DETERMINANTS OF MATERNAL MORTALITY IN MAKURDI LOCAL GOVERNMENT AREA, BENUE STATE, NIGERIA (2010-2019)

Ogbu R.O. , Ikyernum J.K. , Enefu J. , and Prof. Mrs Abba Yaro, M.
Department of Geography, Benue State University, Makurdi, Benue State, Nigeria

ABSTRACT

Despite recent focus on maternal mortality in Nigeria, its rates remain unacceptably high. This study adopted a descriptive survey research design to determine the prevalence, medical causes and factors associated with maternal mortality in Makurdi LGA. Data was obtained from primary survey using hospital records, the administration of structured questionnaire, and focus group discussions (FGDs). Data were analyzed using descriptive statistics, trend analysis and principal component analysis (PCA). Results showed a total of 217 maternal deaths occurred out of 48,658 live births, giving a maternal mortality ratio of 446 per 100,000 live births. The yearly maternal mortality ratios saw an undulating scenario. On the specific causes of death, direct causes accounted for 84%, while indirect causes were 16%. The major direct obstetric causes were hemorrhage, sepsis, eclampsia, obstructed labor and unsafe abortion. Amongst the indirect causes, hepatitis was the leading cause of maternal mortality. The causes of maternal death seemed to be affected by age, education and occupation. Generally, the trends of maternal mortality in Makurdi LGA over the period have seen a decline, but the decline is not significant enough. Efforts should be made to sustain or increase antenatal services, encourage girl-child education and encourage later marriages within the local government.

Key words: Maternal Mortality, Maternal Mortality Ratio, Determinants, Maternal Death

1.0 INTRODUCTION

Pregnancy and childbirth are physiological events that should bring joy to the woman, the family and the society at large, but sometimes it turns out to be a source of sorrow. For some women in certain parts of the globe, particularly in developing countries, the reality of motherhood is often grim. Maternal mortality, also referred to as 'maternal death' is the death of a woman from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and child birth or within 42 days of termination of pregnancy (WHO, 2013). According to World Health Organization estimates, about 536,000 women die of pregnancy-related causes annually, and close to 10 million women suffer complications related to pregnancy or childbirth

(World Health Report, 2005; Antor, 2014). Nigeria ranks second to India, in absolute number of maternal deaths and contribute about 10% of all global maternal deaths with the mortality ratio ranging between 800-1800 per 100,000 live births. It is estimated that about 60,000 maternal deaths occur annually in Nigeria. The northern part of the country generally has worse indicators (Hemabh-Hilekaan *et al.,* 2019).

Maternal mortality may be due to a lot of factors ranging from primary medical causes such as abortions, preeclampsia/eclampsia, obstetric hemorrhage, sepsis and ectopic pregnancy to secondary causes (anemia, heart disease, malaria and respiratory tract illness) and some underlying causes which contribute by causing delays in accessing healthcare. These include patient factors, factors from the community and those within the health facility. Understanding the determinants of maternal mortality is a difficult task, as it is influenced by different categories of conditions, such as cultural, economic, biological, demographic, clinical conditions, availability and accessibility of health services (Azuh *et al*., 2017).

There is no single intervention measure that will considerably decrease maternal mortality but interplay of various measures in a comprehensive manner; which indicates the need to examine factors other than medical causes, which are the least studied, in order to understand comprehensively the determinants of maternal mortality (Azuh *et al*., 2017). One of the major challenges over the years has been a narrow focus on the problem of maternal mortality. According to Ujah *et al* (2005), knowledge of maternal mortality has been mainly derived from data provided by urban hospitals. Statistics on non-medical factors, such as information on social, economic, cultural and behavioral factors, contributing to maternal mortality are rarely available, especially at the community level. One important fact is that the dynamics of maternal health and mortality are yet to be fully comprehended in Nigeria. Understanding the real situation of a mother's disease condition and death is vital in dealing with the challenge of uncompromising high maternal mortality rates in Nigeria. Therefore, this study aims at assessing the determinants of maternal mortality in Makurdi local government area of

Benue state. The objectives of the study are to determine the prevalence of maternal mortality, the medical causes, and the major determinants of maternal mortality in Makurdi LGA.

