

ORIGINAL ARTICLE

Stillbirths and associated factors in a peri-urban District in Ghana

A. Alhassan¹, L.A. Ayikai², H. Alidu³ and V.N. Yakong⁴

¹Department of Human Anatomy, School of Medicine and Health Sciences; ⁴Department of Midwifery, School of Allied Health Science, University for Development Studies; ²Agogo Nursing Training College, Agogo; ³Asbanti Akim North District, Asbanti Region, Ghana;

³Department of Medical Laboratory Science, School of Allied Health Science, University of Health and Allied Sciences, Ho, Ghana

To determine stillbirth rate and identify causal factors associated with it in the Asante-Akim South district of Ghana. A retrospective review of records of women who had stillbirths at seven Health facilities in the district was conducted. The study period was from January 1, 2010 to December 31, 2012. The maternity registers were used to identify women who gave birth during the study period and data on women with stillbirth collected. The data collected included maternal age, parity, gestation, mode of delivery, obstetric complications, sex and weight of the baby; ante-natal attendance and treatment of malaria in pregnancy, whether the birth was fresh stillbirth or macerated and cause of stillbirth. Births without vital status were excluded. There were 6356 deliveries during the study period with 141 stillbirths giving a stillbirth rate of 22.2 per 1000 births. About 56.7% of the stillbirths were fresh deliveries and 43.3% of them were macerated. More than 60% of the stillbirths were male and about 60.0% of the delivery occurred within 36-41 weeks of gestation. About 50.0% of the women were between the ages of 20-29 with only 18.4% falling within the age bracket of 15-19 years. Unexplained intrauterine foetal death (18.4%), prolong/obstructed labour (14.9%), hypertensive disease (9.9%), and malaria in pregnancy (8.5%) was the leading causes of stillbirth in this study. The prevalence of stillbirth rate among the study subject especially among less educated and younger mothers as well as those engage in petty trading and farming was very high. The major risk factors for stillbirth in this study was unexplained intrauterine foetal death although preterm birth, low birth weight and hypertensive/diabetic disorders, placenta/cord factors, infections (malaria and HIV) and use of herbs in pregnancy also contributed significantly.

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INTRODUCTION

Stillbirth rate is an indirect measure of the quality of management of pregnancy, labour and delivery. Studies have shown that approximately 2.6 million women experience stillbirths every year and majority of these occurrences is in Sub-Saharan Africa and Latin America (McClure *et al.*, 2007). About 98% of all stillbirths occur in low and middle income countries. These numbers also varies between countries depending on the various national policies relating to maternal and child health (Baqui *et al.*, 2011; Edmond *et al.*, 2008; McClure *et al.*, 2007). The causes

and factors associated with stillbirths are also wide and varied. According to some studies the main causes of stillbirths are of maternal origin including medical and nonmedical origin.

The most commonly reported medical factors include pre-eclampsia/eclampsia or hypertensive diseases, prolonged/obstructed labour (Baqui *et al.*, 2011; Edmond *et al.*, 2008; Elhassan *et al.*, 2009; Engmann *et al.*, 2009; Jammeh *et al.*, 2010; Jehan *et al.*, 2007), placental/cord factors, diabetes mellitus, congenital malformations (Shrestha *et al.*, 2010; Zupan, 2005). Other studies have also reported maternal or foetal infections as possible causes of stillbirth especially in developing countries (Lawn *et al.*, 2010; Ngoc *et al.*, 2006). Advance maternal age and multipara as well as distance to health facility,

Correspondence: Dr. Abass Alhassan, Department of Human Anatomy, School of Medicine and Health Sciences; University for Development Studies.

Email: abassalhassan82@gmail.com / daabass@uds.edu.gh

delay in receiving appropriate medical attention, lack of skilled attendants and poor antenatal care have also been reported as risk factors for stillbirth (Jammeh *et al.*, 2010; O'Leary *et al.*, 2007; Stanton *et al.*, 2006).

