja District and Hospital Management teams with evidence for policy formulation in reducing stillbirths. It would offer service

provides the opportunity to identify service gaps for improvement. Other stakeholders like NGOs and Civil Society Organizations who are working in the area of prevention of stillbirths would be guided as to where to channel resources. Last but not least, the results of this study would also add to literature in Ghana especially in the study District and would also sharpen the researcher's skills.

1.4 Conceptual framework of factors influencing still births

Stillbirths as shown in the illustration above is influenced by several factors, which in this study were grouped into health facility factors and maternal/obstetric factors. These factors can individually and interactively influence stillbirths. The availability and accessibility of ANC would influence the utilization of ANC services such as malaria prophylaxis, vitamin supplementation, counseling, identification of minor ailments and complications which could be life threatening to both mother and foetus, and thus the number of visits.

The availability and accessibility of delivery services, and skilled attendance at delivery would influence the use of the partograph in the management of labour to aid early identification of complications for appropriate intervention to prevent or reduce the rates of stillbirths. Delivery occurring during the day when many skilled personnel are available could easily be handled if there are complications. However, in the night when complications arise during labour and delivery the time lapse between identification of complications to intervention could lead to adverse outcomes, including stillbirths.

Adverse pregnancy outcomes, including stillbirths occur frequently with extreme parity i.e. parity of zero and grand multi-parity (parity above 4). Hemoglobin (Hb) during pregnancy

influences foetal growth and development and as such pregnancy outcomes such as stillbirth. ANC and counseling during ANC could influence maternal nutrition and Hb levels. Preterm and post-term delivery tend to increase the risk of stillbirths and ANC visits could be key to identifying these risk factors, especially post maturity. Early reporting in labour to the health facility is vital to early recognition of complications through the use of the partograph. Obstetric complications and maternal infections are major risk factors of stillbirths, ANC services and counseling/education on danger signs are crucial to preventing or reducing stillbirths.

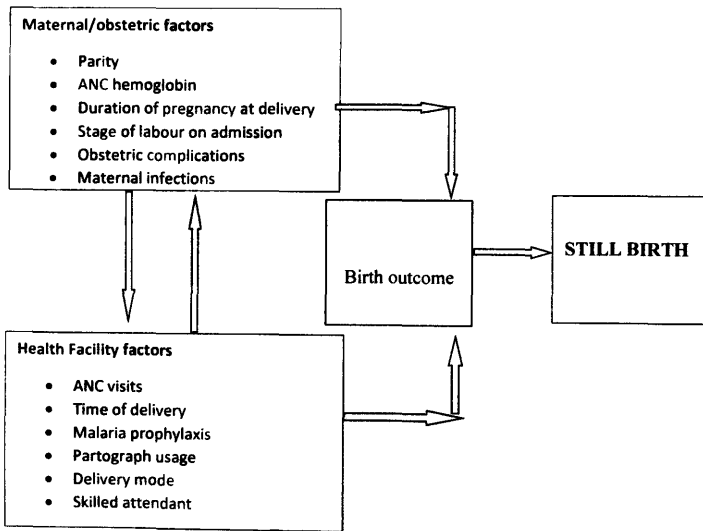


Figure 1 Conceptual framework of obstetric and health facility factors that influence still births.

1.5 Study Objectives

The objectives of the study are categorised into general and specific as below.

1.5.1 General objective

To determine the factors influencing stillbirths in the West Gonja Hospital, Damongo

1.5.2 Specific objectives

1. To determine the proportion of stillbirths recorded at the West Gonja Hospital
2. To assess health facility factors influencing stillbirths at the West Gonja Hospital
3. To determine obstetric/maternal factors associated with stillbirths at the West Gonja Hospital

1.6 Research questions

1. What is the proportion of stillbirths at the West Gonja Hospital?
2. Which health facility factors influences stillbirths at the West Gonja Hospital?
3. Which obstetric/maternal factors influences stillbirths in the West Gonja Hospital?

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents a review of relevant and current work of scholars in the subject area under study, examined the methodology employed in the various studies which served as a guide for this study and also established a sound evidence for comparing this study's findings. The literature was organized under the specific objectives of the study.

2.1 Health facility factors influencing stillbirths

Health facilities are designed to provide care for individuals and families when they need them. The purpose of health care is to promote health, prevent disease, provide treatment and rehabilitate those with disabilities. Unfortunately, this is not always the case, sometimes health service factors if not managed and monitored properly could lead to adverse health outcomes. Health service factors in this study looked specifically at; ANC visits, malaria prophylaxis during pregnancy, partograph usage, delivery mode and skilled personnel providing care.

2.1.1 Antenatal care and stillbirths

Antenatal care is the services provided to pregnant women from conception through to delivery. The aim of antenatal care is to identify at risk pregnancies and take appropriate interventions to prevent complications to both mother and baby. Stillbirths can be prevented or reduced through ANC by detecting and managing complications of the

pregnancy like pre-eclampsia, pre-existing medical conditions that get worse during pregnancy, maternal infections, intrauterine growth retardation (Beauclair, Petro, & Myer, 2014). Additionally, health education and counseling during ANC on lifestyle effect on pregnancy, danger signs in pregnancy, birth preparedness and complication readiness can together reduce the risk of stillbirths.

The WHO standard of minimum ANC is four visits during which comprehensive care is provided, the essential ANC package includes: history taking, checking of maternal vital signs, examination, screening, health education and counselling, immunization, vitamin supplementation, malaria prevention, treatment of existing health conditions (Ornella, Seipati, Patricia, & Stephen, 2008). Antenatal care is said to be adequate when a mother attends four or more antenatal visits and inadequate if she has less than four visits. However, when complication develops the woman is moved from standard care to special care. Four visits are considered adequate because the skilled attendant would have had ample time to assess and identify any risk factors across the continuum of care of the pregnancy and manage them appropriately to prevent complications to both mother and baby. The importance of good and quality ANC for the health of both mother and unborn baby cannot be over emphasized. Inadequate ANC breaks the continuum of care with its negative effects on mother and baby.

The effect of inadequate ANC on the baby according to Ornella *et al.*, (2008), includes antepartum foetal death, preterm birth, intrauterine growth retardation. These researchers noted that, antepartum foetal death in particular accounts for two-thirds of all stillbirths.

In a study conducted among pregnant women in Cape Town, South Africa to determine the association between timing of ANC registration and still births, Beauclair *et al.*, (2014), found that there was no association between gestational age at ANC registration and stillbirth outcome. Comparing second and third trimester's registrations with first trimester registration as reference point, there were still no differences. Again, in Kenya it was observed that attending ANC had no association with having a still birth (Cheptum, Muiruri, Mutua, Gitonga, & Juma, 2016).

In Uganda, it was observed that there was an association between stillbirth and ANC (Agaba, Mugisha, Dhristine & Atuhairwe, 2016). Inadequate ANC, including less than three visits had an association of stillbirths outcome in New Zealand and Australia, (Tomasia, 2011).

Afulani (2016), in her national survey of women in their reproductive age in Ghana revealed an association between quality of ANC and stillbirths outcome. The rate of stillbirths was 60% in women who did not receive ANC as compared to those who received quality ANC services. Ashish *et al.*, (2016), in their study on intrapartum stillbirths in a tertiary hospital in Nepal observed a positive association between stillbirths and ANC care. In an earlier study on risk factors of antepartum stillbirths in the same study location, Ashish *et al.*, (2015), found a significant positive association between stillbirths and ANC care.

In other retrospective studies in Nigeria and The Gambia, there were significant association between stillbirths and ANC visits which were positive, (Dahiru & Aliyu, 2016; Jammeh *et al.*, 2010).

In conclusion out of the nine articles reviewed on the association between stillbirths and ANC, seven found a positive association and two found no association.

