

## Stillbirths in Primary Level Hospitals in Sunyani, Ghana: A Retrospective Data Analysis

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### Authors' contributions

This work was carried out in collaboration among all authors. Authors PCA, KAW, MRA, CLN and TSL designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors JVB and AEY managed the analyses of the study. Author PCA managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

**Aims:** To determine prevalence and factors influencing stillbirth among deliveries.

**Study Design:** A facility-based cross-sectional analytical study.

**Place and Duration of Study:** Sunyani Municipal and Seventh Day Adventist (SDA) Hospitals in Bono Region, Ghana from January, 2014 and December, 2015.

**Methodology:** Two thousand and twelve deliveries were analyzed. Outcome variable was stillbirth, explanatory variables were the sociodemographic, obstetric and clinical characteristics. Logistic regression (bivariate and multivariate) analysis reporting odds ratio at 95% confidence interval were calculated to identify factors associated with stillbirth.

**Results** Stillbirth rate was 15/1000 births. Mean age of mothers was 28.2 ±5.9 years and majority (75.1%) were aged 20-34 years. Prevalence of stillbirth was higher among women with no formal education (2.1%). Odds of stillbirth decreased with additional antenatal care (ANC) visits; 2-3times ANC visits (AOR=0.16, 95% CI:0.06 - 0.48), ANC 4+ times (AOR=0.017, 95% CI: 0.006 - 0.052). Women who received 3+ doses of intermittent prophylactic treatment (IPT) for malaria had 68% reduction in odds of stillbirth compared with those who had one (AOR=0.32, 95% CI: 0.009-0.103). Women with haemoglobin greater than 11.0 g/dl were more than 70% less likely of stillbirth outcome (AOR = 0.29, 95% CI: 0.11-0.73).

**Conclusion:** High number of ANC visits, optimal maternal haemoglobin (>11.0 g/dl) and 3+ IPT are associated with lower risk of stillbirth among deliveries. Premium should be placed on quality of ANC to suit the specific needs of pregnant women whiles encouraging more visits.

*Keywords: Sunyani; primary level hospital; stillbirth; antenatal care.*

## ABBREVIATIONS

ANC : Antenatal Care;  
 AOR : Adjusted Odds Ratio;  
 CI : Confidence Interval;  
 CEmONC : Comprehensive Emergency  
 Obstetric and Newborn Care;  
 ENAP : Every Newborn Action Plan;  
 HIV : Human Immunodeficiency Virus;  
 IPT : Intermittent Prophylactic Treatment;  
 OR : Odds Ratio;  
 SDA : Seventh Day Adventist;  
 SDG : Sustainable Development Goal;  
 WHO : World Health Organization;

## 1. INTRODUCTION

Stillbirth; defined as the birth of an infant that has died in the womb or during intra partum after 28 weeks of gestation is largely avoidable and a neglected tragedy that requires the needed attention to address the psychological trauma on families and communities [1,2]. Annual stillbirth rates globally has not changed since 2011 and remains unacceptably high [3]. Approximately 2.6 million stillbirths occur annually around the world with ninety-eight percent occurring in low- and middle-income countries [4]. These stillbirths; largely preventable are thought to mirror the quality of antepartum, intrapartum care as demonstrated by rate in sub-Saharan Africa being approximately ten times that of developed countries [5]. The Every Newborn Action Plan (ENAP), a call on government, set a stillbirth target at 12 per 1000 births or less by 2030 [2].

Almost half of all stillbirths are caused by child birth complications, which can be reduced with skilled support during the birth. Other causes include post-term pregnancy; maternal infections in pregnancy such as malaria, syphilis and HIV; maternal medical disorders especially

hypertension, obesity and diabetes; and congenital abnormalities [5] Risk factors for stillbirth include maternal age (<20 years and age > 35 years); maternal parity (zero parity and parity greater than 3 both associated with increased stillbirth risk compared to 1 or 2 parity); low antenatal care visits; and mode of delivery (assisted vaginal delivery versus spontaneous vaginal delivery) [6,7].

