ORIGINAL ARTICLE

A 10 years autopsy-based study of maternal mortality in Lagos State University Teaching Hospital, Lagos, Nigeria

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Abstract

Background: Maternal mortality is 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. Nigeria is among the six countries that record over 50% of all maternal deaths in the world. There are few papers on autopsy based causes of maternal mortality. This paper is to present the causes of maternal mortality that had postmortem done in our center.

Materials and Methods: This is a 10-year retrospective study of all maternal deaths seen in our center from January 01, 2005 to December 31, 2014. Lagos State University Teaching Hospital is the only state-owned tertiary center and the main referral center in Lagos State. Autopsy records are taken from the death register and other information were extracted from the postmortem reports.

Results: Most maternal deaths 98/328 (29.9%) were seen in the age group 26–30 years which was followed by 31–35 years (24.7%). Postpartum hemorrhage was the most common cause of death followed by eclampsia. Direct causes accounted for 60% of maternal deaths with hemorrhage as the most common while cardiovascular related diseases are the most common indirect cause of death.

Conclusion: The leading causes of death in this study, hemorrhage, cardiovascular disease and eclampsia are highly avoidable and treatable. We recommend that thorough cardiovascular management should be instituted during antenatal care, and the government should focus more on an emergency response such as availability of adequate blood and blood products in the hospitals.

Key words: Autopsy, eclampsia, hemorrhage, maternal mortality

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Introduction

Maternal mortality is 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 causes.[1] Nigeria, the most populous country in Africa has one of the highest maternal mortality in the world.[2]

The persistent high numbers of women who die during pregnancy, delivery, and puerperium remain a global public

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health problem. In the year 2012, published estimates show that 287,000 maternal deaths occur annually and majority of these deaths occur in developing countries.[2] There were 342,900 maternal deaths worldwide in 2008, down from 526,300 in 1980.[3] In 2008, more than 50% of all maternal deaths were in only six countries namely India, Nigeria, Pakistan, Afghanistan, Ethiopia and Democratic Republic of the Congo.[3] The average maternal mortality rate in Nigeria is estimated to be 704/100,000 live births, although this ranges from 165 to 1549 deaths per 100,000 live births in the South-Western and North-Eastern parts of the country, respectively.[4]

These high figures are a great departure from the finding in a European study that reported that maternal mortality has declined from 35.0 to as low as 3.3 maternal deaths per 100,000 live births over the last five decades.[5] A study has observed that culture is paramount in affecting the high maternal mortality rate in developing countries. This may be directly, through harmful practices which may include female genital mutilation, under-aged pregnancy, and ignorance, leading to inaction in cases where maternal death could be prevented. Culture also plays a role in dictating the resources and decisions of women through their social status.[6] Of all the eight United Nations Millennium Development Goals, the goal number 5 which is aimed at reducing maternal mortality by 75% by the year 2015, remains the most unattainable.[7]

This study is to present the causes of maternal mortality that had autopsy done in our center and to also recommend ways of reducing it.

Materials and Methods

This is a 10-year retrospective study of all cases of maternal deaths sent to the Department of Pathology and Forensic Medicine in Lagos State University Teaching Hospital (LASUTH), Ikeja for autopsy between 2005 and 2014. LASUTH is the main state owned tertiary institution and the referral center to the over 30 general hospitals in the state. Lagos State has a population of over 17 million and is the former capital and the economic nerve center of Nigeria.[8] The teaching hospital also serves as the referral center to other hospitals in the contiguous states.

Our center being the main state-owned tertiary hospital in the state receives mostly complicated cases from the over 30 secondary centers. The revised Lagos State Coroner's System law which came into effect in 2007 made it mandatory for all maternal deaths to have postmortem examinations.[9] This accounted for the fairly good numbers seen between 2005 and 2009 until there was a need to relocate the Obstetrics and Gynaecology Department to another center due to renovation work in the teaching hospital. This relocation led to low numbers of an autopsy on maternal deaths seen between 2010 and 2014 because most maternal deaths were not sent to the main morgue and the relations could not be persuaded to bring the bodies down to the main morgue which is about 5 km away from the newly relocated center.

The autopsy records data such as age, cause of death, and relevant clinical information were extracted from the postmortem reports of the patients. These were recorded on a predesigned data form. These records are analyzed using IBM Statistical Package for Social Sciences for Windows version 22 (SPSS). Descriptive statistics were applied to determine the means, frequencies and ranges. Results are presented in tables, graphs, and histograms.