In Ghana, recent studies have put the stillbirth rates at 24 per 1000 births and neonatal death rates at 30 per 1000 live births (Engmann *et al.*, 2009; GDHS, 2008; Kinney *et al.*, 2010; Okiwelu *et al.*, 2007; Zakaria *et al.*, 2009). The Ghana Demographic Health Survey reported an overall national stillbirth rate of 13 per 1000 pregnancies using a sample size of 2949 (GDHS, 2008). There is some regional variation in the stillbirth rates. According to Edmond *et al.*, (Edmond *et al.*, 2008), the stillbirth rate in the Central Region of Ghana is 35 per 1000 live birth. This rate is very high compare to the National figure indicating a possible variation in regional data. There is however a paucity of detailed regional data on stillbirth rates in Ghana and there is therefore the need for thorough studies on stillbirth in the country. The present study was thus aimed to study the stillbirth rates and identify some risk factors associated with stillbirth in the Asante Akim South District of the Ashanti Region of Ghana.

MATERIALS AND METHODS

Study design/setting

A retrospective descriptive study was conducted at seven Health facilities in the Asante Akim South district of the Ashanti Region of Ghana. The study was conducted over a two years period from January 1, 2010 to December 31, 2012.

Study population and Data collection

All women with singleton stillbirths in health facilities in the district were considered, however only those with complete data in the maternal register were included in the study. The maternity registers and antenatal records were used to identify women who gave birth during the study period. Data were collected using a data collection form designed for the study. Stillbirth in this study was defined, in accordance with the World Health Organization's International Classification of Disease (ICD-10) rec-

ommendation for international comparison, as the death of a foetus weighing at least 1000 g occurring after 28 weeks of gestation (WHO, 2004). The data collected included maternal age, parity, gestation, mode of delivery, obstetric complications, gender and weight of the baby; ante-natal attendance and treatment of malaria in pregnancy, whether the birth was fresh stillbirth or macerated and cause of stillbirth.

A fresh stillbirth was defined as the intrauterine death of a fetus during labor or delivery; while a macerated stillbirth was defined as an intrauterine death of a fetus occurring before the onset of labor and the fetus shows degenerative changes (WHO, 2001). The numbers of fresh and macerated stillbirths are presented as a proportion of all deliveries. Women with incomplete data such as absence of maternal age, weight and sex of baby as well as type of stillbirth were excluded from the study. The town or village the women came from were also recorded to help determine distance to the health facility.

Ethical consent

This retrospective study was approved by the District Health Directorate of the Asante Kim South District. Patient's information were made anonymous and de-identified prior to entering the data for analysis.

Data management and analysis

Patient's information were made anonymous and de-identified prior to entering the data for analysis. The numbers of fresh and macerated stillbirths are presented as a proportion of all deliveries. Categorical variables (mode of delivery, baby's gender and weight) were displayed as frequencies and proportions and compare using Chi-Square or Fisher's exact test. Continuous variables (maternal age, gestational age, birth weight and parity) was reported as mean \pm SD and compare using unpaired student t-test. In all statistical tests, a value of $P < 0.05$ was considered significant. All statistical analysis was performed using Systat for Windows, Version 11.0, (Systat Software, Erkrath, Germany; www.systat.com).

RESULTS

The total mean age of the women in the present study was 26.23 ± 6.6 (mean \pm SD) with a range of 15-50 years. The mean age of the women with stillbirths was 26.72 ± 7.1 which was not significantly different from those with live births (25.86 ± 6.2) even though those with live birth were relatively younger in age. About 52.31% and 22.77% of all the women were within the age brackets of 21-30 years and 31-40 years respectively. Teenagers constituted about 24.0% of the women under investigation. In addition, almost 22.0% of the women with stillbirth and 30.46% of those with live births were within the ages of 21-30. The major occupation of the women under study was petty trading accounting for about 39.38% with farm related activity constituting about 24.31% (Table 1).