2.0 STUDY AREA

Makurdi local government area is located from Longitude 7° 47" and 10° 00" east and Latitude 6° 25" and 8° 20" north of the equator. It shares boundaries with Guma local government area to the North-East, Gwer-East local government area to the South, Gwer-West local government area to the West and Doma local government area of Nasarawa state to the North-West (National Population Commission, 2009). The study area is made up of eleven (11) wards including Agan, Ankpa/Wadata, Bar, Central/South mission, Clerks/Market, Fiidi, Mbalagh, Modern market, Northbank I, Northbank II and Wailomayo (Tivpedia, 2021). The population of Makurdi local government area as of 2006 stood at 300,377 with 154,138 males and 146,239 females (National population commission, 2010). The LGA is a semi-urban settlement with a mixture of many ethnic groups but predominantly made up of the Tiv, Idoma, Igede and Etulos (Tivpedia, 2021). Agriculture is the mainstay of the economy, engaging over 75% of the population, while majority of the non-agricultural workers are civil servants (Benue State Ministry of Information and Orientation, 2012). Within Makurdi local government area, there is a federal hospital, a teaching hospital, a general hospital, primary healthcare centers, and numerous private health facilities. It is a predominant Christian settlement with few Muslims and traditionalists.

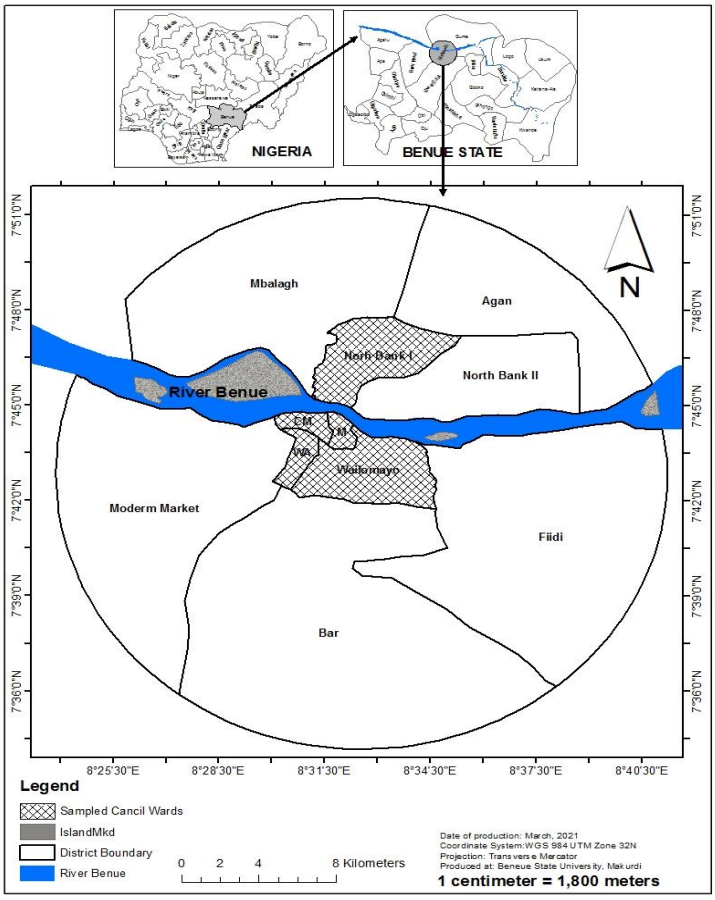


Figure 1: Map of Makurdi Local Government Area showing the Sampled Council Wards
Source: ***GIS Laboratory, Department of Geography, Benue State University, Makurdi (2021)***

3.0 MATERIALS AND METHODS

A descriptive survey research design was used to assess the determinants of maternal mortality in Makurdi local government area. Multi-stage sampling technique was used to select three hundred and ninety-nine (399) women of child hearing age in Makurdi LGA. The respondents were selected from 399 households in five (5) sampled council wards in Makurdi LGA. The identified households in these wards were visited to collect information from eligible respondents for the quantitative study. For qualitative data collection, 3 focus group discussions (FGDs) were conducted among health workers in the sampled hospitals. The FGD participants were drawn from gynecologists, auxiliary nurses and midwives. The instrument for data collection in the study was an information sheet (to extract the medical records from 3 selected hospitals), a structured

questionnaire, and a focus group discussion guide. The case records of all pregnant women who died in the 3 sampled hospitals (Federal Medical Center, Bishop Murray Medical Center, and General hospital, Northbank) within the study period (2010-2019) were retrieved and information on age, occupation, educational level, parity, booking status, causes of death were entered onto a data form designed for the study. The cases were extracted from patient folders, admission and discharge registers', out-patient department records and other records. The items in the questionnaire relate directly to the research objectives. The socio-demographic characteristics of the respondents covered in section A include: age, marital status, educational qualification, occupation of the respondents. Section B was used to elicit information on respondents' awareness of maternal mortality, while section C, D and E covered the respondents' knowledge of demographic, socio-economic and cultural correlates which influence maternal mortality in the study area. While, the FGD guide was structured to elicit information on the health workers' experiences of pregnancy complications, the causes of these complications, why women are susceptible and the characteristics of those who are majorly suffering from those complications. Maternal mortality was calculated by dividing the total maternal death by the total number of live births recorded within the study period multiplied by 100,000. The pattern of maternal mortality for each year was also calculated. Trend was shown using MMR. The results were computed using frequency and descriptive methods of SPSS software version 20 and presented by simple statistical tables. The study was approved by the Hospital Ethical Committee.