Ghana's stillbirth rate has stagnated at 18/1000 births over the past decade [8,9] despite increasing number of midwives employed by government since 2005 [10] and institution of free maternal health services through the National Health Insurance Scheme (NHIS) [11] A qualitative study on health system barriers of accessibility and utilization of maternal and newborn healthcare services in Ghana after the user-fee abolition however found that apart from the inequitable distribution of midwives, women's experiences of intimidation in healthcare facilities, unfriendly healthcare providers, cultural insensitivity, long waiting time, poor care quality, lack of privacy at healthcare facilities, were important health system barriers [10].

The Brong Ahafo Region, although, has antenatal care (ANC) coverage of 98.9%, ANC fourth visit (ANC 4+) of 90.3% and skilled birth attendance of 79% [11], institutional stillbirth has only reduced marginally from 16/1000 to 14/1000 within the past five years (Brong Ahafo Region Annual Report, 2018). In addition, Sunyani Municipal which is one of 27 districts in the region has the highest concentration of midwives and health facilities yet contributes to 15% of all the institutional stillbirths (Brong Ahafo Annual Review Meeting, 2015). This study in 2018, examines factors associated with still birth in two primary referral hospitals in Sunyani Municipality in order to tailor health care services and education to address the challenge.

## 2. MATERIALS AND METHODS

### 2.1 Study Site

Sunyani Municipal is one of the 12 administrative districts in the Bono Region of Ghana and is approximately 380 kilometers from the country's capital, Accra. It is a peri-urban municipality with its capital serving doubling as the regional capital. There are 144 communities in six sub-districts within the Municipality. There are 20 facilities providing maternal, child and reproductive health services for an estimated population of 250, 000 with almost half living in rural areas (Ghana Statistical Service, Population Housing Census, 2010).

The Sunyani Municipal and Seventh Day Adventist (SDA) Hospitals are the first level referral facilities that provide comprehensive emergency obstetric and new born care (CEmONC). Together these facilities conducted 67% of deliveries in 2014 and 2015 excluding the Regional Hospital. The Municipal Hospital has a 17-bed capacity maternity unit and conducts an average of 150 births per month. The SDA hospital on the other hand operates a 21-bed capacity maternity with an average delivery of 90 per month.

### 2.2 Study Design

A facility-based cross-sectional analytical study was carried out at Sunyani Municipal and Seventh Day Adventist (SDA) hospitals in Bono Region, Ghana from January, 2014 to December, 2015. Deliveries that occurred in the facilities and with complete clinical records of participants were conveniently selected and included in the study.

### 2.3 Data Collection and Analysis

A total of 5029 births were extracted from delivery registers at the Sunyani Municipal and SDA Hospitals onto Microsoft Excel 14.0 spreadsheet. A total of 2012 postpartum women with complete data on age, address, occupation, educational level, number of ANC visits, parity, gravidity, number of doses of intermittent preventive treatment (IPT) against malaria received, human immunodeficiency virus (HIV) infection status, haemoglobin (Hb), hepatitis B infection status, blood pressure, gestational age at delivery, mode of delivery, birth outcome, birth weight were included in the study. Deliveries with incomplete clinical records were discarded.

Data was exported into Stata statistical software (Stata Intercooled version 15; Stata Corp, College Station, TX, USA) for analysis. Frequency and percentage distribution of background and obstetric characteristics of respondents were computed with cross tabulations to compare delivery outcomes (stillbirth and livebirth). Logistic regressions (bivariate and multiple) analysis reporting odds ratio (OR) at 95% confidence interval (95% CI) were calculated to identify factors associated with stillbirths. A p-value  $\leq 0.05$  was used as an indication of statistical significance.