A significant 17.54% of them were unemployed with the remaining 16.92% of them engaging in dress-making/hair dressing business. Majority of women (78.15%) had at least some formal education up to secondary school. Twenty percent of the women had no formal education at all with only 2.15% attaining education to the tertiary level. Women with live births were more educated compare to those with stillbirths even though it was not statistically significant ($P = 0.05$). More than 60.0% of the women were multipara with only 36.31% of them being nulliparous. Multiparous women were more likely have live birth in this study compare to the nulliparous women.

Spontaneous vaginal delivery (SVD) constituted over 90.0% of all the deliveries with only 8.92% of the deliveries being conducted through caesarean sections (CS). Most of the stillbirth occurred among women who went through SVD. In total male babies constituted the majority of the deliveries accounting for about 55.7%. The total mean birth weight was 2.85 ± 0.57 . The mean weight of the stillbirths was significantly lower compared with the livebirths ($P = 0.0001$) as shown in Table 1. Eighty percent of the deliveries had birth weight ≥ 2500 g. The mean gestational age for all deliveries was 35.84 ± 3.7 whereas that of those with stillbirths and live birth was 34.99 ± 4.5 and 36.29 ± 3.2 respectively as shown in Table

1. In all about 69.83% of the deliveries occurred on or before gestation week 37 with about 30.15% of the deliveries occurring after gestation week 37.

The mean age of women with fresh stillbirths was 26.40 ± 7.2 whilst that of mothers with macerated stillbirths was 27.13 ± 6.9 years. The difference in the mean ages was not statistically significant ($P = 0.543$). The mean parity for mothers with fresh stillbirths was 1.6 ± 1.9 and that for mothers with macerated stillbirths was 2.54 ± 2.7 which was significantly higher compare to that of mothers with fresh stillbirths ($P = 0.016$) as shown in table 2. A significant number of the fresh stillbirth was delivered through caesarean sections compared with the macerated stillbirths ($P = 0.024$). However, no significant difference was observed with regards to sex of babies and birth weight, although of the 80 fresh stillbirths 58 of them were males (Table 2).

Of the 141 deliveries that were stillbirths, 80 (56.7%) of them were fresh stillbirth and macerated stillbirths constituted 61 (43.3%). Out of the total number of stillbirths about a quarter (35) of them constituting about 24.82%, were unexplained intra-uterine foetal deaths. Also prolong labour, APH/ Anaemia, and malaria cases were responsible for 20 (14.18%), 14 (9.92%) and 12 (8.52%) of the stillbirths respectively as shown in table 3. Placental cord accidents was responsible for about 12 (8.51%) of the deaths. Other causes of the stillbirths included Hypertension/diabetes as well as pre-eclampsia related cases accounting for 9 (6.38%) in each case, restricted foetal growth and cord prolapse both accounted for 6 (4.25%) of the total cases of stillbirths. It is worth mentioning that the used of herbal concoction was responsible about 5.67% of the births with almost all of this resulting in macerated stillbirths (Table 3). In addition 2 (1.42%) of the stillbirth was due to HIV status of the mothers and each of the cases resulted in macerated stillbirths (Table 3).

DISCUSSION

The stillbirth rate of 22.2 per 1000 births found in the present study is relatively high. This is similar to the recent national rate of 21 per 1000 deliveries