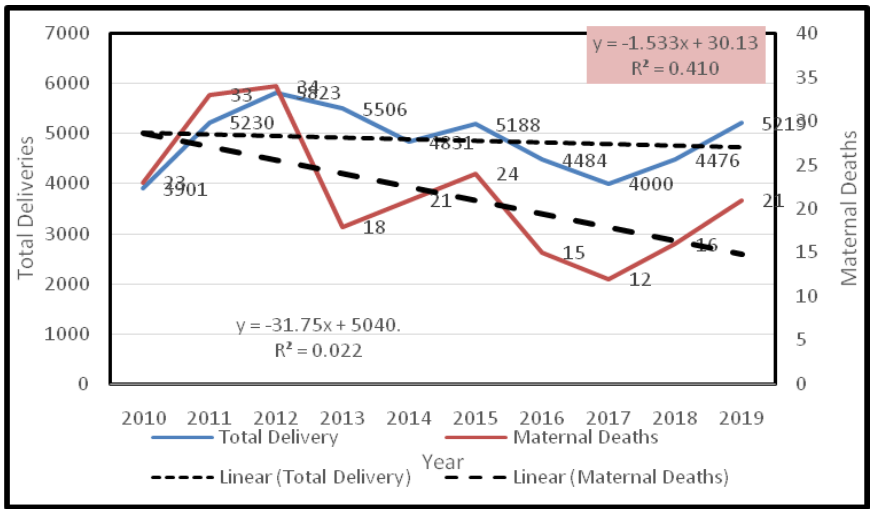
4.0 RESULTS AND DISCUSSION

4.1 Prevalence of Maternal Mortality

A total of 217 maternal deaths occurred among 48,658 deliveries over the 10-year period, yielding the maternal mortality ratio (MMR) of 446/100,000 live births. There was no consistent trend in MMR over the study period. It rather showed annual fluctuations in MMR. The MMR peaked in 2011 with a ratio of 631/100,000 live births. The lowest

MMR of 300/100,000 live births is in 2017. Annual deliveries also fluctuated remarkably during the study period with the lowest deliveries in 2010 (*figure 2*).

Figure 2: Annual Deliveries and Maternal Deaths in Makurdi Local Government Area (2010-2019)



4.2 Medical Causes of Maternal Mortality

The leading direct cause of maternal mortality in the study was hemorrhage which accounted for 30.1% of all deaths, while sepsis, eclampsia, obstructed labor and unsafe abortion made up 23.5%, 21.3%, 15.8% and 9.3% respectively (*Table 1*). The majority of (84%) maternal deaths occurred as a result of direct obstetric causes. Hepatitis was the common indirect cause of maternal death accounting for 23.5%, followed by anesthetic death (17.6%). Indirect obstetric deaths account for 16% of all maternal deaths in the study.

Table 1: Medical Causes of Maternal Mortality in Makurdi Local Government Area, Benue State, Nigeria (2010-2019)

Causes	Number	Percentage
Direct causes		
Hemorrhage	55	30.1
Sepsis	43	23.5
Eclampsia	39	21.3
Obstructed labor	29	15.8
Unsafe abortion	17	9.3
Indirect causes		
Hepatitis	8	23.5
Anesthetic death	6	17.6
Gastro-enteritis	4	11.8
HIV/AIDS	3	8.8
Sickle-cell anemia	3	8.8
Meningitis	2	5.9
Diabetes	2	5.9
Heart disease in pregnancy	2	5.9
Malaria in pregnancy	2	5.9
Pelvic Inflammatory disease	2	5.9
Unknown	3	8.3

Note: *There may be more than one cause of maternal mortality in this study*

4.3 Socio-demographic Characteristics and Maternal Mortality

Table 2: Socio-Demographic Distribution of Maternal Mortality by Percentages in Makurdi Local Government Area