2.1.2 Malaria prophylaxis during pregnancy and still births

Malaria in pregnancy is a global public health issue because it is associated with increased maternal morbidity and mortality and adverse birth outcomes such as stillbirths, preterm births, low birth weight or intrauterine growth retardation and maternal anemia, especially in first and second pregnancies. To reduce the impact of malaria in pregnancy, the WHO recommends Intermittent Preventive Treatment of pregnant (IPTp) women with Sulfadoxine Pyrimethamine (SP). Malaria prophylaxis during pregnancy is a strategy to reduce the effect of malaria in pregnancy on pregnant women and improve birth outcomes. IPTp can be described as the full therapeutic course of antimalarial medicine given to pregnant women at routine prenatal visits, regardless of whether the recipient is infected with malaria or not. This gives a combined effect of clearance or suppression of existing malaria infections in the placental and peripheral blood of the mother, and a post-treatment prophylactic effect of preventing new infections for several weeks after each dose, (Radeva-Petrova, Kayentao, ter Kuile, Sinclair, & Garner, 2014).

The full regimen is five doses of SP starting at 16 weeks of gestation when formation of vital organs of the foetus would have been completed to prevent teratogenic effects. At this time the foetal heart might be heard or when there is foetal movement felt by the mother, it is taken at four weeks' interval until five doses are achieved or until delivery.

However, if the mother develops malaria during pregnancy she is treated with the full regimen of antimalarial after which she resumes the prophylaxis. Three or more doses are supposed to confer some protection for the mother and reduce placental malaria infection.

A study determined the factors associated with stillbirths in the Tamale Metropolis, found that there was a positive association between stillbirths and malaria (Adam, 2014). Braun *et al.*, (2015) determined the effect of IPT for malaria in pregnancy and intense drug resistance in Western Uganda, observed *plasmodium falciparum* by Polymerase Chain Reaction (PCR) and microscopy in placental blood samples, and this was associated with stillbirths. Women who took two or three doses of IPTp had a significant reduction in placental malaria parasitaemia. The prevalence of placental malaria infection in The Gambia was associated with foetal outcomes, including stillbirths (Okoko *et al.*, 2002). In another study evaluating SP coverage and birth outcomes, Mace *et al.*, (2015), observed no association between SP coverage and stillbirths outcomes.

In a systematic review, it was found that among women in Sub-Saharan Africa, those receiving three or more of IPTp doses had better birth outcomes such as reduction in low birth weight and stillbirths than those who received less than three doses (Radeva-Petrova *et al.*, 2014). Several evidence point to the fact that IPTp doses of three or more were associated with reduced malaria parasitaemia, placental malaria and birth outcomes (Muhammad *et al.*, 2016; Mosha, Chilogola, Ndeserua, Mwingira, & Genton, 2014; Maiga *et al.*, 2011).

Review of current evidence indicates that no malaria prophylaxis during pregnancy is significantly associated with maternal parasitaemia, placental malaria, low birth weight and these in turn influence stillbirths.

2.1.3 Partograph usage and stillbirths

The partograph is a graphical representation of the progress of labour, recommended for use in the routine monitoring of the first stage of labour. The partograph sheet is divided into four parts; one portion has documentation on foetal wellbeing, another on the progress of the labour itself, one part for maternal wellbeing and last but not the least a section for interventions taken. It is a tool used to aid decision making in the care of women in labour by providing early warning of deviation from normal. When documentation is done properly it helps to detect obstructed and prolonged labour, and foetal distress, which leads to stillbirth and birth asphyxia, so that timely intervention would be taken to prevent foetal death and subsequent stillbirth. The partograph though not a direct cause of stillbirth, its proper usage can contribute to the identification of intrapartum risk factors of stillbirths such as foetal distress, prolonged or obstructed labour.

In Mbarara hospital in Uganda, an association was observed between lack of partograph use and stillbirths, (Agaba *et.al.*, 2016). They observed that partograph use was very poor and documentation made on the partograph were not beneficial in decision making. As a result, intrapartum risk factors of stillbirths like foetal distress, prolonged and obstructed labour were not identified in women who reported in labour with foetal heart beat present and ended up with fresh stillbirths. In The Gambia, it was realized that a higher proportion

of stillbirths were associated with lack of partograph use in the management of labour, where warning signs of foetal distress were missed (Jammeh, Vangen & Sundby, 2010).

In Katsina Nigeria, a hospital based study on the determinants of stillbirths, revealed that majority of the fresh stillbirths occurred whilst the women were in the labour ward and foetal distress were not identified. The odds of intrapartum stillbirths associated with non-use of the partograph were significant. (Suleiman et al., 2015).

In their work to determine the incidence of intrapartum stillbirths in a tertiary hospital in Nepal, Ashish et al., (2016), observed an association between non-use of partograph and stillbirths. Studies assessing the influence of partograph use versus non-use on stillbirths were limited, however the few that were reviewed showed a positive association.

2.1.4 Skilled attendant at birth

Skilled care at birth could be described as care provided by a health worker with midwifery skills, also called a skilled attendant. Skilled attendants are accredited healthcare professionals such as midwives, doctors, and nurses who have been educated and trained with expertise in managing normal/uncomplicated pregnancies and childbirth, and can identify, manage, and refer complications in women during pregnancy and labour (Pearson, *et al.*, 2010). Skilled birth (delivery) should typically occur in a facility with the support of a functioning health system and the necessary life support structures such as equipment, supplies, drugs, skills, and transport for referral to manage complications or refer to the next level of care. Where the facility provides comprehensive obstetric and newborn care, blood transfusion facilities and theater services are a component.

Labour and delivery is a crucial period for the unborn baby since their vulnerability is greatest at this time, complication during this period if not identified early and appropriate interventions taken, the resultant effect is a higher risk of stillbirths. The availability of a skilled attendant to take split seconds decision is crucial. UNICEF, (2008), observed that though there was over 87% highly trained midwifery staffs stillbirths was still high in Guyana in South America. Afulani, (2016), found no association between stillbirths and skilled attendants at delivery in Ghana.

2.2 Maternal/obstetric factors influencing stillbirths

Maternal characteristics such as parity, nutrition, obstetric complications are factors that have been documented in literature to influence stillbirths.

2.2.1 Parity and stillbirths

Parity refers to the number of times a woman has given birth. First time mothers and women who delivered more than three times stand the risk of their babies dying before birth (Lawn *et al.*, 2011; Cheptum, 2012). A study in New South Wales Australia found stillbirths to be associated with first delivery after adjusting for other variables (Gordon, Raynes-Greenow, McGeechan, Morris, & Jeffery, 2013). Suleiman *et al.*, (2015) in Nigeria observed more stillbirths among women who had delivered more than three times as compared to those who delivered between one and three times. In Kenya, it was identified that a relationship exist between stillbirths and 4 or more deliveries (Agaba *et al.*, 2016). In South Africa, Ntuli and Malangu, (2012), realized a positive association between stillbirths and first time mothers. A population based study on maternal and foetal risk

factors of stillbirths in England, found that first time mothers and mothers of three deliveries or more had a higher risk of stillbirths (Gardosi, Madurasinghe, Williams, & Malik, 2013).

2.2.2 ANC Haemoglobin and stillbirth

Maternal nutrition before and during pregnancy has significant influence on maternal health as well as foetal growth and development. Hemoglobin (Hb) level during pregnancy is used as a proxy measure of maternal nutrition in this study. Anemia is the deficiency of red blood cells described as the Hb level of less than 11g/dl. However, it is categorized into severe anemia with Hb less than 7.5g/dl and moderate anemia of Hb between 7.5 to 10.9g/dl.

