

The Causes of Maternal Mortality in the Core Niger Delta Region of Nigeria

¹Omidiji ,Adedoyin Oluwatoyin, ²Prof. Akpoghomeh Osi

^{*1,2}Department of Geography and Environmental Management,
Faculty of Social Sciences. Rivers State, Nigeria.
University of Port Harcourt, Nigeria

ABSTRACT

The causes of maternal death differ everywhere in the world, so this regional study aimed at examining the causes of maternal mortality in the core Niger Delta Region of Nigeria. The objectives are to explore the causes of maternal mortality over the years, months, season and in each of the three states making up Niger Delta Region. Data on the causes were retrieved from the death register and the personal file of the late woman. One hospital was chosen in each state based on their functions and accessibility to women. Descriptive statistics were the main tools for statistical analysis of the data collected. The instrument used to collect data was a structured proforma. The study revealed that the causes of maternal mortality in the region in descending order are: hypertensive disorder, (27.5%) obstetric hemorrhage, (24.6%), obstructed labour, (14.1%). The study further revealed that the causes of maternal mortality differs over the year, months and season .Based on this, the researcher proffer possible solutions to ameliorate the problem

Keywords: Maternal, Mortality, Causes, Health, Women, Pregnancy

INTRODUCTION

The impacts of mortality on the population structures, composition, and development of the economy cannot be emphasized. Mortality differs among males and females age groups. Mortality is high among infants, from 0-1 year, 1-5 years and at older ages. It is higher for males than females, but among females, it is higher among women within the child bearing age cohort (15-49 years old) (Olomo & Sajimi, 2011). This age cohort is usually the economically active ones. The high mortality among them signifies a great loss on the Gross Domestic Products (GDP) and other index of development (World Health Organization, 2014). The death of women in this age cohort is literary known as Maternal Mortality, though it should be related to pregnancy. Maternal Mortality Rate (MMR) is the number of maternal death divided by the number of livebirth per 100,000 for any given period.(Okigbo, Adegoke & Olorunsaiye, 2017; Waugh, 2014)..

The principal cause of death among women particularly those within child bearing age group (15-49) years is maternal mortality and the greatest concern of the world today is the reduction in maternal mortality apparent by its frequent appearance in most development goals and its inclusion in the defunct Millennium Development Goals (MDG5) and Sustainable Development Goals (SDGs3). Despite all this the ratio of maternal mortality is still rated high in the core Niger Delta region of Nigeria.(Adam Franz-Vasdeki; 2012; Saraki, 2008; Rosenfield, Min & Freeman, 2007; WHO, 2007).Previous studies on maternal mortality in Nigeria concentrated on socio cultural status of the deceased women, using several approaches, and such studies focused on the Northern, Eastern and Western part of Nigeria, with little or no study on the Niger Delta region. This constitutes a gap in the literature that this present study seeks to fill.

Gender stratification theory is of the view that maternal mortality will be low in Nation where women are economically empowered and politically powerful, and have power over their reproductive lives (Ezumah, 2003 ; Rovston and Armstrong, 1989, cited in C.Shen,J.B Williams (1989). Akubue (2001) and

Acha (2009) stated that for a country to attain meaningful development, the women, which constitute up to half of the whole population, should not be neglected. These women have lots of potential, so there is need to empower them economically and politically. The woman's vulnerability to poverty level in Nigeria is associated with gender unequal enrolment in school, unequal power distributions among the two genders where females are seen as weaker vessel, thus men tend to dominate many affairs in the country (Abdul Karim, Mohammed and Abubakar, 2008). Women are faced with humiliating treatment and sometimes treated with disrespect. Women are forced to go through pregnancies against their wish. Many studies have shown that mortality is influenced by a number of factors (Bello, 2002; Abimbola, Akanni & Falusi, 2012; Black, & Liu, 2012; Muntunga 2007) and these factors vary among the Nations of the world, it also varies within a country. Lots of works have been carried on maternal mortality in other places, no attention has been focused on Niger Delta Region. So this present study will add to the existing knowledge and focused on Niger Delta Region

MATERIALS AND METHODS

Study Area- The Core Niger Delta region is defined as comprising the area covered by the natural delta of the Niger River (Alagoa, 2005) and this is made up the present day Delta, Bayelsa and Delta state. The region is located approximately between latitudes 4°15'58.96"N and 6°30'54.64"N and longitude 4°75'47.35" E and 7°36'37.90" (see figure 1)

The health conditions of the inhabitants are deplorable despite government interventions. The region has restricted access to health care providers compared to zones of the country. This odd state of poverty indicates a low dimension of human advancement, which in turn affect the economy in terms of high maternal deaths, infant and child mortality, diseases such as malaria and HIV/AIDs, restricted access to social infrastructure.

