

PREGNANCY RELATED CAUSES OF DEATHS IN GHANA: A 5-YEAR RETROSPECTIVE STUDY

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SUMMARY

Objective: Data on maternal mortality varies by region and data source. Accurate local-level data are essential to appreciate its burden. This study uses autopsy results to assess maternal mortality causes in southern Ghana.

Method: Autopsy log books of the Department of Pathology, Korle-Bu Teaching Hospital Mortuary were reviewed from 2004 through 2008 for pregnancy related deaths. Data were entered into a database and analyzed using SPSS statistical software (Version 19).

Results: Of 5,247 deaths among women aged 15-49, 12.1% (634) were pregnancy-related. Eighty one percent of pregnancy-related deaths (517) occurred in the community or within 24 hours of admission to a health facility and 18.5% (117) occurred in a health facility. Out of 634 pregnancy-related deaths, 79.5% (504) resulted from direct obstetric causes, including: haemorrhage (21.8%), abortion (20.8%), hypertensive disorders (19.4%), ectopic gestation (8.7%), uterine rupture (4.3%) and genital tract sepsis (2.5%). The remaining 20.5% (130) resulted from indirect obstetric causes, including: infections outside the genital tract, (9.2%), anemia (2.8%), sickle cell disease (2.7%), pulmonary embolism (1.9%) and disseminated intravascular coagulation (1.3%). The top five causes of maternal death were: haemorrhage (21.8%), abortion (20.7%), hypertensive disorders (19.4%), infections (9.1%) and ectopic gestation (8.7%).

Conclusion: Ghana continues to have persistently high levels of preventable causes of maternal deaths. Community based studies, on maternal mortality are urgently needed in Ghana, since our autopsy studies indicates that 81% of deaths recorded in this study occurred in the community or within 24 hours of admission to a health facility.

Keywords: Maternal mortality, pregnancy, autopsy, coroner

INTRODUCTION

Maternal mortality is defined as deaths occurring in women while pregnant or within 42 days of termination of pregnancy.¹ Reduction of maternal mortality is a high priority for the Ghanaian Government and internationally.² Maternal mortality is often seen as a hallmark for a nation's development, especially as it relates to likelihood of reaching Millennium Development Goal 5 (MDG5), which aims to reduce maternal mortality ratio by three-quarters from 1990 to 2015.

In 2008, it was estimated that 99% of maternal deaths occurred in the developing countries of Sub-Saharan Africa and South Asia.^{1,3} In Ghana, in 2008, the maternal mortality rate was estimated to be 451/100,000 live births.⁴ While this is lower than many of its neighbours, Ghana's rate is still much higher than global averages and is higher than is acceptable. In addition, the rate varies by region within Ghana and by the source of data used to make the estimate.⁵ Reported rates have varied from 140.7 per 100,000 in the Upper West to 341.9 per 100,000 live births, in the Western Region.⁴

The vast majority of reported data on pregnancy-related causes of maternal deaths in Ghana are from clinical studies, community surveys and verbal autopsies. Yet these methodologies often present very different pictures of maternal mortality, both in terms of rates as well as underlying causes. For example, in one study comparing hospital-based data against vital registry data in Ghana, the authors found a six-fold difference in reported rates.⁶ This could be due to vital registries underreporting the true mortality rates, or it could be seen as clinical studies over-reporting deaths since they exclude women who deliver in the community without incident. For studies relying upon verbal autopsy data, recall bias among those being interviewed and misclassification by verbal autopsy coders can present problems in identifying cause of death with any degree of certainty.

Such methodological challenges raise the question of whether there are alternative modalities for estimating and reporting maternal deaths in Ghana. It was against this backdrop that this study was designed to explore the utility of examining autopsy results at one large tertiary care center for information on pregnancy-related maternal deaths.

METHODS

In this study, "maternal death" was defined according to the tenth revision of International Classification of Diseases (ICD-10) by WHO. It is described as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes¹. "Direct maternal deaths" were defined as maternal deaths resulting from complications of the pregnant state (pregnancy, labour and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events arising from any of the above. "Indirect maternal deaths" were defined as maternal deaths due to previously existing disease or diseases that develop during pregnancy, and not due to direct obstetric causes but which were aggravated by the physiological effects of pregnancy¹.