Anemia affects majority of pregnant women globally especially in Sub-Sahara Africa and is associated with adverse pregnancy outcomes including stillbirths (Ornella *et al.*, 2008). ANC offers the opportunity for health promotion, education and counseling of pregnant women on nutrition and also iron and folic acid supplementation, de-worming for intestinal worm infestations, malaria prevention, improved obstetric care, and management of severe anemia, which are strategies for improving maternal nutrition and preventing anemias and its subsequent effect on pregnancy (Ornella *et al.*, 2008). Hb levels in pregnancy are monitored at registration and at 36 weeks of gestation so as to correct anemia before delivery. A study on anemia and its association with pregnancy outcome conducted in Monchegorsk in Russia, by Chumak and Grjibovski, (2010), observed no association between anemia and stillbirths. High Hb concentration of more than 14.0g/dl was found to be associated with stillbirths, whilst a low concentration of less than 11.0g/dl was

associated with a significant reduction in stillbirths (Maghsoudlou *et al.*, 2016). Tomashek and Ananth, (2006), found that there was no association between stillbirths and mild anemia as well as Hb above 14g/dl, however, there was significant positive association between stillbirths and moderate anemia among non-black women in the United States. In Nigeria, Suleiman *et al.*, (2015), observed a positive association between maternal anemia and stillbirths in their work on determinants of stillbirths.

2.2.3 Duration of pregnancy at delivery and stillbirth

Preterm is the delivery of a baby before 37 completed weeks of gestation. Preterm birth can be categorized into two: very preterm are those born between 28 and 32 weeks of gestation and moderate preterm are born after 32 weeks but before 37 completed weeks. In Kenya, Cheptum, (2012) found an association of stillbirth with gestation of 28 to 37 weeks of gestation to be positive. Post-term or postdates is delivery of a baby after 40 completed weeks of gestation.

After 37 completed weeks, there is an increasing risk of stillbirth as the placenta can no longer supply the required nutrients to the foetus. A study in California found an increased risk of stillbirth with increasing gestational age (Rosenstein *et al.*, 2013).

2.2.4 Obstetric complications/emergencies and still births

Complications of pregnancy such as pre-eclampsia/eclampsia, antepartum hemorrhage, prolonged and obstructed labour, cord prolapse and foetal distress are some of the complications associated with stillbirths documented in literature.

2.2.4.1 Prolonged/obstructed labour

Prolonged labour is labour that last more than 18 hours for multiparous women and 20 hours for nulliparous women, whilst obstructed labour is the failure of the presenting part of the foetus to descend despite strong uterine contraction. Obstruction more often than not leads to prolonged labour. Though obstructed labour is not preventable, early detection and appropriate intervention can save both mother and baby; otherwise it can result in foetal distress and foetal death which is an important cause of stillbirths occurring during labour. Prolonged/obstructed labour is commonly associated with cephalo-pelvic disproportion, that is the foetal head being too large for pelvic size or the pelvis too small or contracted such that the foetus cannot negotiate the pelvic brim or outlet. The partograph which is an important tool used in the management of the first stage of labour, can aid in the early detection of obstructed/prolong labour if used properly. Literature shows that in Africa, 300,000 stillbirths occur annually during the intrapartum period as a result of obstructed labour (Pearson, Larsson, Fauveau, & Judith, 2010b). Prolonged and obstructed labour were observed to be positively associated with still births in Bangladesh, and Nepal (Nahar, *et.al*, 2013; Ashish *et al.*, 2016).

2.2.4.2 Antepartum haemorrhage (APH) and stillbirths

Bleeding from the genital tract after twenty-eight weeks of gestation and before the delivery of the baby is termed antepartum hemorrhage, it is an obstetric emergency which poses threat to the life of both mother and baby. The commonest causes of antepartum hemorrhage are placenta praevia and abruption. APH causes up to 5% of complicated

pregnancies annually across the globe resulting in adverse pregnancy outcomes including stillbirths (Bott, 2011). In placenta abruption, the placenta is normally situated in the fundus of the uterus and starts to separate before labour or during labour but before the delivery of the baby, resulting in reduced oxygen supply to the foetus. Whereas in placenta praevia, the placenta is located in lower uterine segment thus as soon as labour starts the placenta begins to separate. Placenta separation in normal labour starts after the delivery of the baby. In a cohort study in Aberdeen maternity hospital in Scotland, APH was found to have no association with stillbirths in a multivariate analysis.(Bhandari, Raja, Shetty, & Bhattacharya, 2014). Gardosi *et al.*, (2013), found a significant positive association of APH and stillbirth in a cohort study in England. In The Gambia and Nepal, in a cross sectional retrospective study, there was a positive significant association between APH and stillbirths (Jammeh *et al.*, 2010; Ashish *et al.*, 2015; Ashish *et al.*, 2016).

2.2.4.3 Pre-eclampsia/eclampsia

Pre-eclampsia is a complication in pregnancy characterized by increased blood pressure, oedema and protein in the urine, it is a life threatening condition for both mother and baby.

In pre-eclampsia there is reduced blood supply to the placenta site resulting in reduced oxygen and nutrients to the foetus with its resultant intrauterine growth retardation, preterm delivery and stillbirth. Early detection is key to survival of mother and foetus. It can be detected during ANC or labour; if not detected early pre-eclampsia can progress to eclampsia which is very fatal without timely and appropriate intervention. About 5-8% of complications in pregnancy is as a result of pre-eclampsia, (Cande & Olga, 2012).

Literature has documented higher risk of stillbirths in pre-eclampsia/eclampsia in Norway (Cande & Olga, 2012; Wylie *et al.*, 2015).

2.2.4.4 Cord prolapse and stillbirth

Umbilical cord prolapse is an obstetric emergency in which the cord passes through the cervix and take lead of the presenting part in the presence of ruptured membranes. Cord prolapse occurs more commonly with cord presentation, that is when the umbilical cord leads the presenting part; or when the presenting part is not well applied to the cervix. This however is a rare condition occurring in one out of hundred pregnancies. (Lin, 2014). When this happens the presenting part turns to compress the cord thus cutting off oxygen supply to the foetus resulting in foetal death and stillbirth. When a diagnosis is made, immediate intervention is required to save the life of the baby. If it occurs outside the hospital setting foetal death is as high as 91/1000 deliveries. Even when it occurs in the hospital, an early diagnosis is key to saving the life of the foetus. In Mbarara Referral Hospital in Uganda, cord prolapse was found to be associated with stillbirths (Agaba *et al.*, 2016). Other studies also found cord prolapse to be associated with stillbirths in South Africa and Nepal (Ntuli & Malangu, 2012; Ashish *et al.*, 2016).

2.2.5 Maternal infections and stillbirth

Maternal infections arising from several causes like bacteria, viruses and protozoa during pregnancy may have an influence on stillbirth. The actual causal relationship between infections and stillbirths is not well known however studies have shown that several mechanisms are involved. (Goldenbrg, McClure, Saleem, & Reddy, 2010). The pathogen may damage the placenta leading to placental insufficiency with its resultant intrauterine

growth restriction or may cross the placental barrier to infect the unborn child thus causing foetal death and stillbirth. The infection may cause severe maternal illness with fever, respiratory difficulty and other reactions which influence foetal death without the pathogen reaching the placenta or foetus. Alternatively, these infections could trigger premature labour and the preterm baby unable to stand the impact of the labour may die resulting in stillbirth. Other ways pathogens cause infection leading to stillbirth is by ascending through the birth canal before or after rupture of membranes. In developed countries, maternal infections account for 10% to 25% of stillbirths. This percentage could be much higher in developing countries (McClure *et al.*, 2012; Goldenberg *et al.*, 2010). Some of these infections include malaria, respiratory tract infection, urinary tract infections, sexually transmitted infections and other systemic infections. These infections could be latent and go unrecognized. Maternal infection was found to be significantly associated with stillbirths and this association was positive (Yakoob, Lawn, Darmstadt, & Bhutta, 2010).

CHAPTER THREE

METHODS

3.0 Introduction

This chapter discusses the design and how the study was conducted in order to achieve the research objectives. It describes briefly the study type/design, profile of the study area, study population, data collection tools and techniques, data processing and analysis, ethical consideration and the study limitation. The totality of these is the methodology of the study.

3.1 Study design

This study used a retrospective cross sectional design involving secondary analysis of delivery data from 1st January to 31st December 2015 in the West Gonja Hospital Damongo. A quantitative method was used to assess the factors influencing stillbirths. This design was proposed because it is relatively quick to do given the time period available and it is also quiet cheap to finance independently by the researcher.