## 3. RESULTS AND DISCUSSION

Five thousand and twenty-nine deliveries occurred in the period under review and 2012 (40%) with complete data were included in analysis. All the stillbirths had complete data and were included in the analysis. About two thirds (76.3%) of the deliveries occurred in the Sunyani Municipal Hospital. The total still birth rate was 1.5% (15/1000 livebirths) and by health facility; 1.6% and 1.1% for Sunyani Municipal and SDA hospitals respectively. The mean age of the mothers was  $28.2 \pm 5.9$  years and majority (75.1%) were women aged 20-34 years. More than half (55.9%) resided in communities classified as rural and approximately same proportion (54.8%) were self-employed. More than 40% had attained at least secondary level education. Women with no formal education had high prevalence of stillbirth (2.1%). By age group women 35 years and above had the highest prevalence (1.9%). Stillbirth prevalence was higher among rural dwellers compared with urban (1.6% versus 1.4%). The prevalence of still birth was 1.6% among rural resident as compared to 1.4% among urban residents. Although the differences in stillbirth prevalence among groups were clinically significant, they were not statistically significant (Table 1).

Number of ANC visits; number of IPT doses received; birth weight; maternal haemoglobin (HB) levels and gestational age at delivery were significantly associated with stillbirth (Table 2).

In the multivariate analysis, number of ANC visits; number of IPT doses; and maternal haemoglobin (HB) levels remained significantly associated with stillbirth. Women who visited ANC twice were more than 80% less likely to have stillbirth (2-3 visits: AOR=0.16, CI=0.06-0.48; 4+ visits: AOR=0.02, CI=0.01-0.05).

Receiving at least two doses of IPT was associated with more than 65% reduction in odds of stillbirth (2 doses: AOR=0.32, CI=0.01-0.10; 3+ doses: AOR=0.20, CI=0.07-0.58). Maternal anaemia (HB<11.0 g/dl) was associated with nearly threefold increase in odds of stillbirth (AOR=2.9, CI=1.1-7.3).

In this study, the prevalence of still birth in Sunyani Municipality was 15 per 1000 birth and mirrors the regional prevalence (2018). At the multivariate level, stillbirth was significantly associated with low number of ANC attendance of pregnant women, low number of doses of IPT, and maternal anaemia. Contrary to findings of other studies, there was no association of stillbirth with mode of delivery, maternal blood pressure, parity, maternal infections including HIV, syphilis and hepatitis B [4,12,13].

In contrast to similar studies in Ghana which reported higher antepartum stillbirths [14,15] this study found equal proportions of antepartum and intrapartum stillbirths which is either possibly consequential or due to late referral of laboring women from rural Sunyani. Indeed, this study reported higher stillbirths from women living in rural areas and those with no formal education comparable to studies in India [16]. In addition, a retrospective study on cause of death from a major referral tertiary facility in Kumasi, Ghana,

showed higher intrapartum stillbirths attributed to high hypoxic intrapartum events [17]; and the resultant higher fresh stillbirths compared to the macerated also possibly due to delays along the referral path and receiving care. Higher stillbirths were also recorded in pregnant women aged more than 35 years and it is consistent with findings of other studies conducted in Ghana and globally [6,18,19] although it was statistically not significant.

In 2016, the World Health Organization released new recommendations on ANC for a positive pregnancy experience. Pregnant women are to have a minimum of eight ANC contacts during pregnancy to improve perinatal outcomes [20] Until then, the recommendation was for at least four ANC visits in a focused ANC [21]. This study showed that the likelihood of still birth outcome decreased with additional ANC visits as observed in studies conducted in Ghana, other sub-Saharan Africa countries, South Asia and Central America [6,19]. This also supports the new WHO recommendation that more ANC contacts are required especially in the last trimester to improve perinatal outcomes [20]. In addition, transportation and distance to facilities are important determinants of ANC attendance [22,23]. A cluster randomized control trial in rural Ghana examined effects of home visit on neonatal mortality. Home visits by trained