Aim and objectives of study

The aim of this research is to examine the causes of maternal mortality in the Core Niger Delta Region of Nigeria. The objectives are to explore the causes of maternal mortality over the years, months, and season and in each of the three states making up Niger Delta Region

Data Sources: This study adopted cross-sectional research design. Data for this work was sourced from the folders of the women and from death register. This work is a retrospective research design. It also involved a combination of both primary and secondary sources. Three hospitals were chosen for this on the basis of accessibility to pregnant women and functions provided by each hospital.

Instruments for Data Collection -The instrument for data collection was a structured proforma. Ethical approval was obtained in each hospital, other forms provided by the hospital in turn was likewise filled. Among other things, data for determination of maternal mortality causes were sourced from the folders of women who died due to pregnancy related causes. Data obtained for this objective was causes of death. The causes of maternal mortality were analyzed descriptively, using graphs, table, frequencies etc

Data analysis tools: Data was entered into a computer database using SPSS version 22 and statistical analysis was performed. The data generated was presented and discussed using frequency counts, percentages and cross-tabulations. An attempt was made to draw trend graphs to examine the variations that occurred on the levels and ratios of incidences of maternal deaths.

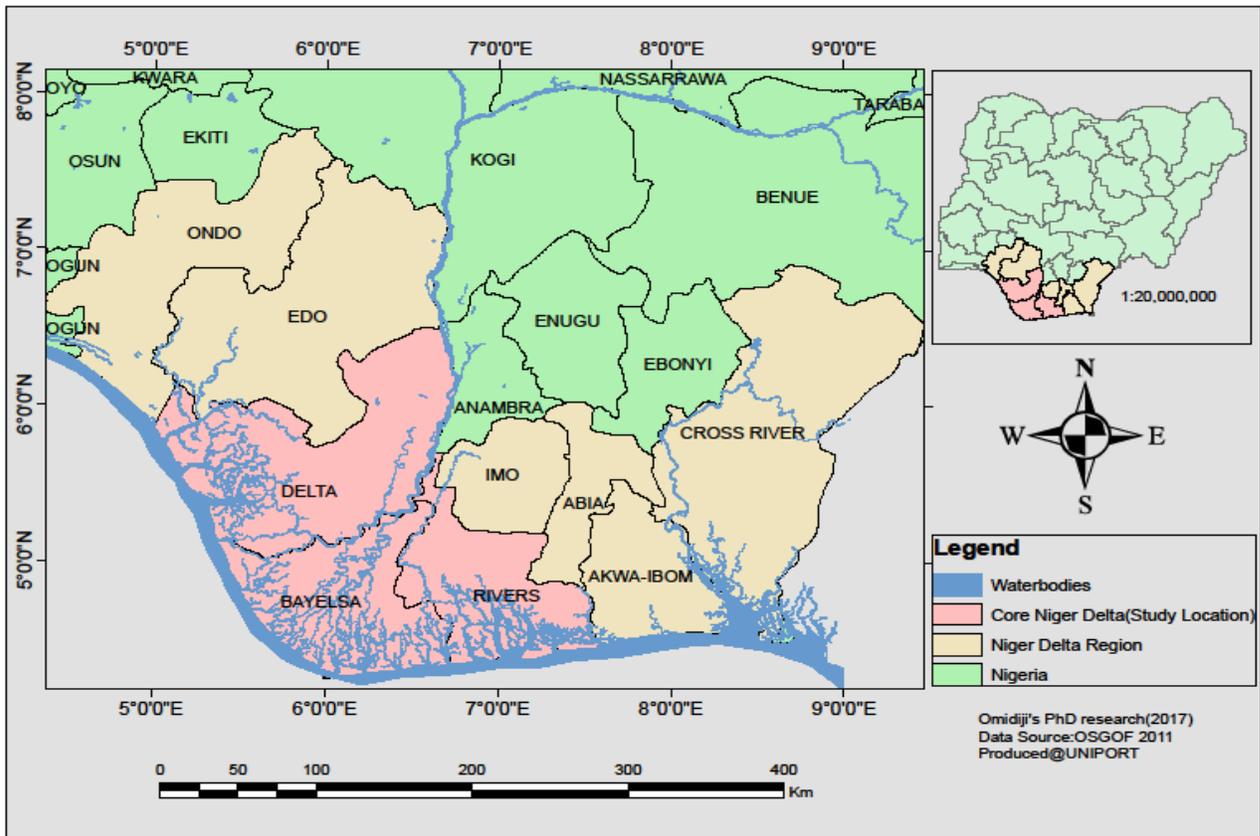


Figure 1- Map of the Core Niger Delta Region

RESULTS AND DISCUSSION

The causes of maternal mortality were explored under the following headings:

- a) Causes of Maternal Mortality by State
- b) Causes of Maternal Mortality by Year
- c) Causes of Maternal Mortality Level by Month
- d) Causes of Maternal Mortality by Season

Causes of Maternal Mortality by State