3.2 Study location

The West Gonja District is one of the 26 districts in the Northern Region. North Gonja District borders the district to the north. Further south, the district shares boundaries with Central Gonja and to the west by Bole and Sawla Tuna Kalba Districts. A greater part of the land area is occupied by the Mole National park, which is a tourist site with only few communities and camps. The district capital Damongo, is approximately 129 km west of Tamale, the Regional capital.

In the year 2016, the estimated population of the district was 48,886 according to projections from the 2010 population and housing census with Women in Fertile Age (WIFA) as 10,755 and expected pregnancies and deliveries as 1,955. The West Gonja Hospital, which is located in Damongo, the district capital is a referral facility receiving obstetric and other cases from the district and beyond. As a referral hospital, it provides comprehensive obstetric and new born care. It has 24 hour services, including ambulance, blood transfusion, with a blood bank. With regards to maternal and child health services, the hospital has three medical officers with four midwives in active service and three retired midwives on contract and four community health nurses with other enrolled nurses and ward aid to support service delivery.

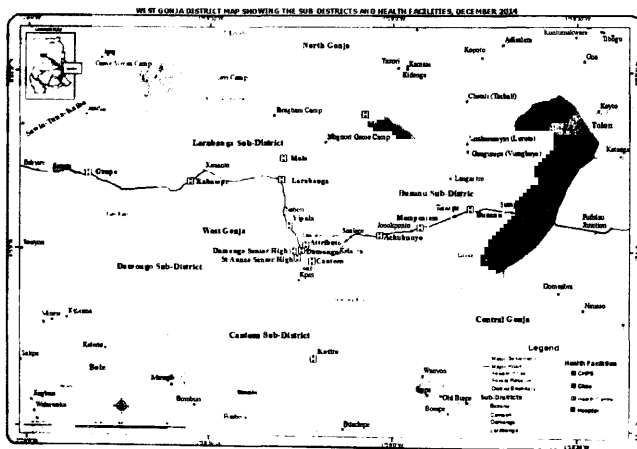


Figure 2 Map of West Gonja District

3.3 Study variables

Table 1. Operational definition of study variables

Objective	Variable	Measurement
Determining the proportion of still births	Stillbirth outcome	Yes
		No
Assessing facility level factors influencing still births	No. of ANC visits	1-3 4 and above
	No. of doses of sulfadoxine-pyrimethamine received	0-2 3-5
	Duration of pregnancy at delivery	Preterm Term Post-term
	Partograph use	Yes No
	Attendant at delivery	Midwife Doctor Other
	Mode of delivery	Spontaneous vaginal Caesarean section Vacuum extraction
	Time of delivery	Morning shift Afternoon shift Night shift
	Examining maternal factors influencing still births	Number of parity
Obstetric complications present		Pre-eclampsia APH Prolonged labour Cord prolapse Others
Socio-demographic factors:		Age in completed years
	Type of Occupation	House wife Trader Seamstress/Hairdresser Government employee Other
	Place of Residence	Rural Urban

The **dependent** variable of this study is stillbirth. The **independent variables** are **organized** under the objectives of the study as shown in **table 1** above.

3.4 Sampling methods

In this work there was no sampling since it was a retrospective review of available records. All 930 deliveries conducted within the period of January 1st to December 31st 2015, were reviewed. However, deliveries without records or with incomplete documentation were excluded because they would not provide all the information on the variables under study.

3.5 Data collection methods and instrument

An adapted data extraction tool from UNICEF was used to gather information from delivery registers. This tool was used in a retrospective analysis of stillbirths and neonatal deaths from five hospitals in Guyana in South America (UNICEF, 2008). Find data extraction instrument attached in appendix A. This tool was modified to suit the study objectives and study setting. The registers were arranged in a chronological order, and information extracted month by month chronologically. Information were extracted for both live and stillbirths to allow for analytical comparisons.

The data collection was a desk review of existing data on delivery records using an instrument adapted to suit the study setting. The instrument was structured into four sections. The first section contained the mothers' socio-demographic characteristics, section two comprised the health facility factors and section three contained maternal/obstetric factors and section four assessed foetal characteristics.

3.7 Data processing

Processing began with a preliminary clean-up of the data extraction form checking for completeness and appropriateness of all filled in information. The information extracted was imported into Stata 14.0 and then coded. A codebook analysis was run to identify missing values, invalid or inconsistent entries, and outliers for correction using the same software.

3.8 Statistical analysis

Data analysis were presented in frequency tables for mothers socio-demographic and babies' characteristic, cross tabulation of dependent variable stillbirth and independent variables for each specific objective were conducted reporting Chi-square (χ^2) and p-values. Those variables that were significant at p-value of 0.2 were put into a simple logistic regression model to identify the strength of association. Finally, multiple logistics regression analysis was performed for those variables that were significant at p-value of 0.2 to determine the strength of the association controlling for the other variables. Odds ratios, 95% confidence interval and p-values were reported with significant level set at less than 0.05.

3.9 Quality control

Three research assistants were recruited, a disease control officer and health information officer from the District Health Directorate and one midwife from the hospital, who were trained at the hospital's public health unit at a day seminar. The content of the training included the research objectives, variables to be measured; and the data extraction form

was discussed in details. Confidentiality and privacy issues were covered in the training as well as ethical issues.

Though the data collection instruments were adapted from previous work, it was pretested to ensure appropriateness for use in the local setting of West Gonja Hospital. Pretesting was done at Bole hospital to test for appropriateness and reliability.

3.10 Ethical clearance

The proposal was submitted to Ghana Health Service Ethical Review Board for consideration and ethical approval was granted before data collection. Refer to appendix B for copy of ethical clearance letter and appendix C for statement on confidentiality. Approval was also sought from the West Gonja District and Hospital management teams for permission to use their facility, before data collection was carried out. Permission letter is attached in appendix D. Patients' names and other identifiers were excluded in the data extraction instrument. However, codes were used to keep track in case there was the need for revisit to correct errors. Original and coded data are password protected.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presents findings of the study categorized into socio-demographic characteristics of mothers, foetal characteristics, health facility and obstetric/maternal factors associated with stillbirths. The results are presented in tables.

4.1 Mothers Socio-demographic and foetal characteristics of deliveries

4.1.1 Mothers Socio-demographic characteristics

A total of 893 out of 930 deliveries were extracted from the delivery registers for the year 2015. The demographic characteristics of the study participants as shown in Table 2 below indicate that 228 (25.5%) of the mothers were in the 20 – 24 years and 227 (25.5%) in 25 – 29 years age groups. Regarding occupation of mothers house wives formed, 471 (52.7%) of the participants followed by students who formed 144 (16.1%) of all mothers. About 538 (60.3%) of mothers resided in urban areas. Of 228 mothers in the age group of 20 – 24years, 140 (61.4%) resided in urban areas. Likewise, 139 (61.2%) of those in the age group 25 – 29years also resided in urban areas, then 110 (60.8%) of the 30 – 34 years age group, followed by the age group 35+ 79 (59.4%) of them lived in urban areas. Also, 264 (56.1%) of house wives resided in rural areas whereas 103 (71.5%) of students lived in urban areas.

4.1.2 Foetal characteristics

Of the total deliveries of 893 babies, 493 (55.2%) were males. Normal birth weight were 772 (86.5%) of the babies in the study whilst low birth weight were 104 (11.6%) and macrosomic babies of 4.0 kg and above were 17 (1.9%). Majority 807 (90.4%) of them were full term, 63 (7.0%) pre-term and about 23 (2.6%) of them were post-term.