Table1: Maternal demographic characteristics

Variable	Total n (%)	Stillbirth n (%)	Live n (%)	P value
Age (years)				0.31
Mean± SD	26.23 ± 6.6	26.72 ± 7.1	25.86 ± 6.2	
≤20	76 (23.38)	36 (11.08)	40 (12.31)	
21-30	170 (52.31)	71 (21.85)	99 (30.46)	
31-40	74 (22.77)	30 (9.23)	44 (13.54)	
41-50	5 (1.54)	4 (1.23)	1 (0.31)	
Occupation				0.0285
Unemployed	57 (17.54)	17 (5.23)	40 (12.31)	
Farmer	79 (24.31)	42 (12.92)	37 (11.38)	
Traders	128 (39.38)	62 (19.08)	66 (20.30)	
seamstress/Hairdresser	55 (16.92)	21 (6.46)	34 (10.46)	
Education				0.055
No formal Educ	64 (19.69)	36 (11.08)	28 (8.62)	
Primary/Secondary	254 (78.15)	103 (31.69)	151 (46.46)	
Tertiary	7 (2.15)	2 (0.62)	5 (1.54)	
Parity				1.000
0	118 (36.31)	52 (16.00)	66 (20.31)	
1-5	207 (64.00)	90 (27.69)	117 (36.00)	
Type delivery				0.0008
SVD	296 (91.08)	123 (37.85)	173 (53.23)	
C/S	29 (8.92)	9 (2.77)	20 (6.15)	
Sex of Baby				0.0015
Male	191 (58.77)	97 (29.85)	94 (28.92)	
Female	134 (41.23)	44 (13.54)	90 (27.69)	
Birth Weight				0.0001
Mean± SD	2.85 ± 0.57	2.66 ± 0.65	3.00 ± 0.46	
(<2500 g)	65 (20.00)	46 (13.15)	19 (5.85)	
(≥2500 g)	260 (80.00)	95(29.23)	165 (50.77)	
Gestation at Delivery				0.807
Mean ± SD	35.84 ± 3.67	34.99 ± 4.45	36.29 ± 3.27	
≤37	227 (69.84)	100 (30.77)	127 (39.07)	
>37	98 (30.15)	41 (12.62)	57 (17.54)	

(GDHS, 2008). According to Dassah *et al.* (2014) the stillbirth prevalence in the largest referral hospital in the Ashanti is 5.9%. The findings is however lower compare to those studies with range between 30 and 40 per 1000 delivery (Chigbu *et al.*, 2009; Elhassan *et al.*, 2009; Engmann *et al.*, 2009; Ngoc *et al.*, 2006; Onyiriuka, 2009; Shrestha *et al.*, 2010). The rate in this study is however higher than those reported in developed countries where the rates are below 10 per 1000 births. This disparity is due the fact that antenatal and obstetric care in the advance countries are much improved compared to those in

developing countries such as Ghana (Archibong *et al.*, 2003; McClure *et al.*, 2007; O'Leary *et al.*, 2007; Shankar *et al.*, 2002). There is significant difference in the socio-demographic and reproductive risk factors in the most developed cities compare to the rural communities such as the one in the present study and this account for the difference in the rates.

Previous studies reported that pre-eclampsia/eclampsia, obstetric haemorrhage, prolonged/obstructed labour are the most common risk fac-

Table 2: Demographic characteristics between mothers with fresh and macerated stillborn babies

Variable	Total n (%)	Fresh n (%)	Macerated n (%)	P value
Maternal Age, Mean \pm SD		26.40 \pm 7.2	27.13 \pm 6.9	0.501
<20	26 (18.44)	18 (12.76)	8 (5.67)	
20-30	81 (57.45)	43 (30.50)	38 (26.95)	
31-40	30 (21.27)	16 (11.35)	14 (9.93)	
41-50	4 (2.84)	3 (2.13)	1 (0.71)	
Occupation				0.0259
Unemployed	17 (12.05)	9 (6.38)	8 (5.67)	
Farmer	42 (29.79)	24 (17.02)	18 (12.76)	
Student	4 (2.84)	4 (2.84)	0 (0.00)	
Civil Servant	6 (4.26)	1 (0.71)	5 (3.55)	
Trader	51 (36.17)	23 (16.31)	28 (19.86)	
seamstress/Hairdresser	21 (14.90)	16 (11.35)	5 (3.55)	
Education				0.3604
No formal Educ	36 (25.53)	22 (15.60)	14 (9.93)	
Low Level of Educ	103 (73.05)	56 (39.71)	47 (33.33)	
High level of Educ	2 (1.42)	2 (1.42)	0 (0.00)	
Parity, mean \pm SD		1.60 \pm 1.9	2.54 \pm 2.7	0.016*
Nulliparous	51 (36.17)	23 (16.31)	28 (19.86)	
Multipara	90 (63.83)	38 (33.33)	43 (30.50)	
Type delivery				0.0242**
SVD	123 (87.23)	60 (42.55)	63 (44.68)	
C/S	18 (12.77)	14 (9.93)	4 (2.84)	
Sex of Baby				0.3592
Male	97 (68.79)	58 (41.13)	39 (27.66)	
Female	44 (31.21)	22 (15.60)	22 (15.60)	
Birth Weight				0.2814
Normal birth weight (>2500 g)	95 (67.38)	57 (40.43)	38 (26.95)	
Low birth weight (<2500 g)	46 (32.62)	23 (16.31)	23 (16.31)	
Gestation at Delivery				0.3851
Term	55 (39.01)	34 (24.11)	21 (14.89)	
Preterm	86 (60.99)	46 (32.62)	40 (28.37)	