Results

In all, the total cases of maternal autopsies done during the 10-year period were 328 out of 11,552 autopsies done for the period accounting for 2.84% of all autopsy cases. When divided into 5 years period interval, the percentage of maternal autopsy in 2005–2009 was 3.96% against the 1.19% in the subsequent 5 years when the Obstetrics and Gynaecology Department was moved from our center.

Table 1 showed that most maternal deaths (29.9%) occurred in the age group 26–30 years, followed by age group 31–35 years (24.7%). About the same number of deaths was recorded in the age groups 21–25 years and 36 years and above. Over half of maternal deaths (54.6%) occurred in the age group 26–35 years and 73.2% of death occurring in the active childbearing age of 21–35 years.

The graph showing the conspicuous reduction of maternal deaths that had autopsy done on them from 2010 to 2014 which coincided with the relocation of the Obstetrics and Gynaecology Department to another center. The two graphs, however, shows similar peaks with postpartum hemorrhage (PPH) peaking in the two series and similar peaks in those that died as a result of acute left ventricular failure (ALVF) in pregnancy [Figure 1].

Figure 2 shows the prevalence of PPH as the most common cause of death (59 patients) and closely followed by eclampsia (57 patients). Ectopic gestation recorded only

Table 1: Age incidence of maternal mortality

Age	Number of patients	Percentage
20 and below	15	4.5
21-25	61	18.6
26-30	98	29.9
31-35	81	24.7
36 and above	57	17.4
Unknown	16	4.9
Total	328	100

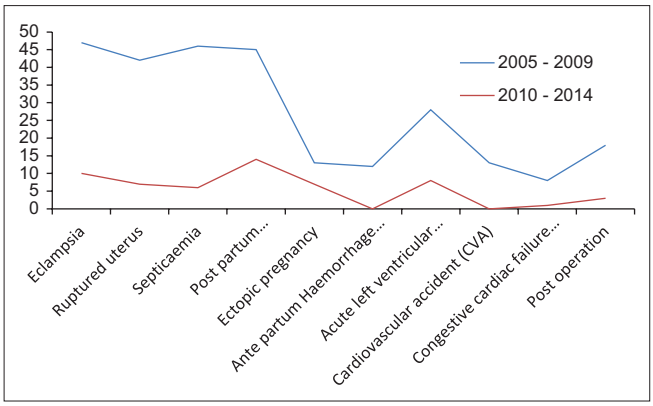

Figure 1: Graph showing 5 year period interval of maternal mortality

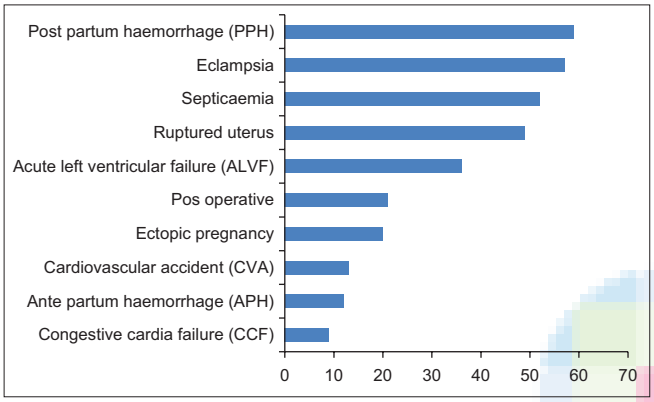

Figure 2: Bar chart showing the different causes of maternal death

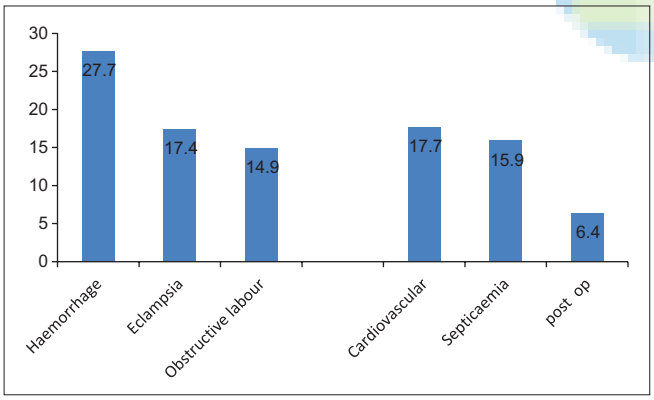

Figure 3: Bar Chart showing percentages of the direct and indirect causes of death

20 deaths in this series as antepartum hemorrhage (APH) recorded 12 cases.