Table 2. Mothers' socio-demographic and foetal characteristics of deliveries at the West Gonja Hospital, 2015

Variable	Category	Freq.	Percent
Maternal age	15 – 19	124	13.9
	20 – 24	228	25.5
	25 – 29	227	25.5
	30 – 34	181	20.3
	35+	133	14.9
Occupation	House wife	471	52.7
	Trader	117	13.1
	Seamstress/hairdresser	94	10.5
	Government employee	67	7.5
	Students	144	16.1
Place of residence	Urban	538	60.2
	Rural	355	39.8
Foetal characteristics			
Sex of foetus	Female	400	44.8
	Male	493	55.2
Birth weight	Normal birth weight	772	86.5
	Low birth weight	104	11.6
	Macrosomia	17	1.9
Maturity	Full term	807	90.4
	Pre-term	63	7.0
	Post-term	23	2.6
Birth outcome	Live birth	872	97.6
	Stillbirth	21	2.4

4.1.2.1. Characteristics of stillbirths

Among the stillbirths, a large proportion was males, 15 (71.4%). Compared to pre-term babies, full term babies had a higher proportion of stillbirths. A little more than half (52.4%) of normal birth weight babies were stillborn. Stillbirths were also high (57.1%) among mothers from rural residence and among housewives 61.9%. Mothers age 15 – 19 years and 20 – 24 years had high proportions of stillbirths (28.6%) each as compared to mothers age 35 and above (19.1%).

Among the health facility factors, stillbirths were higher (61.9%) in mothers who had adequate ANC visits (4 or more). Mothers who received inadequate (less than 3) doses of malaria prophylaxis had higher (90.5%) proportion of stillbirths. High proportion 20 (95.2%) of stillbirths were also recorded among mothers whose labour was not managed using the partograph. Spontaneous vaginal deliveries recoded high (71.4%) proportion of stillbirths as well. More stillbirths (47.6%) were recoded among deliveries that occurred during the night shift compared with those that took place during the morning and afternoon shifts. Midwife assisted deliveries also had high proportion (61.9%) of stillbirths. Referral cases had 23.8% stillbirths as compared to those who walked in.

With regards to obstetric/maternal factors, stillbirths were common (57.1%) among mothers within the para 1-2 category as compared to 23.8% in para 3-4 and 19.1% in para 5 and above. Mothers with full term pregnancies at the time of delivery had the highest (61.9%) proportion of stillbirths. Additionally, mothers who reported in the first stage of labour had high (57.1%) proportion of stillbirths compared with those who reported in the second stage of labour. Among mothers who had malpresentation, 14.3% had stillbirths,

and that of mothers with pre-eclampsia/eclampsia was 14.3%. Also stillbirths were high (42.9%) among mothers with foetal distress and 28.6% mothers with APH.

4.1.3 Association between stillbirths and mother' socio-demographic and foetal characteristics

Table 3 presents results of bivariate analysis of stillbirths and maternal demographic and foetal characteristics. The association between stillbirths and maternal age was not remarkable ($p = 0.173$). Stillbirths were high (61.9%) among house wives compared to 14.3% among student mothers and the other occupation groups. This difference was not statistically significant ($p = 0.956$). Geographically, stillbirths were more (57.1%) among mothers who lived in rural areas as compared to urban dwellers. This however did not hold any statistical significance ($p = 0.099$).

Higher stillbirths proportion (71.4%) was recorded in male babies' but this was not statistically significant ($p = 0.130$). The study also observed that more stillbirths (52.4%) occurred among normal birth weight babies compared to low birthweight and macrosomic babies. Birth weight and stillbirth were significantly related statistically ($p < 0.001$).

Statistically significant ($p = 0.012$) relationship was found between the maturity of babies and stillbirths recorded. A high proportion of full term babies (71.4%) resulted in stillbirths ($p = 0.007$).

Table 3. Association between stillbirths and mothers' socio-demographic & foetal characteristics at the West Gonja Hospital, 2015

Variable	Category	Live births N (%)	Stillbirth N (%)	p-values
Mothers' socio-demographic characteristics				
Maternal age	15 – 19	118 (13.5)	6 (28.6)	0.173**
	20 – 24	222(25.5)	6 (28.6)	
	25 – 29	225 (25.8)	2 (9.5)	
	30 – 34	178 (20.4)	3 (14.3)	
	35+	129 (14.8)	4 (19.1)	
Occupation	House wife	458 (52.5)	13 (61.9)	0.956**
	Trader	114 (13.1)	3 (14.3)	
	Seamstress/hair dresser	93 (10.6)	1 (4.8)	
	Government employee	66 (7.6)	1 (4.8)	
	Student	141 (16.2)	3 (14.3)	
Place of residence	Urban	529 (60.7)	9 (42.9)	0.099*
	Rural	343 (39.3)	12 (57.1)	
Foetal characteristics				
Sex of foetus	Female	394 (45.2)	6 (28.6)	0.130*
	Male	478 (54.8)	15 (71.4)	
Birthweight	Normal birth weight	761 (87.3)	11 (52.4)	<0.001**
	Low birthweight	94 (10.8)	10 (47.6)	
	Macrosomia	17 (1.9)	0	
Maturity	Full term	792(90.8)	15 (71.4)	0.012**
	Pre-term	58 (6.7)	5 (23.8)	
	Post-term	22 (2.5)	1 (4.8)	

Test statistic notation: Chi square*, Fisher exact**, † p-value estimate from the Cochran Armitage trend test.

4.1.4 Measure of association between stillbirths and mothers' socio-demographic and foetal characteristics

Results from logistics regression as presented in Table 4 below shows that, stillbirths was significantly associated with birth weight after adjusting for maternal age, place of residence, sex and maturity of baby. The odds of stillbirth was 10.40 (CI = 3.30, 32.76, $p < 0.001$) more likely among babies with low birth weight compared to normal birth weight babies.

As compared to full term babies, the odds of stillbirths was 4.55 (CI 1.60, 12.96, $p = 0.005$) times more likely among pre-term babies at the bivariate level analysis. However, after controlling for the others variables in a multiple logistics regression model stillbirths association with maturity of baby was no longer statistically significant among pre-termed (aOR=0.50, CI =0.12-2.05, $p = 0.336$) and post-termed babies (aOR = 3.86, CI = 0.46 – 32.52, $p = 0.114$).

However, there were no statistical significance between stillbirths and maternal age after adjusting for place of residence, sex of baby, birth weight and maturity of baby. Nevertheless, when compared with mothers in the age category 15-19, stillbirths were less likely to occur in the other age categories though not statistically significant as indicated by the p-values.

Place of residence of mother was not significantly ($p = 0.176$) associated with stillbirths after adjusting for maternal age, sex of baby, maturity and birth weight. However, with reference to urban residence stillbirths were more likely among mothers who resided in rural communities. Likewise sex of baby had no statistical significance ($p = 0.068$) with

stillbirths after adjusting for all the other variables. Meanwhile more males were likely to be stillborn. Similarly, maturity of baby after controlling for the other variables had no statistical association with stillbirths.

Table 4. Measure of association between stillbirths and mothers' socio-demographic and foetal characteristics in the West Gonja Hospital, 2015

Variable	COR(95% conf. interval)	p-value	AOR(95% conf. interval)	p-value
Maternal age				
Age 15-19	Ref		Ref	
Age 20-24	0.53 (0.17, 1.68)	0.283	0.63 (0.18, 2.24)	0.477
Age 25-29	0.17 (0.03, 0.88)	0.034	0.22 (0.04, 1.17)	0.076
Age 30-34	0.33 (0.08, 1.35)	0.124	0.44 (0.10, 1.92)	0.276
Age 35 & above	0.61 (0.17, 2.21)	0.452	0.72 (0.18, 2.86)	0.639
Place of residence				
Urban	Ref		Ref	
Rural	2.06 (0.86, 4.93)	0.106	1.87 (0.76, 4.61)	0.176
Sex of foetus				
Female	Ref		Ref	
Male	2.06 (0.79, 5.36)	0.138	2.53 (0.93, 6.89)	0.068
Birth weight				
Normal birth weight	Ref		Ref	
Low birth weight	7.36 (3.04, 17.79)	<0.001	10.40 (3.30, 32.76)	<0.001
Maturity				
Full term	Ref		Ref	
Pre-term	4.55 (1.60, 12.96)	0.005	0.50 (0.12, 2.05)	0.336
Post-term	2.40 (0.30, 18.98)	0.407	3.86 (0.46, 32.52)	0.114

4.2 Proportion of stillbirths in the West Gonja Hospital

Out of the 893 deliveries that qualified for this study, stillbirths recorded were 21 given a stillbirth rate of 23.5/1,000 total births for the year 2015. Also, fresh stillbirths were 19 out of the 21 stillbirths thus fresh stillbirths proportion was 90.5%.