The distributions of maternal death in each of the three states were presented in Table 1 and Figure 2. There are variations among the states over the eight years period under study. In Bayelsa state, Hypertensive disorder (24.75%), is the most common causes of death while infectious /parasitic diseases (7.5%) was the least. In Delta state, Obstetric hemorrhage is the most common causes of death (31.3%), while infectious /parasitic diseases (1.5%) was the least. The major cause of death in Rivers state was hypertensive disorder which accounted for (30.1%). Generally in the study area, the major cause of death was hypertensive disorder (27.5%), while 24.6% was attributed to obstetric hemorrhage, 14.1% was due to obstructed labour, 12.1% was due to sepsis, 10.5% were attributed to medical conditions, 6.6% was due to unsafe abortion, 4.6% were attributed to infectious and parasitic diseases. Result in table 3 reveals that 75 (80.6%) of the cases of mortality in Bayelsa state was due to direct causes while 18 (19.4%) was a result of indirect cause, In Delta State, maternal mortality was majorly due to direct causes, 62(92.5%), while indirect causes accounted for 5 (7.5%). The major cause of maternal death in Rivers

state was direct causes 121(84 %), while the indirect causes accounted for 22(15.4%). Result reveals that direct causes, 259 (85.5%) is the major causes of mortality in the study area.

Table 1: Causes of Maternal Mortality in the study area

	States			Total (n=303)
	Bayelsa State (n=93)	Delta State (n=67)	Rivers State (n=143)	
Causes of mortality				
Obstetric hemorrhage	18(19.4)	21(31.3)	36(25.2)	75(24.6)
Sepsis	17(18.3)	11(16.4)	9(6.3)	37(12.1)
Unsafe Abortion	9(9.7)	3(4.5)	8(5.6)	20(6.6)
Hypertensive disorder	23(24.7)	16(23.9)	43(30.1)	82(27.5)
Obstructed labour	8(8.6)	11(16.4)	25(17.5)	44(14.1)
Infectious /parasitic diseases	7(7.5)	1(1.5)	6(4.2)	14(4.6)
Medical condition	11(11.8)	4(6.0)	16(11.2)	31(10.5)
Summary				
Direct	75(80.6)	62(92.5)	121(84.6)	258(85.5)
Indirect	18(19.4)	5(7.5)	22(15.4)	44(14.5)