**Table 1. Background characteristics of respondents, Sunyani Municipal; 2014/2015**

Variable	Still birth; n (%)	Live birth n (%)	Total, N (%)	P-value
<b>Age group</b>				
<20	2 (1.4)	138 (98.6)	140 (7)	.68
20-34	21 (1.4)	1491 (98.6)	1511 (75.1)	
35+	7 (1.9)	353 (98.1)	361 (17.9)	
<b>Place of residence</b>				
Urban	12 (1.4)	874 (98.7)	886 (44.1)	.65
Rural	18 (1.6)	1108 (98.4)	1126 (55.9)	
<b>Employment status</b>				
Unemployed	3 (2.1)	140 (97.9)	143 (7.1)	.92
Employed	24 (1.4)	1689 (98.6)	1711 (85.0)	
Student	3 (1.9)	155 (98.1)	158 (7.9)	
<b>Educational level</b>				
None	3 (2.1)	140 (97.9)	143 (7.1)	.44
Basic	0 (0.0)	86 (100.0)	86 (4.3)	
Secondary	17 (1.8)	911 (98.2)	928 (46.1)	
Tertiary	10 (1.2)	845 (98.8)	855 (42.5)	
<b>Facility of delivery</b>				
Municipal Hospital	25 (1.6)	1511 (98.4)	1536 (76.3)	.36
SDA Hospital	5 (1.1)	471 (98.9)	476 (23.7)	

**Table 2. Clinical characteristics of respondents, Sunyani Municipal; 2014/2015**

<b>Variable</b>	<b>Still birth; n (%)</b>	<b>Live birth; n (%)</b>	<b>Total; n (%)</b>	<b>P- value</b>
<b>Number of ANC visits</b>				
1	17(17.4)	81 (82.6)	98 (4.9)	<b>.00</b>
2-3	8 (5.2)	145 (94.7)	153 (7.6)	
4+	5 (0.3)	1756 (99.7)	1761 (87.5)	
<b>Parity</b>				
Nullipara	13 (2.1)	613 (97.9)	626 (31.1)	.25
Primipara	9 (1.5)	575 (98.5)	584 (29.1)	
Multipara	8(1.0)	794 (99.0)	802 (39.8)	
<b>Gravidity</b>				
0	0(0)	5 (100)	5 (0.3)	.96
1-3	21 (1.5)	1388 (98.5)	1409 (70)	
4+	9(1.5)	589 (98.5)	598 (29.7)	
<b>Number of IPT</b>				
1 dose	18 (12.3)	128 (87.7)	146 (7.2)	<b>.00</b>
2 doses	8 (2.4)	328 (97.6)	336 (16.7)	
3+ dose	4 (0.3)	1526 (99.7)	1530 (76)	
<b>Weight (KG)</b>				
<2.5	9 (5.1)	167 (94.9)	176 (8.8)	<b>.00</b>
≥ 2.5	21 (1.1)	1815 (98.9)	1836 (91.2)	
<b>HB status</b>				
Normal (≥ 11 g/dl)	11 (0.)	1298 (99.2)	1309 (65.1)	
Anaemia (<11 g/dl)	19 (2.7)	684 (97.3)	703 (34.9)	<b>.00</b>
<b>Diastolic</b>				
Normal	11 (1.1)	1036 (98.9)	1047 (52)	.20
Prehypertension	12 (1.9)	628 (98.1)	640 (31.8)	
High Diastolic	7 (2.2)	318 (97.8)	325 (16.2)	
<b>Systolic</b>				
Normal	14 (1.7)	812 (98.3)	826 (41.1)	.44
Prehypertension	12 (1.2)	985 (98.8)	997 (49.5)	
High Systolic	4 (2.1)	185 (97.9)	189 (9.4)	
<b>HIV test</b>				
Positive	1 (2.4)	40 (97.6)	41 (2.1)	.46
Negative	29 (1.5)	1942 (98.5)	1971 (97.9)	
<b>Syphilis</b>				
Positive	0 (0)	8 (100.0)	8 (0.4)	.88
Negative	30 (1.5)	1974 (98.5)	2004 (99.6)	
<b>Hep B</b>				
Positive	0(0)	87 (100.0)	87 (4.4)	.64
Negative	30 (1.6)	1895 (98.4)	1925 (95.6)	
<b>Mode of delivery</b>				
SVD	27 (1.6)	1719 (98.4)	1746 (86.8)	.79
Caesarean	3 (1.1)	263 (98.9)	266 (13.2)	
<b>Gestational age</b>				
<37 weeks	11 (2.9)	358 (97.1)	369 (18.3)	<b>.04</b>
37-40weeks	18 (1.2)	1480 (98.8)	1498 (74.5)	
40+ weeks	1 (0.7)	144 (99.3)	145 (7.2)	