4.3 Health facility factors influencing stillbirths

4.3.1 Association between stillbirths and health facility factors

The proportion of mothers who had adequate ANC visits was 79.0% whilst those who had adequate doses of the malaria prophylaxis during pregnancy was 23.0%. The proportion of labour that was managed using the partograph was 27.4%. Mothers who had spontaneous vaginal deliveries formed 80.7% of the study participants, with caesarean section and vacuum deliveries forming 18.3% and 1.0% respectively. Majority (47.0%) of the deliveries occurred during the night shift, with 73.6% of the deliveries conducted by midwives as shown in Table 5 below.

Assessing health facility factors associated with stillbirths as presented in Table 5 below, shows that 61.9% mothers who had stillbirths had adequate ANC visits of 4 plus. However this was not associated with stillbirth ($p = 0.053$). Stillbirths among mothers who received adequate doses of malaria prophylaxis during pregnancy was 9.5%, but this was not significantly associated ($p = 0.139$). Also, 4.8% of the stillbirths occurred in labour that were managed using the partograph. The proportion of stillbirths associated with partograph nonuse was 95.5% compared to partograph use, which was statistically related ($p = 0.014$).

Additionally, stillbirths were higher (71.4%) among mothers who had spontaneous vaginal deliveries as compared to mothers who had caesarean operation or vacuum extraction. This however was not significantly associated with stillbirths ($p = 0.396$). Mothers who delivered during the night shift had a stillbirth proportion of 47.6%, but this proportion was not statistically associated with stillbirths ($p = 0.997$). Midwives supervised deliveries recorded 61.9% stillbirths proportion which also was not statistically significant ($p = 0.198$). Labour cases that were referred cases had 23.8% proportion of stillbirths compared with those who walk in, this was statistically related ($p < 0.001$).

Table 5. Association between stillbirths and facility factors in the West Gonja Hospital, 2015

Variable	Category	Live births N (%)	Stillbirths N (%)	p-value
ANC visits	Adequate	692 (79.4)	13 (61.9)	0.053*
	Inadequate	180 (20.6)	8 (38.1)	
Malaria prophylaxis	Adequate	203 (23.3)	2 (9.5)	0.139**
	Inadequate	669(76.7)	19 (90.5)	
Partograph use	No	628 (72.0)	20 (95.2)	0.014**
	Yes	244 (28.0)	1 (4.8)	
Mode of delivery	Spontaneous vag. del	706 (81.0)	15 (71.4)	0.396**
	Caesarean section	157 (18.0)	6 (28.6)	
	Vacuum extraction	9 (1.0)	0 (0.00)	
Time of delivery	Morning shift	248 (28.4)	6 (28.6)	0.997*
	Afternoon shift	214 (24.5)	5 (23.8)	
	Night shift	410 (47.1)	10 (47.6)	
Skilled attendant at delivery	Midwife	644 (73.9)	13 (61.9)	0.198**
	Doctor	174 (19.9)	8 (38.1)	
	Student midwife	50 (5.7)	0 (0.00)	
	Others	4 (0.5)	0 (0.0)	
Referred cases	No	841 (96.4)	16 (76.2)	<0.001*
	Yes	31 (3.6)	5 (23.8)	

Test statistic notation: Chi square*, Fisher exact**, † p-value estimate from the Cochran Armitage trend test.

4.3.2 Measure of association between stillbirths and health facility factors

There was a significant association between stillbirths and referred cases in both simple and multiple logistics regression models. The odds of stillbirth among mothers who were referred with labour was 6.95 (CI 2.21, 21.86, $p = 0.001$) times higher compared to mothers who walked in by themselves with labour pains after adjusting for the other variables in the model.

Also, partograph nonuse was statistically associated with stillbirths at the simple regression analysis (cOR 7.77, CI 1.04, 58.22, $p = 0.046$), however the association was no longer significant after controlling for all the other variables in multiple logistics regression.

Meanwhile, there was no statistically significant ($p = 0.366$) association between stillbirths and ANC visit after adjusting for malaria prophylaxis received during ANC, partograph use, skilled attendance at delivery and referred cases. However stillbirths were more likely to occur among mothers who had inadequate ANC visits as compared to those who had adequate ANC visits.

Similarly, stillbirth was not significantly ($p = 0.338$) associated with number of doses of malaria prophylaxis received during pregnancy after controlling for number of ANC visit, partograph use, skilled attendance at delivery and referred cases. Though stillbirths were more likely to occur among mothers who had inadequate doses of malaria prophylaxis, this was not statistically significant. The results are shown in Table 6 below.

Table 6. Measure of association between stillbirths and health facility factors in the West Gonja Hospital, 2015

Variable	COR(95% conf. interval)	p-value	AOR(95% conf. interval)	P-value
ANC visit				
Adequate	Ref		Ref	
Inadequate	2.37 (0.97, 5.79)	0.060	1.58 (0.58, 4.22)	0.366
Malaria prophylaxis				
Adequate	Ref		Ref	
Inadequate	2.88 (0.67, 12.48)	0.157	2.11 (0.46, 9.72)	0.338
Partograph use				
Yes	Ref		Ref	
No	7.77 (1.04, 58.22)	0.046	6.52 (0.85, 49.84)	0.071
Skilled attendant				
Midwives	Ref		Ref	
Doctor	2.28 (0.93, 5.58)	0.072	1.93 (0.76, 4.90)	0.168
Referred cases				
No	Ref		Ref	
Yes	8.48 (2.91, 24.62)	<0.001	6.95 (2.21, 21.86)	0.001

4.4 Maternal/obstetric factors influencing stillbirths

4.4.1 Association between stillbirths and maternal/obstetric factors

Majority (57.1%) of the mothers who had stillbirths were within the para 1-2 category as compared to the para 3-4 and para 5 and above. However this was not statistically associated ($p = 0.697$). Mothers with full term pregnancies at the time of delivery had the highest proportion (61.9%) of stillbirths, meanwhile this was not statistically associated with stillbirths ($p = 0.109$). Additionally, mothers who reported in the first stage of labour had high proportion (57.1%) of stillbirths as compared to those who reported in the second stage of labour, however this had no significant relationship with stillbirths ($p = 0.801$).

There was a statistical relationship between obstetric complications and stillbirths ($p < 0.001$). Stillbirth proportion among mothers who had foetal distress was 42.9%, whilst the proportion of stillbirth among mothers with APH was 28.6% as shown in Table 7 below.

Table 7. Association between stillbirths and maternal/obstetric factors in the West Gonja Hospital, 2015

Variable	Category	Live births N (%)	Stillbirths N (%)	p-value
Parity	Para 1-2	417 (47.8)	12 (57.1)	0.697**
	Para 3-4	245 (28.1)	5 (23.8)	
	Para 5+	210 (24.1)	4 (19.1)	
Duration of preg. at del	Term	691 (79.2)	13 (61.9)	0.109**
	Pre-term	132 (15.2)	6 (28.6)	
	Post-term	49 (5.6)	2 (9.5)	
Stage of lab on admission	First stage	434 (49.8)	12 (57.1)	0.801**
	Second stage	398 (45.6)	9 (42.9)	
	Elective c/s	40 (4.6)	0 (0.0)	
Obstetric complications	Prolonged labour	20 (12.7)	0 (0.0)	0.001**
	CPD	76 (48.1)	0 (0.0)	
	Malpresentation	25 (15.8)	1 (14.3)	
	Pre-eclampsia	15 (9.5)	1 (14.3)	
	Fetal distress	10 (6.3)	3 (42.9)	
	APH	6 (3.8)	2 (28.6)	
	Oligohydraminous	6 (3.8)	0 (0.0)	

Test statistic notation: Chi square*, Fisher exact**, † p-value estimate from the Cochran Armitage trend test.