Source- Researcher's fieldwork, 2018

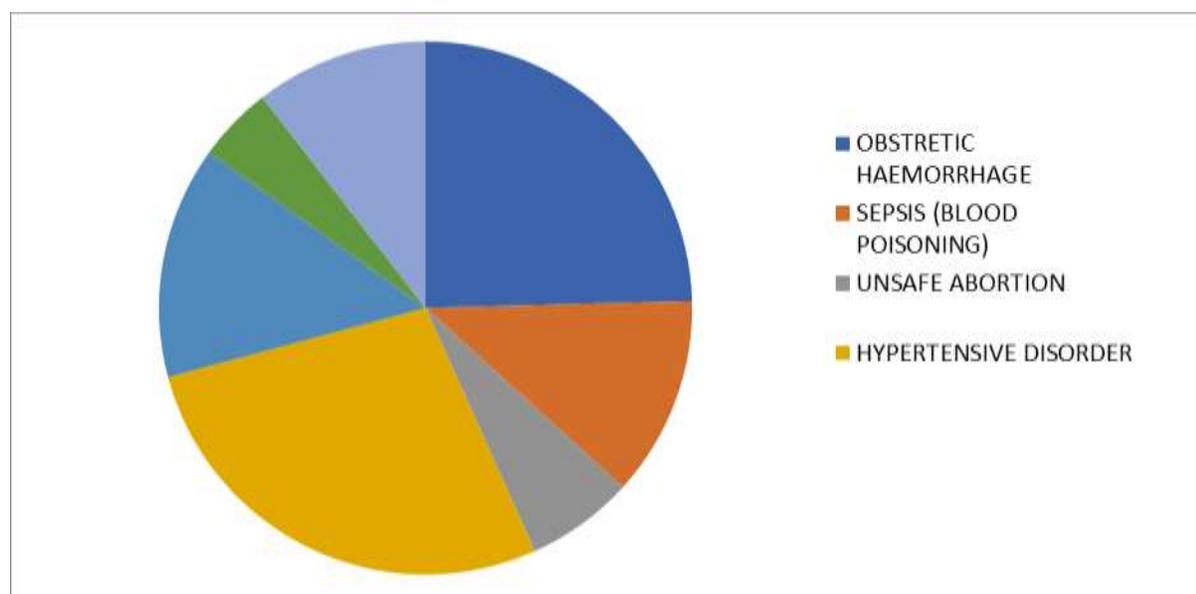


Figure 2: Causes of Maternal Mortality in the Core Niger Delta Region
Source- Researcher's fieldwork, 2018

The causes of maternal death also vary by year. Table 2 shows clearly, the distribution of causes of maternal mortality over the years . The highest cause of death in 2002 was by Obstretic heamohage 5(41.7%), followed by Sepsis, 2(16.7%) , obstructed labour 2(16.7%), hypetensive disorder 1(8.3%), Infectious and parasitic disease 1 (8.3%) and medical condition (8.3%) , there was no death caused by unsafe abortion .

The highest cause of death in 2003 was by hypetensive disorder 5(45.5%) and there was no death caused by medical conditions , infectiuos and parasitic disease. In 2004, Obstretic heamohage 4(50%) was the major cause of death and , no death was caused by medical conditions, infectiuos and parasitic disease. Obstretic heamohage consistute the major cause of death in 2005, no death was caused by infetious and