Study Site

All data were gathered from the files of the Korle-Bu Teaching Hospital Mortuary, the largest mortuary in the country, Ghana, where between 3,000 and 6,000 autopsies are performed each year. This mortuary receives cases from Korle-Bu Teaching hospital, the largest referral hospital in Ghana; as well as cases within the Accra Metropolis, neighbouring towns and Districts, and in special circumstances, cases from other regions across the country. All pregnancy related deaths within Korle-Bu Teaching hospital must have an autopsy. However, not all pregnancy related deaths within the catchment area, automatically, had an autopsy. This is because deaths that occurred in the communities that were not reported to the police, or due to other reasons, did not have autopsy done on them.

Data Collection and Analysis:

All autopsy logbooks and hospital files were reviewed for the period of January 2004 through December 2008, and all cases of pregnancy-related deaths were recorded. Data were collected and cross-checked by two doctors, to prevent double entry. For each case of maternal death, data were collected on age, cause of death and category of death (Coroner's or hospital). Coroner's deaths were deaths that occurred in the community or within 24-hours of admission to a health facility, where no definitive diagnosis was arrived at

before death. Hospital deaths on the other hand were deaths that occurred in a health facility while the patient was on treatment for a given diagnosis. The cause of death was based on review of clinical and macroscopic autopsy findings. The data was entered into a computerized spreadsheet and analyzed using SPSS software (Version 19). Frequency distributions and descriptive statistics were calculated for each variable. Given the descriptive nature of this study, no multivariate analyses were attempted.

RESULTS

From 2004 through 2008, a total of 25,454 autopsies were performed at the Korle-Bu Teaching Hospital's Department of Pathology Mortuary. Of this number, 5,247 (20.6%), were women in the reproductive age group (15-49years). Six hundred and thirty-four (12.1%) of the 5,247 cases were classified as pregnancy-related deaths. As shown in Table 1, over the period of study, total numbers of autopsies dropped, but the proportion of pregnancy-related deaths showed an increase. Five hundred and seventeen of the 634 pregnancy related deaths (81.5%) occurred in the community or within 24 hours of admission to a health facility (Coroner's autopsies), with 18.5% (117), occurring in a health facility.

Table 1 Annual variation in pregnancy related deaths in 15 to 49 year olds at the Korle-Bu Teaching Hospital Mortuary, Accra, Ghana.

Year	TNA	TNDW	TNDW/ TNA (%)	TNPRD	TNPRD/ TNDW (%)
2004	5547	1136	20.48	109	9.60
2005	5880	1202	20.44	141	11.73
2006	5448	1103	20.25	144	13.06
2007	4637	973	20.98	122	12.54
2008	3942	833	21.13	118	14.17
Total	25454	5247	20.61	634	12.08

KEY

TNA = Total number of autopsy

TNDW = Total number of deaths in women aged 15-49 years

TNPRD = Total number of Pregnancy-related deaths

Five hundred and four (79.5%) of the cases were classified as direct obstetric causes of death, while 130 (20.5%) were classified as indirect obstetric causes of death. The direct obstetric causes of death included haemorrhage (21.8%), abortion and its complications (20.7%), hypertensive disorders in pregnancy (19.4%), ectopic gestation (8.7%), uterine rupture (4.3%) and genital tract sepsis (2.5%). The indirect obstetric causes of death were infections outside the genital tract, 58 (9.2%) followed by anaemia in pregnancy 18 (2.8%) (Table 2).

Table 2 Age Distribution of Pregnancy-Related Deaths at the Korle-Bu Teaching Hospital Mortuary, Accra, Ghana, 2004 - 2008

Age Group	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TOTAL	%	Coroner N (%)	Hospital N (%)
H'rrhage	4	21	35	38	36	4	0	138	21.8	119(23.0)	19(16.2)
AB	23	44	33	18	9	4	0	131	20.7	119(23.0)	8(6.8)
HPT	5	19	37	37	21	3	1	123	19.4	92(17.8)	34(29.1)
EG	2	21	17	8	2	5	0	55	8.68	54(10.4)	1(0.9)
UR	0	7	0	10	7	2	1	27	4.25	26(5.0)	1(0.9)
INF	4	9	18	14	11	2	0	58	9.15	33(6.4)	25(21.4)
AP	3	5	4	5	1	0	0	18	2.84	16(3.1)	2(1.7)
SCD	0	6	6	5	0	0	0	17	2.68	9(1.7)	8(6.8)
GTS	0	3	3	7	2	0	0	16	2.52	13(2.5)	3(2.6)
IOC	1	1	4	5	2	1	0	14	2.20	12(2.3)	2(1.7)
DIC	0	2	1	3	1	1	0	8	1.26	6(1.2)	2(1.7)
PE	0	2	3	3	3	1	0	12	1.59	10(1.9)	2(1.7)
OTHERS	1	3	3	7	3	1	1	17	3.00	8(1.5)	9(7.7)
TOTAL	43	143	164	160	97	24	3	634	100.0	517(100)	117(100)
Percentage	6.78	22.56	25.86	25.24	15.3	3.79	0.47	100.00			