tors for stillbirths (Archibong *et al.*, 2003; Begum *et al.*, 2010; McClure *et al.*, 2007; O'Leary *et al.*, 2007; Shankar *et al.*, 2002; Walsh *et al.*, 2008). Some others have also indicated that placenta/cord factors, congenital malformation and infections were the most common cause of stillbirth (Jammeh *et al.*, 2010; Ngoc *et al.*, 2006; Stanton *et al.*, 2006; Zupan, 2005). In the present study however, unexplained intrauterine foetal deaths were the most common cause of stillbirth even though hypertension/diabetes, placenta/cord factors, pre-eclampsia/eclampsia and infections such as malaria and HIV also contributed significantly. It is also worth mentioning that the used

of herbal concoctions by pregnant women was also a major contributor the causes of stillbirth in this current study. According to Bayisa *et al.* (Bayisa *et al.*, 2014) use of herbs among pregnant is very common in Africa. Most of this herbs tends to have serious side effects to both the foetus and the mother which could be responsible for some of these negative outcomes (Eisenberg *et al.*, 1998; Ernst, 2003; Fakeye *et al.*, 2009). The findings of our study confirm placenta/cord factors as the common causes of stillbirth, although unexplained intrauterine deaths were the most common. The findings of this study is in conformity to the work

Table 3: Aetiology of Stillbirths

Aetiology	Total N (%)	Fresh stillbirth N (%)	Macerated stillbirth N (%)
Maternal			
Diabetes/ Hypertension	9 (6.38)	3 (2.13)	6 (4.25)
pre-eclampsia	9 (6.38)	6 (4.25)	3 (2.13)
Prolong labour	20(14.18)	18(12.76)	2 (1.42)
Infection			
Malaria	12 (8.51)	5 (3.55)	7 (4.96)
HIV	2 (1.42)	0 (0.00)	2 (1.42)
APH/ Anaemia	14 (9.92)	7(4.96)	7 (4.96)
PROM	5 (3.55)	4 (2.84)	1 (0.71)
Foetal			
Restricted Growth	6 (4.25)	2 (1.42)	4 (2.84)
Breech	3 (2.13)	2 (1.42)	1 (0.71)
Placenta			
Cord prolapse	6 (4.25)	6 (4.25)	0 (0.00)
cord accidents	12 (8.51)	11 (7.80)	1 (0.71)
Others			
	35		
Unexplained	(24.82)	13 (9.22)	22(15.60)
Use of Herbs	8 (5.67)	1 (0.71)	7 (4.96)

of others (Ntuli *et al.*, 2012; Shankar *et al.*, 2002; Shrestha *et al.*, 2010; Zupan, 2005).

Although it was not possible to distinguish between intra-uterine fetal deaths and intrapartum stillbirths in this study, some studies have suggested that up to about 40% of stillbirths occur during delivery, suggesting that about half of these stillbirths may not have occurred during labour. It has been suggested provision of better obstetric care including skilled attendance at and the use of partographs for early recognition of intrapartum complications as well as the provision of appropriate timely interventions in managing these complications could save up to 60% of intrauterine deaths (Dassah *et al.*, 2014).