Table 2 Major Class of Cause of death by the years

YrIncid	Year	Count	Class of Causes						Total
			Obstretic haemorrhage	Sepsis	Unsafe abortion	Hypertensi ve disorder	obstructed labour	infectious /parasitic disease	
2002	Count	5	2	0	1	2	1	1	12
	% within YrIncid	41.7	16.7	0.0	8.3	16.7	8.3	8.3	100.0
2003	Count	1	1	2	5	2	0	0	11
	% within YrIncid	9.1	9.1	18.2	45.5	18.2	0.0	0.0	100.0
2004	Count	4	2	1	0	1	0	0	8
	% within YrIncid	50.0	25.0	12.5	0.0	12.5	0.0	0.0	100.0
2005	Count	6	1	2	3	3	0	1	16
	% within YrIncid	37.5	6.3	12.5	18.8	18.8	0.0	6.3	100.0
2006	Count	4	3	0	8	1	3	5	24
	% within YrIncid	16.7	12.5	0.0	33.3	4.2	12.5	20.8	100.0
2007	Count	0	2	0	4	2	0	1	9
	% within YrIncid	0.0	22.2	0.0	44.4	22.2	0.0	11.1	100.0
2008	Count	4	0	2	6	8	0	1	21
	% within YrIncid	19.0	0.0	9.5	28.6	38.1	0.0	4.8	100.0
2009	Count	1	0	1	1	2	0	1	6
	% within YrIncid	16.7	0.0	16.7	16.7	33.3	0.0	16.7	100.0
2010	Count	1	2	1	5	10	1	1	21
	% within YrIncid	4.8	9.5	4.8	23.8	47.6	4.8	4.8	100.0
2011	Count	6	1	1	9	1	2	2	22
	% within YrIncid	27.3	4.5	4.5	40.9	4.5	9.1	9.1	100.0
2012	Count	5	1	0	7	2	2	1	18
	% within YrIncid	27.8	5.6	0.0	38.9	11.1	11.1	5.6	100.0
2013	Count	13	6	1	6	5	1	2	34
	% within YrIncid	38.2	17.6	2.9	17.6	14.7	2.9	5.9	100.0
2014	Count	6	0	1	10	1	3	1	22
	% within YrIncid	27.3	0.0	4.5	45.5	4.5	13.6	4.5	100.0
2015	Count	10	5	4	8	1	0	8	36
	% within YrIncid	27.8	13.9	11.1	22.2	2.8	0.0	22.2	100.0
2016	Count	3	7	1	4	3	0	0	18
	% within YrIncid	16.7	38.9	5.6	22.2	16.7	0.0	0.0	100.0
2017	Count	6	4	3	5	0	1	6	25
	% within YrIncid	24	16	12	20	0	4	24	100
Total	Count	75	37	20	82	44	14	31	303
	% within YrIncid	25	12	7	27	15	5	10	101

parasitic disease. The major cause of death in 2006 was Hypertensive disorder (33.3%), there was no death caused by unsafe abortion. In year 2007, hypertensive disorder was the main cause of death while no death was caused by unsafe abortion. The highest cause of death in 2008 was by obstructed labour, no death caused by sepsis was recorded.

In 2009, obstructed labour (33.3%) caused the major cause of death and again, no death was caused by sepsis and by infectious and parasitic disease. The major cause of death in 2010 was by obstructed labour (47.6%), unsafe abortion constitute the lowest cause. In year 2011, The major cause of death was hypertensive disorder (40.9%), the lowest cause was by sepsis, unsafe abortion and infectious /parasitic disease. The highest cause of death in 2012 was by hypertensive disorder, no death was caused by unsafe abortion. In 2013, obstetric haemorrhage (38.2%) was the main cause of death. Hypertensive disorder (45.5%) was the main cause of death in 2014 and in 2015 (22.2%)

The highest cause of death in 2016 was by Sepsis (38.9%), followed by hypertensive disorder, (22.2%). In 2017, medical conditions (24%) and obstetric haemorrhage (24%) were the highest cause of death followed by hypertensive disorder (20%) and obstetric haemorrhage. However the highest cause of death in the region was Hypertensive disorder (27%), this was followed by obstetric haemorrhage (25%), sepsis (12%) medical condition (10%), unsafe abortion (7%) and lastly, infectious and parasitic diseases (5%)

Causes of Maternal Mortality by Months

Table 3 depicts distribution of major causes of maternal mortality level by month in the study area. Obstetric haemorrhage occurred more in March 11(14.7%), February 8(10.7%), September 8(10.7%), and October 3(4.0%) with the least occurrence in January 2(2.7%). Sepsis was prevalence more in October, 7(18.9%) with the least occurrence in January, February, June, November and December. Unsafe abortion caused the maternal death in the month of April, 5(25%), and none in the month of August and November. Hypertensive disorder led to more death in the month of August, 9(11.25%), the lowest in February, 1(1.25%). Obstructed labour occurred more in March 11(14.7%) and no maternal mortality due to obstructed labour in the month of January and September. Infectious and parasitic diseases were high in April and no death was due to it in February, June, July, and December. Lastly, Medical conditions occurred more in the month of June 8(23.5%) and low in January, September and October.