KEY

H'rrhage=Haemorrhage, HTP= Hypertensive disorders in pregnancy. AB= Abortion

DIC =Disseminated intravascular coagulation, UR=Uterine rupture, PE=Pulmonary embolism. SCD= Sickle cell disease, AP=Anaemia in pregnancy, INF=Infections EG=Ectopic gestation, GTS=Genital tract sepsis, IOC=Intra-operative complications Others (systemic congestion)

Of the 138 cases of haemorrhage, 119 (86.2%) occurred in the community or within 24 hours of admission to a health facility, while 19 (13.7%) occurred later in a health facility. Seventy-four (53.6%), were due to uterine atony, followed by retained products of conception in 26(18.8%). As shown in Table 2, the highest incidence of deaths due to haemorrhage occurred in the 30-34 years age group (27.5%), followed by 35-39 years age group (26.1%), with no deaths in the 45-49 years age group.

There were 131 abortion-related maternal deaths constituting 20.7% of maternal deaths. Of these 119 (90.8%) occurred in the community while 12 (9.2%) occurred in a health facility. These deaths occurred most frequently in the 20-24 years age group (33.6%) followed by the 25-29 years age groups with 25.2%. The most common complication of abortion was septicaemia (53.4%), followed by anaemia (35.9%) .

Of the 123 (19.4%) pregnancy-related maternal deaths due to hypertensive disorders, 92(74.8%) occurred in the community or within 24 hours of admission to a health facility with the rest occurring later after admission to a health facility. The highest frequency of deaths in this category (30.1%) occurred in the 30-34 years age group. This was followed by the 35-39 years age group with 17.1% (Table 2).

Complications of hypertensive disorders leading to death in this group include; intra-cranial haemorrhage in 27 (21.9%), congestive cardiac failure in 24 (19.5%) and hypertensive encephalopathy with cerebral oedema in 19 (15.5%).

Of the 55 cases of ectopic gestation, 54 (98.2%) were deaths in the community or within 24 hours of admission to a health facility (Coroner's). Twenty-one (38.2%) occurred in the 20-24 years age group. This was followed by 17 (30.9%) in the 25-29 years age group. There were no deaths due to ectopic gestation in the 45-49 years age group (Table 2).

Twenty seven(4.3%) pregnancy related maternal deaths were due to uterine rupture, of which 26(96.3%) occurred in the community or within 24 hours of admission to a health facility. The most commonly affected age group was 30-34years. Genital tract sepsis accounted for a total of 16(2.4%),deaths, of which 12(1.9%) occurred in the community, most commonly 7(46.7%) in the 30-34 age group (Table 2). Fourteen(2.2%) of 634 pregnancy related maternal deaths were due to intra-operative complications such as cardiac arrest during ceasaran section, electrolyte derangement,complications of spinal anaesthesia and hypoxia.

Of the indirect causes of maternal deaths, 58 (9.2%) out of the total of 634 cases were due to infections in pregnancy, of which 33(56.9%) were Coroner's cases and 25(43.1%), hospital cases. Eighteen (31.0%), of these occurred in 25-29 years age group, 14(24.1%) in the 30-34 years age group, 11(18.9%) in the 35-39 years age group with no deaths in the 45-49 years age group.

The common infections were; pneumonia 19(32.8%), meningitis 13(22.4%), HIV/AIDS 13(22.4%), urinary tract infection 6(10.3%) and pulmonary tuberculosis 3(5.2%).

A total of 18 out of the 634 pregnancy-related maternal deaths were due to anaemia in pregnancy, most commonly in the 20-24 and 30-34 age groups. Sickle cell disease as a non-obstetric complication accounted for 17(2.7%) of the total 634 maternal deaths, of which roughly equal numbers occurred in the community and hospital.

Twelve (1.9%) and 8(1.3%), of all pregnancy-related deaths were due to pulmonary embolism and disseminated intravascular coagulation respectively (Table 2).