Figure 3 shows that hemorrhage related causes (a direct cause of maternal mortality) was the overall most common cause of death accounting for 27.7%, and this was followed by cardiovascular causes (an indirect cause of maternal mortality) accounting for 17.7%. Other direct causes of death include eclampsia (17.4%) and obstructed labor (14.9%).

Discussion

Postmortem examination provides the most reliable approach to determining the cause of maternal death. Thus, maternal death autopsies are essential for death certification, and information from autopsies have been shown to be invaluable tools for preventing maternal deaths.[10,11]

In this study, majority (29.9%) of maternal deaths occurred in the age group of 26–30 years followed by age group 31–35 years (24.7%). This figure is similar to studies from other parts of the country where Oladapo *et al.* in Ibadan showed that the age group of 25–29 years accounted for 28% of deaths in their study[12] while Olapade and Lawoyin in Ibadan recorded 25–29 years as the most common age group affected (41.7%),[13] although with a percentage higher than that of this study. It can then be stated that the age group at most risk is 26–30 years. Cumulatively, over half of maternal deaths in this study (54.6%) occurred in the age group 26–35 years; this age group we believe was consistent with the peak age of active female reproductive years, this finding is in contrast with another Lagos study by Daramola *et al.* which found majority of deaths (70%) occurred in those between 11 and 30 years.[14] Dinyain *et al.* in their study of 84 autopsy certified maternal deaths showed a mean age of 27.9 ± 7.5 years.[15]

We also found out that PPH was the single most common cause of death in our study which was followed by eclampsia and its complication and then, septicemia. Olapade and Lawoyin found out that hemorrhage was the most common cause of death in their study, which was followed by sepsis and then eclampsia.[13] However, Oladapo *et al.* in their study found out that hypertension in pregnancy was the most common cause of death which was followed by hemorrhage and then sepsis.[12] The three main causes of death are therefore similar in these Nigerian studies; a situation believed to reflect the inadequacy of the emergency obstetric response in the country which is in agreement with the conclusion of Matthew in his Editorial on Improving Maternal and Child Survival in India.[16]

When grouped together, hemorrhage was the most common cause of death seen in our study, and this included PPH, APH and ruptured ectopic gestation. This is followed by cardiovascular causes which included ALVF, congestive cardiac failure, and intracranial cardiovascular accident. Dinyain *et al.* in their autopsy study in Ile-Ife, South Western Nigeria showed that the three overall leading causes of death were obstetric hemorrhage (30.9%), complications of abortion (23.8%), and nongenital (nonobstetric) infections (14.2%).[15] Ujah *et al.* in a study of 267 maternal deaths over a 17-year period in Jos, showed that the major direct causes of deaths were hemorrhage (34.6%), sepsis (28.3%),

eclampsia (23.6%), and unsafe abortion (9.6%). The most common indirect causes of death were hepatitis (18.6%), anesthetic death (14.6%), anemia in pregnancy (14.6%), meningitis (12.0%), HIV/AIDS (10.6%), and acute renal failure (8.0%).[17] Another study in Sokoto, North-Western Nigeria also identified obstetric hemorrhage as the leading cause of maternal death in that area.[18]

Direct causes account for 60% of all maternal death in this study, and it included hemorrhage, eclampsia, and obstructive labor while indirect causes accounted for 40% of all cases and it included septicemia, cardiovascular causes, and postsurgical operation. This finding is lower than that of the autopsy study on maternal mortality by Fubara *et al*. in Port Harcourt, which showed direct causes accounting for 80% of which ectopic gestation was the most common cause while indirect cause accounted for 20% with cardiovascular disorders predominating.[19] In Lagos, Daramola *et al*. found out that about 81% of autopsy certified maternal deaths were due to direct causes. The same study showed the three leading causes of maternal deaths were obstetric hemorrhage (25.61%), genital sepsis (19.68%), and pregnancy-induced hypertension (16.71%). The most common indirect cause of death was anemia (7.01%) making it the fifth leading cause of death in their study.[14]

The Ife study also showed that 71.4% of maternal deaths were due to the direct cause, comprising obstetric hemorrhage, complications of unsafe induced abortion and complications of labor.[15] This percentage is higher than our study which showed 60%, but the three leading causes of death are similar in both studies. The indirect causes recorded in Ife included nongenital infections, anemia in pregnancy and preexisting hypertension which is similar to that in our study which showed cardiovascular-related causes, septicemia accounting for most deaths.[15] The reason for the difference in the percentages from these studies may be due to the smaller sample sizes by the studies which were between 75 and 100 maternal deaths studied in comparison to our study which have over 300 cases for analysis.