community health workers in interventions areas was significantly associated with reduced referrals for advanced care and consequently, families saved cost on transportation and obstetric care [24]. With evidence from this, midwives could be trained to provide domiciliary services to improve geographic access as part of

the community-based health planning service (CHPS) strategy in Ghana. The home visits provide avenue to prepare the family to support the woman in the event of any emergency. Additionally, unpleasant experiences of pregnant women during ANC at healthcare facilities also affect utilization of services [10] and a major

**Table 3. Factors associated with still births in primary level hospitals in Sunyani**

Variable	OR (95% CI)	P-value	AOR (95% CI)	P-value
<b>Number of ANC visits</b>				
1 (Ref)	1		1	
2-3	0.26 (0.11 - 0.64)	.00	0.16 (0.06 - 0.48)	.00
4+	0.01 (0.01 - 0.04)	.00	0.02 (0.01 - 0.05)	.00
<b>Number of IPT</b>				
1 dose (Ref)	1		1	
2 doses	0.17 (0.74 0.41)	.00	0.32 (0.01 - 0.10)	.00
3+ doses	0.02 (0.01 - 0.56)	.00	0.20 (0.07 - 0.58)	.00
<b>Weight (KG)</b>				
<2.5 (Ref)	1		1	
≥ 2.5	0.21 (0.09 - 0.48)	.00	0.45 (0.16 - 1.24)	.12
<b>HB status</b>				
Normal (≥11.0 g/dl) (Ref)	1		1	
Anaemic (<11.0 g/dl)	3.28 (1.55 - 6.93)	.00	2.9 (1.1 – 7.3)	.00
<b>Gestational age</b>				
<37 weeks (Ref)	1		1	
37-40weeks	0.40 (0.18 – 0.50)	.02	0.57 (0.22 - 1.48)	.25
40+ weeks	0.57 (0.08 - 4.3)	.59	0.78 (0.07 - 8.63)	.84

concerned especially among rural dwellers [25,26]. The quality of care is therefore a major determinant of utilization and must be central in attempts to improve utilization [25,27].

Furthermore, IPT given during ANC has been shown to reduce severe maternal anaemia, low birth weight and perinatal mortality [28,29] and it is consistent with our study findings. The influence of maternal anaemia on stillbirth has been studied to act through low birth weight in a multi-ethnic population in England [30]. Nevertheless, the causal pathways for stillbirth remain complex, and are often thought to be linked with multiple risk factors such as genetic, obstetric, infection and nutritional pathologies, all interacting to influence the eventual outcome [31].

A limitation of the study is that, the data analyzed were primarily collected for routine healthcare services and errors may have occurred during the documentation of the records. Again, convenient selection of respondents with complete data might have introduced selection bias.

#### 4. CONCLUSION

ANC provides the platform for valuable health care services which if implemented timely and appropriately could reduce stillbirths. Barriers to ANC utilization should be addressed to include, changes to the structure of ANC clinics to improve privacy, improving provider relational

practices and mobilizing faith-based leaders who can positively influence women's health-care-seeking behaviours.

A well-structured domiciliary midwifery services could be incorporated into community-based health planning services (a strategy in Ghana to improve universal health coverage by addressing geographic access and acceptability of care) in the municipality to improve utilization and ultimately quality of antenatal care.

#### CONSENT

It is not applicable.

#### ETHICAL APPROVAL

Ethical clearance was obtained from the Kintampo Health Research Centre Institutional Ethics Committee with study ID number KHRCIEC/2017-13. Administrative permission was obtained from the management of the two hospitals.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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