Spontaneous vaginal deliveries was the main mode of delivery and this was highly associated with stillbirth specifically with fresh stillbirths. Reliably moni-

toring of the progress of labour by skilled staff has been seen to reduce the number of stillbirths in resource constrain setting such us ours. Several reasons may account for the high morbidity and mortality associated with spontaneous vaginal deliveries in this study. Non adherence to standard operating procedures (SOP) on vaginal deliveries by staff and late reporting of patients to the health facility due to long distance couples with bad road network in the district could have contributed significantly to this high figures. An improvement of the barriers to the provision of emergency obstetric care in district hospitals such as availability qualify staff, training and capacity building as well as timely referral patterns will be useful in improving adverse vaginal birth outcomes.

In this study, adolescent mothers age 20 years and below and those women aged 21 to 30 years had high proportion of stillbirths. This finding is similar to studies conducted elsewhere (Katz *et al.*, 2008), which found higher rates of stillbirth among adolescents. It is however in contrast to others who found a higher stillbirths in older women (O'Leary *et al.*, 2007; Shrestha *et al.*, 2010; Stanton *et al.*, 2006) and those who reported no difference in stillbirths rates by maternal age (Goldenberg *et al.*, 2007). Multiparity was significantly associated with stillbirth specifically with macerated stillbirths. This is similar to the findings of Hossain and colleagues (Hossain *et al.*, 2009)) as well as Jammeh and co-workers (Jammeh *et al.*, 2010) who indicated that both null parity and grand multiparity were significantly associated with stillbirths. A similar study reported higher parity as risk factor for stillbirths (Stanton *et al.*, 2006). The present findings is however in contrast to Ntuli and Malanga (Ntuli *et al.*, 2012) who found that women who never had live birth are at higher risk of stillbirth.

There are many other factors that contribute to higher stillbirth rates in a community. Previous studies have indicated that socioeconomic status and literacy also influence pregnancy outcomes (Bhattacharya *et al.*, 2010; Engmann *et al.*, 2009; Korde-Nayak *et al.*, 2008; Lamont *et al.*, 2015). In the current study, the occupational status and edu-

cational level of the study participants were highly associated with stillbirth with majority of the women who had very low education and engaging in petty trading and farming constituting the majority of the women with stillbirths.

Although this is a retrospective analysis of data, this study has identify such important risk factors associated with stillbirth and the type of stillbirth in this low resource setting. In this study the causes of stillbirth were based on clinical assessment of the health personnel not on post-mortem. Feotal autopsy is said to be the adequate diagnostic procedure for information on the cause of deaths (ACOG, 2009; Ahiadeke, 2001; Silver *et al.*, 2007) hence more accurate information regarding the cause of foetal could have been available if feotal autopsies were conducted. Nevertheless, this study has provided useful data that can be used for further studies and in training healthcare providers to help improve maternal and child care in the study area.

CONCLUSION

The prevalence of stillbirth rate among the study subject especially among less educated and younger mothers as well as those engage in petty trading and farming was very high. The stillbirth rate among women who delivered through vaginal deliveries is high in the study setting. The major risk factors for stillbirth in this study was intrauterine foetal death although preterm birth, low birth weight and hypertensive/diabetic disorders, placenta/cord factors, infections (malaria and HIV) and use of herbs in pregnancy also contributed significantly. The malaria cases among the women was unacceptably high and efforts must be made to ensure that the insecticide treated mosquito nets that are distributed free at antenatal are used properly to help reduced the cases and its associated complications. Improving quality of obstetric care during labour in district health facility through the provision of consultant obstetric service as well as retraining of staff to improve quality.

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COMPETING INTERESTS

The authors declare that they have no competing interests.