Causes of Maternal Mortality by Season

Table 4 shows clearly, the distribution of causes of maternal mortality between the two seasons of the year. The causes of maternal death vary between the seasons. The main cause of maternal death in the dry season was obstetric haemorrhage (28.57%), which was followed by obstructed labour (15.58%), hypertensive disorder (20.78%), medical condition (14.29%), Sepsis, 4(10.39%), Infectious and parasitic disease (5.196%) and Unsafe abortion (5.19%). In the wet season, the main cause of death was hypertensive disorder (29.9%), followed by obstetric haemorrhage (22.5%), obstructed labour (11.8%), Sepsis (12.8%), medical condition (10.0%), Unsafe abortion (7.4%), Infectious and parasitic disease (5.19%).

The table also reveals that obstetric haemorrhage occurred more in the wet season than in the dry season. Sepsis occurs more in the wet season than in the dry season, Unsafe abortion occurred more in the wet season than in the dry season. Hypertensive disorder occurred more in the wet season than in the dry season. Obstructed labour, occurred more in the wet season than in the dry season.

Infectious and parasitic disease occurred more in the wet season than in the dry season. Obstructed labour medical condition occurred more in the wet season than in the dry season

Table 3-Causes of Maternal Mortality by Month

Month	Obstretic haemorrhage		Sepsis		Unsafe abortion		Hypertensice disorder		obstructed labour		infectious /parasitic disease		medical condition		TOTAL	
	n	%	N	%	N	%	n	%	N	%	N	%	n	%	n	%
January	2	2.7	2	5.4	1	5	2	2.5	0	0	2	14.3	1	2.9	10	3.3
February	8	10.7	2	5.4	1	5	1	1.25	4	9.3	0	0.0	4	11.8	20	6.6
March	11	14.7	3	8.1	4	20	9	11.25	7	16.3	1	7.1	3	8.8	38	12.5
April	7	9.3	3	8.1	5	25	8	10	3	7.0	3	21.4	2	5.9	31	10.2
May	7	9.3	4	10.8	1	5	14	17.5	6	14.0	2	14.3	3	8.8	37	12.2
June	6	8.0	2	5.4	1	5	7	8.75	5	11.6	0	0.0	8	23.5	29	9.6
July	3	4.0	3	8.1	2	10	5	6.25	2	4.7	0	0.0	3	8.8	18	5.9
August	7	9.3	3	8.1	0	0	9	11.25	2	4.7	1	7.1	2	5.9	24	7.9
September	8	10.7	4	10.8	2	10	6	7.5	0	0.0	1	7.1	1	2.9	22	7.3
October	3	4.0	7	18.9	2	10	11	13.75	6	14.0	2	14.3	1	2.9	32	10.6
Novemebr	8	10.7	2	5.4	0	0	5	6.25	5	11.6	2	14.3	2	5.9	24	7.9
December	5	6.7	2	5.4	1	5	3	3.75	3	7.0	0	0.0	4	11.8	18	5.9
Total	75	100.0	37	100.0	20	100	80	100	43	100	14	100.0	34	100.0	303	100

DISCUSSIONS OF FINDINGS

This work explored the causes of maternal mortality in the study area, over the years, months and season. The causes of maternal death were numerous and complex. This study has categorized them into 8 broad groups, for better understanding and analysis. These are

- 1 Obstetric hemorrhage- this include all death that are causes by bleeding, such as placenta cases
- 2 Sepsis- these are infection during pregnancy, labour or post partum
- 3 Unsafe abortion- these are all forms of abortive outcomes that leads to death
- 4 Hypertensive disorder in pregnancy- this include all forms of death caused by hypertension such as Eclampsia, pre Eclampsia and gestational hypertension
- 5 Obstructed labour- this include all issues that can delay or obstruct labour such as mal presentation and unfavorable cervix
- 6 Infectious cause and parasitic diseases: this include any disease cause by micro organism, bacteria, fungi and virus , for example, pulmonary tuberculosis, HIV/AID, Pneumonia, Malaria ,etc
7. Medical conditions – this include all other disease of the circulatory and respiratory system or shortage of essential nutrients or malnutrition, such as anemia, acute renal injury or acute kidney failure, cardiac failure etc
8. Anesthetic causes has to do with wrong drug use, intubation, High spinal