4.4.2 Measure of association between stillbirth and maternal/obstetric factors

Logistics regression results indicate that stillbirths were strongly associated with fetal distress statistically in both simple and multiple logistics regression models. The odds of stillbirth among mothers with fetal distress was 14.18 (CI 3.45, 58.19, $p < 0.001$) compared to mothers who did have complications after controlling for antepartum hemorrhage and duration of pregnancy. Furthermore stillbirth and antepartum hemorrhage were associated significantly. After adjusting for fetal distress and duration of pregnancy at delivery, the odds of stillbirth among mothers who reported with APH was 14.67 (CI 2.59, 83.14, $p = 0.002$) higher as compared to mother who did not experience complications. However after controlling for foetal distress and APH the odd of stillbirth associated with duration of pregnancy was statistically insignificant as shown in Table 8 below. However, stillbirth was more likely to occur in pre-term and post-term pregnancies as compared to full term pregnancies.

Table 8. Measure of association between stillbirths and maternal/obstetric factors in the West Gonja Hospital, 2015

Variable	COR(95% conf. interval)	p-value	AOR (95% conf. interval)	P-value
Duration of preg at del				
Term	Ref		Ref	
Pre-term	2.42 (0.90, 6.47)	0.079	1.82 (0.64, 5.17)	0.262
Post-term	2.17 (0.48, 9.89)	0.317	2.86 (0.57, 14.31)	0.200
Obst. complication				
No complication	Ref		Ref	
Mal-presentation	2.04 (0.26, 16.13)	0.499	1.87 (0.23, 15.12)	0.557
Pre-eclampsia	3.40 (0.42, 27.55)	0.252	2.75 (0.33, 22.97)	0.350
Fetal distress	15.30 (3.79, 61.70)	<0.001	14.18 (3.45, 58.19)	<0.001
APH	17.00 (3.15, 91.71)	0.001	14.67 (2.59, 83.14)	0.002

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

This chapter presents discussion of study findings with reference to existing literature. Discussions are presented according to the study objectives.

5.1 Demographic characteristics and stillbirths

5.1.1 Maternal characteristics and stillbirths

Maternal ages below 20 years and above 35 years category were observed to be associated with adverse pregnancy outcome, including stillbirths in literature (Huang *et al.*, 2008, Carolan, 2013). This study found that with reference to mothers in the age group 15 – 19 years, the odds of stillbirths were much lower in the other age categories, nonetheless they were not statistically significant. However, the age category of 25-29 years was significantly associated with less odds of stillbirths in the simple logistics model of analysis, meanwhile after controlling for other variables in the model, this became insignificant. This finding was in contrast with that of Ntuli and Ntambwe, (2012) where they found that there was higher proportion of stillbirths among mothers in the age group 20 – 24 in South Africa. Also Agaba *et al.*, (2016) found higher proportions of stillbirths among mothers in the age category of 30 – 45 contrary to findings of this study.

5.1.2 Fetal characteristics and stillbirths

Birth weight of babies was significantly associated with stillbirths at the bivariate and multivariate levels. The odds of stillbirth was higher among low birth weight babies compared to normal birth weight babies. This finding was consistent with the findings of Agaba *et al.*, (2016) where stillbirths were found to be associated with low birth weight as

compared to the normal birth weight and big babies in Uganda. Also, in the United States and in The Gambia it was found that low birth weight and big babies had higher odds of stillbirths. (Bukowski *et al.*, 2014, Jammeh *et al.*, 2010). However, this finding was inconsistent with a study in Tamale in the Northern Region of Ghana where the odds of stillbirth was higher among normal birth weight babies as compared to low birth weight babies (Adam, 2014). Low birth weight due to pre-term delivery or intrauterine growth restriction has long been known to be associated with increased risk of intrauterine death and subsequent stillbirth. This finding may be suggestive of inadequate ANC care since the odds of stillbirth was also high among mothers with inadequate ANC visits.

There were more male babies than females in the data. Stillbirths were higher among male babies however there was no association between stillbirths and sex of babies at both the bivariate and multivariate levels. However the odds of stillbirths were higher in male babies compared to females. This finding was similar to that of Agaba *et al.*, (2016) in Uganda where they found no association between stillbirths and sex of babies.

5.2 Proportion of stillbirths

The study set out to determine the proportion of stillbirths in the West Gonja Hospital for the period of the study and found that the stillbirth rate was 23.5/1,000 total deliveries. This is unacceptably high as compared to the WHO standard of 12/1,000 total deliveries. Also, it is much higher than the national stillbirths rate of 14.0/1,000 total deliveries (GSS, 2014) as well as the finding of Afulani, (2016). It is worth noting that, the aforementioned stillbirth rates are population based study findings and therefore could be much lower than hospital based studies. In contrast it is lower than the findings (33.2/1,000) of earlier studies

in the same Hospital where this study has been carried out (Der *et al.*, 2016). This suggest that efforts have been made since the earlier study to reduce stillbirths and has yielded this results. The rate of stillbirths in this study is also much lower than what was found in Nigeria, Bangladesh, South Africa and the Gambia (Suleiman *et al.*, 2015, Nahar *et al.*, 2013, Ntuli *et al.*, 2012, Jammeh *et al.*, 2010).

5.3 Health facility factors and stillbirths

Good governance and stewardship of health facilities especially adequate monitoring and supportive supervision as well as appropriate response to emergencies could increase health service utilization and improve patients' outcome. One of the objectives of this study was to assess health facility level factors that could be associated with stillbirths such as ANC visits, number of doses of malaria prophylaxis received during pregnancy, the management of labour using the partograph, mode of delivery, skilled attendant at delivery and time of delivery.

The study found statistically significant association between stillbirths and referral cases. There was a high odds of stillbirths among mothers who were referred from lower facilities. This probably suggest that the referral systems from the peripheral facilities to the hospital were ineffective or the emergency response systems in the hospital were inadequate and ineffective or both. It may also be suggestive of delay in identification of obstetric complications at the lower levels, delay in reaching the hospital as a result of transportation or road network.

Additionally, the study found that higher proportions of stillbirths occurred among mothers who had inadequate ANC visits of less than 4, however it was not statistically significant

at the bivariate and multivariate level of analysis. WHO recommends four or more ANC visits as adequate during which time health staff would be able to identify risk factors which could threaten the health of the mother and foetus and also provide the mother with all the essential service package. Therefore, women who receive less than 4 ANC visits stands the risk of adverse birth outcome including stillbirths. This finding was consistent with the findings in Cape Town South Africa and Kenya where stillbirths were not associated with ANC visits (Beauclair *et al.*, 2014, Cheptum *et al.*, 2016).

Furthermore, there was no association between stillbirths and number of doses of malaria prophylaxis the mother received during pregnancy. This was found to be similar to the findings of Mace *et al.*, (2015) where there was no association between SP coverage and stillbirths. However the odds of stillbirths were higher among mothers who received inadequate (less than 3) doses of malaria prophylaxis. This confirms the fact that adequate doses of malaria prophylaxis is protective against adverse birth outcome including stillbirth (Radeva-Petrova *et al.*, 2014).

The proportion stillbirth was high among mothers whose labour were not managed using the partograph. The study observed that partograph non-use was associated with high odds of stillbirth which was statistically significant at the bivariate level. However, when multiple logistics regression analysis was performed, high odds of stillbirths associated with partograph non-use lost its statistical significance. Partograph use or non-use in itself does not cause stillbirths. However, it is used as a tool to identify early warning signs of danger in the labour in both mother and foetus. This finding suggests that partograph use was protective against stillbirths.

5.4 Maternal/obstetric factors and stillbirths

Obstetric complications are a threat to the life of both mother and foetus. Early identification and appropriate management of obstetric risk factors can improve pregnancy outcome and reduce stillbirths.