REFERENCE

- ACOG (2009). ACOG Practice Bulletin No. 102: management of stillbirth. *Obstet Gynecol* **113** (3): 748-761.
- Ahiadeke C (2001). Incidence of Induced Abortion in Southern Ghana. *International Family Planning Perspectives* **27**(2): 96-108.
- Archibong EI, Sobande AA, Asindi AA (2003). Antenatal intrauterine fetal death: a prospective study in a tertiary hospital in south-western Saudi Arabia. *J Obstet Gynaecol* **23** (2): 170-173.
- Baqui AH, Choi Y, Williams EK, Arifeen SE, Mannan I, Darmstadt GL, *et al.* (2011). Levels, timing, and etiology of stillbirths in Sylhet district of Bangladesh. *BMC Pregnancy Childbirth* **11**: 25.
- Bayisa B, Tatiparthi R, Mulisa E (2014). Use of Herbal Medicine Among Pregnant Women on Antenatal Care at Nekemte Hospital, Western Ethiopia. *Jundishapur Journal of Natural Pharmaceutical Products* **9**(4): e17368.
- Begum B, Zaman RU, Afza NS (2010). Understanding the magnitude of still birth in Mymensingh Medical College Hospital. *Mymensingh Med J* **19**(3): 340-342.
- Bhattacharya S, Prescott GJ, Black M, Shetty A (2010). Recurrence risk of stillbirth in a second pregnancy. *Bjog* **117**(10): 1243-1247.
- Chigbu CO, Okezie OA, Odugu BU (2009). Intrapartum stillbirth in a Nigerian tertiary hospital setting. *Int J Gynaecol Obstet* **104**(1): 18-21.
- Dassah ET, Odoi AT, Opoku BK (2014). Stillbirths and very low Apgar scores among vaginal births in a tertiary hospital in Ghana: a retrospective cross-sectional analysis. *BMC Pregnancy Childbirth* **14**: 289.
- Edmond KM, Quigley MA, Zandoh C, Danso S, Hurt C, Agyei SO, *et al.* (2008). Aetiology