Another study by Fubara *et al*. in Port-Harcourt, South-South Nigeria on abortion-related deaths showed that septic shock accounted for 50% of abortion-related maternal deaths. Other causes following abortion included hemorrhagic shock, anemia, heart failure, and peritonitis.[20]

In other parts of Africa, hypertensive heart disease was reported as the leading cause of maternal death in a Tertiary Hospital in Accra, Ghana, accounting for 31.7% of the deaths which was higher than the 17.7% cardiovascular causes seen in our study.[21] Obstetric hemorrhage and unsafe abortion were the next most important causes of maternal death seen in their study which was the most common cause of death in our study.[21] A study in Mozambique showed that obstetric complications accounted for 38.2% of maternal deaths; hemorrhage was the most frequent cause (16.6%). Other obstetric causes were puerperal sepsis and eclampsia (8.7% each), post-cesarean section septicemia and ectopic pregnancy both accounted for 1.4%. Nonobstetric conditions accounted for 56.1%; HIV/AIDS, pyogenic bronchopneumonia, severe malaria, and pyogenic meningitis were the most common nonobstetric causes of maternal death noted in that study.[22] Another study has also shown that tuberculosis associated with HIV/AIDS, malaria, sepsis, and other opportunistic infections were leading causes of maternal death in Sub-Saharan Africa.[23] A study in South Africa identified unsafe abortion as a major cause of maternal mortality.[24]

A retrospective autopsy study in India, another developing country like Nigeria, revealed that pregnancy induced hypertension, anemia, septicemia, and hamorrhage from the genital tract were the leading causes of death in that order.[25] The findings also show the same similarity with that in our study as well as the study by Khan *et al*. who found out that the Indian subcontinent has a significantly higher maternal mortality attributable to sepsis, infection and hemorrhage.[26] The high indirect cause of death is also of concern as revealed by Panchabhai *et al*. in India; they opined that the indirect causes of maternal deaths reflect on the state of maternal health and the present health care system of that country. They further stressed that adequate prenatal testing for these indirect causes has the potential to lower maternal mortality to a significant extent.[27]

In developed countries, though maternal deaths are rare, infection and hemorrhage were observed to be the leading causes.[5,28] These studies showed that bleeding were mostly due to uterine rupture, placental abruption, and PPH.

The large sample size seen in our study which is about the largest cohort in the country can be said to have a better representation of the prevalence of the causes of maternal deaths in the country. This autopsy based maternal mortality study would have been more robust if the enforcement of the Lagos State Coroner's law is in place for all cases of maternal deaths to be investigated.

Conclusion

This study revealed that 54.6% of maternal deaths occurred between the age of 26 and 35 year age group. The leading cause of death was hemorrhage. Cardiovascular related diseases are the most common indirect cause of death seen.

Recommendation

We recommend that thorough cardiovascular evaluation and management is instituted into the antenatal clinic visits. The government should focus more on the emergency response of the health system with regards to availability of blood and blood products in our hospitals.

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Conflicts of interest
There are no conflicts of interest.