This study observed an association between stillbirths and obstetric complications at bivariate level analysis. In logistics regression analysis stillbirth was more likely among mother with foetal distress and it was statistically significant. This finding was consistent with the finding in Bangladesh where high odds of stillbirths was associated with foetal distress (Nahar *et al.*, 2013). Foetal distress is a complication of labour where there is reduced oxygen supply to the foetus resulting in intrauterine foetal death and subsequent stillbirth. Foetal distress is an obstetric emergency where split second decision can save the life of the foetus. This observation probably is a suggestion that response to obstetric emergencies were poor or inadequate in the West Gonja Hospital during the period of this study.

Furthermore, the study observed a statistical association between stillbirths and antepartum hemorrhage. The odds of stillbirth was high among mothers with antepartum hemorrhage which was statistically significant in both simple and multiple logistics regression models. This finding supports literature findings where high odds of stillbirth were associated with antepartum hemorrhage in England, Scotland, The Gambia and Nepal (Ashish *et al.*, 2016; Ashish *et al.*, 2015; Bhandari *et al.*, 2014; Gardosi *et al.*, 2013; Jammeh *et al.*, 2010). This again points to probably inadequate and impromptu response to obstetric emergencies in the hospital and may be due to delay in arriving at the hospital.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter presents summary of the study based on the specific objectives, conclusions and recommendations on the study based on the findings of the study.

6.1 Summary of the study

This study assessed factors influencing stillbirths in the West Gonja Hospital. The researcher set out to determine the proportion of stillbirth, assess the health facility factors associated with stillbirths and also determine the maternal/obstetric factors associated with stillbirths. Data from delivery registers were extracted and analyzed quantitatively using Stata version 14.0. The study found that stillbirth rate in the West Gonja Hospital was high, the significant factors associated with the high odds of stillbirths were low birth weight, referred cases, foetal distress and APH

6.2 Conclusions

6.1.1 Proportion of stillbirths

- Stillbirths rate in the West Gonja Hospital for the year 2015 was 23.5/1,000 total births.

6.1.2 Health facility factors influencing stillbirths

- Referred labour cases contributed significantly to stillbirths in the West Gonja Hospital for the period of the study.

6.1.3 Obstetric factors associated with stillbirths

- APH and fetal distress are obstetric factors that were significant contributors to high odds of stillbirths in the West Gonja Hospital.

6.1.4 Foetal characteristics associated with stillbirth

- Among the foetal characteristics low birth weight was a major factor associated with stillbirth for the study period.

6.2 Recommendation

6.2.1 Proportion of stillbirths

- To reduce stillbirths in the West Gonja Hospital, the factors identified in this study needs to be addressed by the Hospital Management.

6.2.2 Health facility factors influencing stillbirths

- Response to obstetric emergencies require serious attention by the Management of the West Gonja Hospital if stillbirths associated with referred cases would be reduced.
- Early identification, referral and tracking of referred cases by service providers (Midwives and Community Health Nurses) would be helpful in reducing stillbirths associated with referred cases

6.2.3 Obstetric factors associated with stillbirths

- The Management need to take a look at the response to obstetric emergencies in the hospital.

6.2.4 Foetal characteristic associated with stillbirths

- Health education on the benefits of antenatal care so as to reduce low birth weight among mothers should be given by service providers using all available fora, with the involvement of relevant stakeholders.

6.3 Study limitation

This study was not without limitations. The design as a retrospective secondary data analysis, variables which were important for this study were unavailable such as educational and marital status, religion and ethnicity. Antenatal records booklets which contained vital information which could have influenced this study findings were kept by mothers and were unavailable like laboratory investigations and treatment for maternal illness during pregnancy. Incomplete documentation affected the number of deliveries records extracted.

Another limitation is that this is a hospital based study, hence stillbirths which occurred outside the hospital or reported would be missed.

6.4 Future research

- The findings from this study points to the need for a prospective research.
- There is need for a population based research which capture deliveries that occurred outside the hospital.

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Appendix A: Data extraction instrument

**FACTORS INFLUENCING STILL BIRTHS IN WEST GONJA HOSPITAL OF
THE NORTHERN REGION OF GHANA**

Section A mother's demographic variables

- 1) Mothers age in
years _____

- 2) Highest Level of education
 - a) No education
 - b) Primary education
 - c) Junior high education
 - d) Senior high/technical education
 - e) Tertiary education

- 3) Occupation
 - a) House wife
 - b) Trader
 - c) Seamstress/Hairdresser
 - d) Government employee
 - e) Other

- 4) Marital status
 - a) Single
 - b) Co-habiting
 - c) Married

- 5) Place of residence

- a) Rural
 - b) Urban
- 6) Religion
- a) Christian
 - b) Muslim
 - c) Traditional

Section B Fetal factors

- 1) Fetal abnormalities _____
- 2) Birth weight _____
- 3) Sex
 - a) Male
 - b) Female
- 4) Maturity
 - a) Term
 - b) Preterm

Section C Health Service/facility factors

- 1) ANC visits
 - a) Adequate 4 plus
 - b) Inadequate less than 4
- 2) Haemoglobin level at registration _____

- 3) Haemoglobin level at 36 weeks _____

- 4) Malaria prophylaxis
 - a) Adequate 3 doses plus
 - b) Inadequate less than 3 doses

- 5) Partograph usage
 - a) Yes
 - b) No

- 6) Delivery mode
 - a) Spontaneous vaginal delivery
 - b) Caesarean operation
 - c) Vacuum extraction

- 7) Time of delivery
 - a) Morning shift
 - b) Afternoon shift
 - c) Night shift

- 8) Skilled personnel conducting delivery _____

Section D Maternal factors

- 1) Parity
 - a) Para 1
 - b) Para 2
 - c) Para 3

- d) Para 4
 - e) Para 5+
- 2) Duration of pregnancy at delivery
-
- 3) Stage of labour on admission
- a) First stage
 - b) Second stage
- 4) Maternal/obstetric complications _____
- 5) Maternal infection
- (s) _____

Appendix B Ethical clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In name of reply the number and date of this Letter should be inserted

My Ref: GHS/RDD/ERC/ Admin/Appro/17/09a
Your Ref. No.



Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: + 233-302-681109
Fax + 233-302-683434
Email: ghservo@gmail.com

Mary Annasa Zangob
School of Public Health
University of Ghana
Legon - Accra

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 42/12/2016
Project Title	"Factors Influencing Still Births in West Gonja District of the Northern Region"
Approval Date	14 th March, 2017
Expiry Date	13 th March, 2018
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

Appendix C Statement of Confidentiality

This study will mainly be dependent on the use of publicly available secondary data and would not directly involve any individual client. It would use the secondary data recorded in the facility delivery registers.

Any data extracted would be protected, including any hard copies that would be kept under lock and key while soft copies would be password protected to ensure safety and confidentiality of patient information. Patient's names and other identifiers would not be extracted, however serial numbers would be generated to identify patient information so that errors identified during data processing and analysis could be traced.

In case of doubt or any concern feel free to contact any of these persons below.

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Appendix D. Letter of permission from study site



NATIONAL CATHOLIC HEALTH SERVICE

Tel: +233-717-220971, 22001, 22062
Email: westgonjahospital@yahoo.com

West Gonja Hospital
Box DM 18
Damongo
Northern Region

Our Health
Your Health

17th November, 2016.

REV. SR. MARY ASSUNTA ZAAGBEB
SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA
P. O. BOX LG 78
LEGON ACCRA

St.,

RE: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

Receipt is acknowledged of your correspondence dated 15th November, 2016, on the above subject.

For the institution to benefit more from your studies, management grants you the required permission to conduct your dissertation research on the topic "Factors influencing still births in West Gonja District" using client data generated by the hospital.

We will offer you the necessary support for a successful conduct of the dissertation.

Thank you.

Yours Faithfully,

Remy F. Nyewie
(Health Services Administrator)
For: Management Team

ADMINISTRATOR
WEST GONJA HOSPITAL
P. O. BOX 18 DAMONGO

Cc: The Director of Health, Damongo Diocese

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