These aforementioned 8 causes of maternal death are further classified as Direct or Indirect causes. Direct causes of maternal mortality include the first 5 causes above, these causes are related to obstetric issues in pregnancy, during labour or 42 days after delivery. The Indirect causes include the last three causes, while anesthetic causes are sometime rare. The indirect causes are the diseases that are exacerbated by pregnancy such as infectious cause, parasitic , medical and anesthetic causes

The causes of maternal mortality differ among the 3 states. In Bayelsa state, Hypertensive disorder is the most common causes of death , which accounted for 23 (24.7.5%) of the total death, In Delta state, Obstetric hemorrhage is the most common causes of death , this accounted for 21 (31.3%) The major cause of death in Rivers state was hypertensive disorder which accounted for 43 (30.1%). Generally in the study area, the major cause of death was hypertensive disorder, this accounted for 84 (27.5%) of the total cause of death, while obstetric hemorrhage ranked first in this study as the causes of maternal mortality.

This study is consistent with the submission of Alam, Hajizadeh, Dumont & Fournie (2015), who posited that Eclampsia (and every related hypertensive disorder) accounted for 27% of maternal mortality in their work. The study also reinforces the observation of Fatai, (2011), who in his study hypertension – 19% ranked first and, obstetric hemorrhage (17%) ranked second.

In the work of Merson, Black and Mills (2012), hypertensive disorder ranked third while obstetric haemorrhage ranked first among the causes of maternal mortality . The study also found (80.6%) of the cases of mortality in Bayelsa state was due to direct cause while 18 (19.4%) was a result of indirect cause, In Delta State, maternal mortality was majorly due to direct causes ,62 (92.5%) , while indirect causes accounted for 5 (7.5%). The Major cause of maternal death in Rivers state was direct causes 121 (84.%), while the indirect causes accounted for 22 (15.4%).. Result reveals that direct causes, 259 (85.5%) is the major causes of mortality in the study area. This work therefore, seem to align with the findings of Merson, Black and Mills (2012), who noted that the direct causes account for 75-80% of maternal mortality, in the low and middle income countries, they attributed the remaining 20-25% of maternal deaths to indirect cause of death.

Comparing the distribution of causes of maternal mortality by month in the study area, the study found that Obstetric hemorrhage occurred more in March 11(14.7%), Sepsis was prevalence more in October, 7(18.9%), Unsafe abortion cause the maternal death more in the month of April ,5(25%), Hypertensive disorder lead to more death of women in the month of August ,14(17.5%), Obstructed labour occurred more in the month of March 7(16.3%) , Infectious and parasitic diseases was highest in the month of April, Medical conditions occurred more in the month of June 8(23.5%). Furthermore, Direct causes of death contribute the main cause of death throughout the month in the study area, meaning that indirect cause are not the main course of death in this region .This is in line with the work of Omo-Aghoja,,Aisien, Akuse, Bergstrom and Okonofua (2010)

The distribution of causes of maternal death in relation to the months of the year is not found in the literature, knowledge of this relationship is however necessary as a guide for planning purpose. The causes of maternal death also vary on yearly basis in the study area, table 4 shows the variations clearly and in detail. The work also compared the causes of maternal mortality and the two seasons of the year in the study area. Obstretic heamohage occurred more the the dry season, Sepsis occurs more in the wet season than in the dry season, Unsafe abortion ocurred more in the wet season that in the dry season . Hypetensive disorder occurred more in the wet season that in the dry season. obstructed labour, occurred more in the wet season that in the dry season..Infectious and parasitie disease ocurred more in the wet season that in the dry season. medical condition ocurred more in the wet season that in the dry season. obstructed labour.

The main cause of maternal death in the dry season was Obstretic heamohage (31.9%), while in the the wet season, the main cause of death was Hypetensive disorder (29.9%).

The causes of maternal mortality across the study area in descending order are : hypertensive disorder, (27.5%) obstetric hemorrhage, (24.6%), obstructed labour,(14.1%) sepsis, (12.1%) medical condition,(10.5%) unsafe abortion, (6.6%) infectious /parasitic diseases, (4.6%) and, anesthetic causes, (0%)

This findings differ from the work of Omo-Aghoja , Aisien, Akuse, Bergstrom, and Okonofua (2010) , who in their study in another area in Nigeria , found out that HIV(20%) was the leading cause of maternal mortality , while eclampsia (12.4%) was the second leading cause.