References

1. World Health Organization (WHO). WHO Health Report; 2005. Available from: http://www.who.int/whosis/mme_2005.pdf. [Last accessed on 2015 Sep 14].
2. World Health Organization, UNICEF, UNFPA, the World Bank. Trends in Maternal Mortality: 1990 to 2010 WHO, UNICEF, UNFPA and the World Bank Estimates. Published; 2012. Available from: https://www.unfpa.org/webday/site/global/shared/documents/publications/2012/Trends in_maternal_mortality-A4-1pdf. [Last accessed on 2015 Jul 08].
3. Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, *et al.* Maternal mortality for 181 countries, 1980-2008: A systematic analysis of progress towards millennium development goal 5. Lancet 2010;375:1609-23.
4. Chama C, Mairiga A, Geidam A, Bako B. An assessment of policies and programs for reducing maternal mortality in Borno state, Nigeria. Afr J Reprod Health 2010;14:49-54.
5. Mayer-Pickel K, Petru E, Mörtl M, Pickel H, Lang U. Has there been a change in peripartal maternal mortality in a tertiary care obstetric European center over the last five decades? Eur J Obstet Gynecol Reprod Biol 2015;185:145-50.
6. Evans EC. A review of cultural influence on maternal mortality in the developing world. Midwifery 2013;29:490-6.
7. Lozano R, Wang H, Foreman KJ, Rajaratnam JK, Naghavi M, Marcus JR, *et al.* Progress towards millennium development goals 4 and 5 on maternal and child mortality: An updated systematic analysis. Lancet 2011;378:1139-65.
8. Population of Lagos State as at 2006. Available from: http://www.lagosstate.gov.ng/pagelinks.php?p=6. [Last accessed on 2016 Jan 13].
9. Lagos State Coroner System; 2007. Available from: http://www.lagoshouseofassembly.gov.ng/uploads/aa855b1b0064bdfec5bd0985c2e0efe5.pdf. [Last accessed on 2016 Jan 13].
10. Daramola AO, Elesha SO, Banjo AA. Medical audit of maternal deaths in the Lagos University Teaching Hospital, Nigeria. East Afr Med J 2005;82:285-9.
11. Daramola AO, Banjo AA. Autopsy as a tool in the prevention of maternal mortality. Niger J Clin Pract 2009;12:457-60.
12. Oladapo OT, Lamina MA, Fakoya TA. Maternal deaths in Sagamu in the new millennium: A facility-based retrospective analysis. BMC Pregnancy Childbirth 2006;6:6.
13. Olapade FE, Lawoyin TO. Maternal mortality in a Nigerian maternity hospital. Afr J Biomed Res 2008;11:267-73.
14. Daramola AO, Banjo AA, Elesha SO. Maternal deaths in the Lagos University Teaching Hospital: A ten-year review (1989-1998). Niger Postgrad Med J 2004;11:274-8.
15. Dinyain A, Omoniyi-Esan GO, Olaofe OO, Sabageh D, Komolafe AO, Ojo OS. Autopsy-certified maternal mortality at Ile-Ife, Nigeria. Int J Womens Health 2013;6:41-6.
16. Mathai M. Improving maternal and child survival in India. Indian J Med Res 2005;121:624-7.
17. Ujah IA, Aisien OA, Mutihir JT, Vanderjagt DJ, Glew RH, Uguru VE. Factors contributing to maternal mortality in north-central Nigeria: A seventeen-year review. Afr J Reprod Health 2005;9:27-40.
18. Garba JA, Umar S. Aetiology of maternal mortality using verbal autopsy in Sokoto, North-Western Nigeria. Afr J Prm Health Care Fam Med 2013;5:1-6. Available from: http://dx.doi.org/10.4102/phcfm.v5i1.442.
19. Fubara DS, Ikimalo J, John CT. Pathology of maternal deaths in Rivers state (a ten year autopsy review) in a referral hospital. Niger Postgrad Med J 2007;14:256-60.
20. Fubara DS, Etebu EN, Ikimalo J. Pathology of abortion-related deaths in Port Harcourt, Nigeria. Trop J Obstet Gynaecol 2002;19:104-6.
21. Adu-Bonsaffoh K, Oppong SA, Binlinla G, Obed SA. Maternal deaths attributable to hypertensive disorders in a tertiary hospital in Ghana. Int J Gynaecol Obstet 2013;123:110-3.
22. Menéndez C, Romagosa C, Ismail MR, Carrilho C, Saute F, Osman N, *et al.* An autopsy study of maternal mortality in Mozambique: The contribution of infectious diseases. PLoS Med 2008;5:e44.
23. Grange J, Adhikari M, Ahmed Y, Mwaba P, Dheda K, Hoelscher M, *et al.* Tuberculosis in association with HIV/AIDS emerges as a major nonobstetric cause of maternal mortality in sub-Saharan Africa. Int J Gynaecol Obstet 2010;108:181-3.
24. Fawcus SR. Maternal mortality and unsafe abortion. Best Pract Res Clin Obstet Gynaecol 2008;22:533-48.
25. Kavatkar AN, Sahasrabudhe NS, Jadhav MV, Deshmukh SD. Autopsy study of maternal deaths. Int J Gynaecol Obstet 2003;81:1-8.
26. Khan KS, Wojdyla D, Say L, Gülmezoglu AM, Van Look PF. WHO analysis of causes of maternal death: A systematic review. Lancet 2006;367:1066-74.
27. Panchabhai TS, Patil PD, Shah DR, Joshi AS. An autopsy study of maternal mortality: A tertiary healthcare perspective. J Postgrad Med 2009;55:8-11.
28. Homer C, Clements V, McDonnell N, Peek M, Sullivan E. Maternal mortality: What can we learn from stories of postpartum haemorrhage? Women Birth 2009;22:97-104.