- of stillbirths and neonatal deaths in rural Ghana: implications for health programming in developing countries. *Paediatr Perinat Epidemiol* **22**(5): 430-437.
- Eisenberg D, Davis R, Ettners (1998). Trends in alternative medicine use in the United States. *J Am Med Ass* **280**: 1569 - 1575.
- Elhassan EM, Mirghani OA, Adam I (2009). High maternal mortality and stillbirth in the Wad Medani Hospital, Central Sudan, 2003-2007. *Trop Doct* **39**(4): 238-239.
- Engmann C, Matendo R, Kinoshita R, Ditekemena J, Moore J, Goldenberg RL, et al. (2009). Stillbirth and early neonatal mortality in rural Central Africa. *Int J Gynaecol Obstet* **105**(2): 112-117.
- Ernst E (2003). Herbal medicines put into context. *Brit Med J* **327**: 881 - 882.
- Fakeye T, Adisa R, Musa I (2009). Attitude and use of herbal medicines among pregnant women in Nigeria. *BMC Complementary and Alternative Medicine* **9**(1): 53.
- GDHS (2008). Ghana Demographic and Health Survey.
- Goldenberg RL, McClure EM, Bann CM (2007). The relationship of intrapartum and antepartum stillbirth rates to measures of obstetric care in developed and developing countries. *Acta Obstet Gynecol Scand* **86**(11): 1303-1309.
- Hossain N, Khan N, Khan NH (2009). Obstetric causes of stillbirth at low socioeconomic settings. *J Pak Med Assoc* **59**(11): 744-747.
- Jammeh A, Vangen S, Sundby J (2010). Stillbirths in rural hospitals in the gambia: a cross-sectional retrospective study. *Obstet Gynecol Int* **2010**: 186867.
- Jehan I, McClure EM, Salat S, Rizvi S, Pasha O, Harris H, et al. (2007). Stillbirths in an urban community in Pakistan. *Am J Obstet Gynecol* **197**(3): 257 e251-258.
- Katz J, Khatri SK, LeClerq SC, Shrestha SR, West KP, Christian P (2008). Miscarriage but not stillbirth rates are higher among younger nulliparas in rural Southern Nepal. *The Journal of adolescent health : official publication of the Society for Adolescent Medicine*: nihpa44765.
- Kinney MV, Kerber KJ, Black RE, Cohen B, Nkrumah F, Coovadia H, et al. (2010). Sub-Saharan Africa's mothers, newborns, and children: where and why do they die? *PLoS Med* **7**(6): e1000294.
- Korde-Nayak VN, Gaikward PR (2008). Causes of stillbirth. *J Obstet Gynecol India* **58**(4): 314-318.
- Lamont K, Scott NW, Jones GT, Bhattacharya S (2015). Risk of recurrent stillbirth: systematic review and meta-analysis. *Bmj* **350**: h3080.
- Lawn JE, Kerber K, Enweronu-Laryea C, Cousens S (2010). 3.6 million neonatal deaths--what is progressing and what is not? *Semin Perinatol* **34**(6): 371-386.
- McClure EM, Wright LL, Goldenberg RL, Goudar SS, Parida SN, Jehan I, et al. (2007). The global network: a prospective study of stillbirths in developing countries. *Am J Obstet Gynecol* **197**(3): 247 e241-245.
- Ngoc NT, Merialdi M, Abdel-Aleem H, Carroli G, Purwar M, Zavaleta N, et al. (2006). Causes of stillbirths and early neonatal deaths: data from 7993 pregnancies in six developing countries. *Bull World Health Organ* **84**(9): 699-705.
- Ntuli ST, Malangu N (2012). An investigation of the stillbirths at a tertiary hospital in Limpopo province of South Africa. *Glob J Health Sci* **4**(6): 141-147.
- O'Leary CM, Bower C, Knuiman M, Stanley FJ (2007). Changing risks of stillbirth and neonatal mortality associated with maternal age in Western Australia 1984-2003. *Paediatr Perinat Epidemiol* **21**(6): 541-549.
- Okiwelu T, Hussein J, Adjei S, Arhinful D, Armar-Klemesu M (2007). Safe motherhood in Ghana: Still on the agenda? *Health Policy* **84**(2): 359-367.
- Onyiriuka AN (2009). Analysis of stillbirths in a Nigerian mission hospital. *Nig Q J Hosp Med* **19**(1): 27-31.
- Shankar M, Navti O, Amu O, Konje JC (2002). Assessment of stillbirth risk and associated risk factors in a tertiary hospital. *J Obstet Gynaecol* **22**(1): 34-38.

- Shrestha SR, Yadav BK (2010). Risk factors associated with still births. *JNMA J Nepal Med Assoc* **49**(177): 84-87.
- Silver RM, Varner MW, Reddy U, Goldenberg R, Pinar H, Conway D, et al. (2007). WORK-UP OF STILLBIRTH: A REVIEW OF THE EVIDENCE. *Am J Obstet Gynecol* **196** (5): 433-444.
- Stanton C, Lawn JE, Rahman H, Wilczynska-Ketende K, Hill K (2006). Stillbirth rates: delivering estimates in 190 countries. *Lancet* **367**(9521): 1487-1494.
- Walsh CA, Vallerie AM, Baxi LV (2008). Etiology of stillbirth at term: a 10-year cohort study. *J Matern Fetal Neonatal* **21**(7): 493-501.
- WHO (2004). International Statistical classification of Diseases and Related Health Problems. *WHO 2*.
- WHO (2001). WHO Department of Reproductive Health Research, World Health Organization: Guidelines Overview Safe Motherhood Needs Assessment (WHO Publication No. WHO/RHT/MSM/96.18 Rev.1). *World Health Organization*.
- Zakaria AY, Alexander S, van Roosmalen (2009). Reproductive age mortality survey (RAMOS) in Accra, Ghana. *Reprod Health* **6**: 1-6.
- Zupan J (2005). Perinatal mortality in developing countries. *N Engl J Med* **352**(20): 2047-2048.