4 CONCLUSION

The causes of maternal mortality across the study area in descending order are : hypertensive disorder, (27.5%) obstetric hemorrhage, (24.6%), obstructed labour,(14.1%) sepsis, (12.1%) medical condition,(10.5%) unsafe abortion, (6.6%) infectious /parasitic diseases, (4.6%) and, anesthetic causes, (0%).

Having known these causes, with respect to the year, month, season, it will be an eye opener for Government, health personnel and NGO to prepared adequately especially on how to reduce this causes discussed above. The distribution of causes of maternal death in relation to the months of the year is not found in the literature, The knowledge of this relationship between maternal death and the month, year and season is however necessary as a guide for planning purpose.

The study hereby recommends the following: that women should be financially empowered, more skill acquisition programmes should be organized by government, community leaders and relevant stake holder should rise up to see that the reduction of maternal mortality comes to reality. The health centres should be adequately equipped in terms of quality and quantity.

5 REFERENCES

- Abdulkarim, G, Mohammed B, & Abubakar, K. (2008). Community Perception Of Maternal Mortality In North Eastern Nigeria. *African Journal Of Reproductive Health* .12 [3], 27-34.
- Abimbola, A. O., Akanni, O., &Falusi, A. O. (2012). Determinants of Child Mortality In Rural Nigeria. *World Rural Observation*;4(2),38-45.<http://www.sciencepub.net/rural>.
- Acha, C. K. (2009) .Women Empowerment As A Measure Of Good Governance In Nigeria, *International Journal Of Natural And Applied Sciences*, 5(2),167-17
- Adam Taghreed And Franz-Vasdeki- Jennifer ,(2012), Success Factors For Women’s And Children’s Health: A Quantitative Mapping Of Trends In Reductions Of Maternal And Child Mortality In The High Mortalityburden. December 17, 2012 <http://www.who.int/pmnch/knowledge/publications/adam.pdf>
- Akubue, A. I. (2001). Gender Disparities In Third World Technological, Social, And Economic Development. *The Journal Of Technology Studies*, 27(2), 64-73.
- Alagoa E.A. (2005). A History Of The Niger Delta: An Historical Interpretation Of Ijo Oral Tradition. Onyoma Research Publications, Nigeria
- Black, R.E., & Li, Liu (2012). Global Under Five Mortality: Where Do We Stand Today?

Johns

- Ezumah N. N. (2003). Gender Issues In The Prevention And Control Of Stis And Hiv/Aids: Lesson From Awka And Agulu, Anambra State/Nigeria. *African Journal of Reproductive Health* 7(2)89-99
- Mutunga, C. J. (2007). Environmental Determinants Of Child Mortality In Kenya, Unu- *Wider Research Paper* No. 2007/83. Helsinki: United Nations University World Institute For Development Economics Research.
- Olomo, R. O. and Sajini, F. I. (2011). *Population Geography, an introductory textbook*. Ehis Printers Benin City, Edo State, Pg 7.
- Okigbo, C. C., Adegoke, K. K. & Olorunsaiye, C. Z. (2017), Maternal and Child Health in Africa for Sustainable Development Goals (SDGs) Beyond 2015, *An International Journal for Research, Policy and Practice*, 12,(6) Issue 6
- Rosenfield A, Min C, Freedman L (2007). Making motherhood safe in developing Countries. *N Engl J Med*; 356:1395–1397.
- Rovston, E. & Armstrong, S. (1989). Preventing maternal deaths. Geneva: WHO Bulletin. 402
- Waugh D. (2014) *Geography :An integrated Approach*, Oxford University Press. 4th Edition
- World Health Organisation .(2007). Maternal Mortality in 2005. Estimates developed by WHO, UNICEF, UNFPA and the World Bank World Health Organization, Geneva, http://www.hoint/whosis/mme_2005pdf
- World Health Organization (2014). Trends in maternal mortality 1990 to 2013. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. Geneva.
- United Nation Children Education Fund. (2016). Maternal mortality fell by almost half between 1990 and 2015. <http://data.unicef.org/maternal-health/maternal-mortality.html>.