DISCUSSION

In this five-year analysis of deaths at one tertiary care centre in Ghana, we found that 12% of the deaths among women in the reproductive age group were as a result of pregnancy-related causes. Despite a trend toward a decline in the number of deaths among women in the reproductive age group during the study, there was an apparent increase in the percentage of women dying of pregnancy-related causes during this period. This finding mirrors clinical studies reflecting the national trend.^{4,5} Overall, 81% of the pregnancy-related deaths occurred in the community or within 24 hours of admission to a health facility, and only 18.5% occurred after 24 hours of admission to a health facility. It was also found that the deaths in this group of women most commonly occurred in the 25-29 age group. This may indicate that a proportionately higher number of young women are dying in the communities from pregnancy-related causes.

The reasons for this occurrence are not clear because of lack of adequate clinical history an inherent limitation of retrospective studies. Important factors to consider include delay in seeking early medical care, delay in reaching a health facility, or a delay with the initiation of the appropriate intervention or a combination of these and other factors. Our findings support previous institution based autopsy and clinical studies regarding maternal deaths.^{7,8}

Even though these studies indicated the importance of abortion to the total maternal deaths, they failed to separate community deaths from health facility deaths.

We found that 80% of all pregnancy related deaths were due to direct obstetric causes, and this agrees with several studies in other developing countries.^{9,10,11} On the other hand, studies in Mozambique, India, Japan and the United Kingdom found indirect obstetric causes to be the leading causes of maternal deaths.¹² For those developing countries with a different picture, the situation may be due to the increased prevalence of infections such as HIV/AIDS and viral hepatitis in these countries. These may add to the indirect causes of maternal deaths in those communities.

The top five pregnancy related causes of maternal deaths in our study were; haemorrhage, abortion and its complications, hypertension in pregnancy, infections and ectopic gestation, in that order.(Table 2) Most clinical and verbal autopsy studies conducted in other developing countries agree with our finding of haemorrhage as the leading direct obstetric cause of maternal deaths.^{13,14} However, our finding differs from other studies regarding the order of the rest of the causes. Thus, previous studies in Ghana and elsewhere found abortion to be the leading direct pregnancy-related cause of death.^{15,16,17} Those differences may be due to our larger sample size; 634, compared to 239 pregnancy related deaths in the autopsy study by Aboagye *et al*⁷ included in the haemorrhage, although haemorrhage is one of the complications of DIC, these women die of multi-organ failure.

In developed countries, hypertensive disorders in pregnancy are the leading direct obstetric cause of maternal death.¹⁸ Our findings illustrate the difference between developed countries and developing countries with regard to causes of pregnancy-related deaths. It is important to note that in developing countries like Ghana, where there is frequent shortage of blood at the national blood bank, where lack of running water and irregular power supply, are not uncommon, and where the ratio of health care workers to population is extremely low, a woman with peripartum haemorrhage is at a higher risk of dying from haemorrhagic shock.

This risk is especially acute in rural areas where health facilities and trained health care providers may not be readily accessible. It is worthy of note that more than one-fifth of pregnancy-related maternal deaths in our study were due to haemorrhage, of which 86.2% occurred in the community. This suggests that very few cases of bleeding associated with childbirth make it to health facilities.

Our study also found that younger women in the reproductive age group than their slightly older counterparts died in the communities as a result of abortion and its complication. Among factors that may account for this is the fact that women in the 20-24 years age group may be more likely to be unmarried and therefore, more likely to seek illegal abortion to avoid stigmatisation.¹⁴

Of the 123 (19.4%) pregnancy-related maternal deaths due to hypertensive disorders, 31(22.0%) occurred in a hospital while 92(78.0%) occurred in the community. The complications of hypertension in pregnancy, leading to death were; intra-cranial haemorrhage 27(21.9%), cardiac failure 24(19.5%) and cerebral oedema 19(15.5%). Our finding suggests that a relatively higher proportion of deaths due to hypertension as the direct obstetric cause of maternal death occurred within a health facility, compared to the other causes of maternal deaths. This points to the fact that hypertensive disorders in pregnancy are more likely to be referred to hospital and are often very difficult to manage even in the developed countries where they are the leading cause of maternal deaths.¹⁹

CONCLUSION

This study has shown that young Ghanaian women are dying from preventable and treatable pregnancy-related causes, namely haemorrhage, abortion, hypertensive disorders, ectopic gestation and infections. The majority of these deaths occurred in the community or within 24 hours of admission to a health facility. If the trend persists, Ghana may be off-track in achieving the Millennium Development Goal 5 with respect to maternal mortality. We recommend that strategies be put in place to address these preventable causes of maternal death. These should include better education on the need for antenatal care and increased numbers of adequately trained maternal health personnel capable of handling these common causes of maternal death within the community.

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