Variables	Frequency (N = 217)	Percentage (%)
Age		
15-19	69	31.8
20-24	45	20.7
25-29	25	11.5
30-34	24	11.05
35-49	54	24.9
Ethnicity		
Tiv	109	50.2
Idoma	55	25.3
Hausa	28	13.0
Igede	13	6.0
Igbo	12	5.5
Marital status		
Single	29	13.4
Married	188	86.6
Educational status		
Illiterates/primary	146	67.3
Secondary	63	29
Tertiary	8	3.7
Booking status		
Booked	97	45
Un-booked	120	55
Parity		
0	18	8.3
1-2	32	14.7
3-5	65	30
5 above	102	47

Source: Medical Records (2010-2019)

Table 2 shows the association between maternal socio-demographic characteristics and maternal mortality. There were two peaks of maternal mortality recorded with a majority (52.5%) of the deaths among those ≤ 24 years and among those (24.9%) mothers who were ≥ 35 years old. Tiv and Idoma ethnicity was one of the strong predictors of maternal mortality. This was most likely because they were the two dominant local tribes within the study area. Surprisingly, the medical records revealed a lower proportion of maternal deaths among single women (13.4%) compared to married women (86.6%). Further analysis revealed that this may not be the case because parents and relatives of unmarried pregnant women allow their daughters and female relatives to

use their names so as to avoid stigmatization and embarrassment that is usually associated with pregnancy out of wedlock. Women with low literacy level are more exposed to the risk of dying from pregnancy related complications than their counterparts. In this study, the highest maternal deaths (67.3%) occurred in those with no formal education; this decreased as the level of education increased. Mothers who were un-booked for antenatal care had a higher risk of death than their counterparts who had antenatal care. Parity distribution showed that maternal mortality increased with parity, and the highest maternal mortality was recorded in the grandmultiparae (women who had more than 5 pregnancies).

4.4 Socio-Economic Determinants and Maternal Mortality

Table 3: Socio-Economic Indicators of Maternal Mortality in Makurdi LGA

Variables	Frequency	Percentage (%)
Occupation status	**N = 217**	
Housewife	167	77
Petty trader	19	8.8
Student	15	6.9
Farmer	9	4.1
Civil/public servant	7	3.2
Distance to health facility	**N = 377**	
< 30 minutes	68	18.1
30 minutes – 1 hr	138	36.6
> 1 hr	171	45.3
Cost of transportation		
No cost & 50-100 naira	98	26
≥ 100-150 naira	279	74
Institution factors	**N = 377**	
Very good	170	45
Good	83	22
Poor	75	20
Very poor	49	13

Source: Author's Field work, 2020

The study convincingly demonstrated that, occupation of women was a major factor influencing maternal mortality, with women in the lower socio-economic group (housewives and petty traders) contributing 85.8% to maternal mortality in the period under review. Proximity to health facilities was also found to affect the use of maternal healthcare services in the study area as these facilities are usually located at long

distances, and for many rural women, lack of transportation and cost of transportation serve as mitigating factors to health care seeking. On examination of the quality of care received by respondents at the healthcare facility, 67% ranked the quality of services received to be good, compared to 33% of the respondents who reported it was poor.

4.5 Cultural Determinants and Maternal Mortality

The study also sought to identify a number of socio-cultural factors which played significant roles in the occurrence of maternal mortality in the study area.

4.5.1 Tradition and Maternal Mortality

Traditional practices are among the most important driving forces of maternal mortality, which the medical records do not often show. The household survey respondents and focus group participants assessed the traditional practices that lead to maternal mortality in Makurdi LGA, and arranged them in their order of ranking. Early marriage as a cultural cause of maternal mortality is ranked 1st, Food taboos 2nd, Use of herbs 3rd, Female circumcision 4th and hot baths 5th. In the study, early marriage was ranked first (1st) because it was said that *in most cultures in Nigeria, it is common practice for parents to arrange the marriage of their young daughters, particularly to older men.* Marrying out children of 10-15 years is premised on the value to protect them from falling victim of teenage pregnancy (Chukuezi, 2010). The discussants also mentioned that in some parts of Benue state, *women are not expected to eat egg, meat, bread or beverages during pregnancy because the baby will be too fat or that egg and meat should not be eaten, so that the child will not be a thief*. Also, women use various means of boosting hemoglobin (HB) levels during pregnancy and after delivery and the respondents mentioned a mixture of *"milk and malt"*, *"tin tomatoes and coke"* and use of *"small green garden eggs"* for cooking. All these herbs and the various mixtures may be harmful to pregnant women which may put them at a higher risk since these herbs have not been proven scientifically to contain nutrients that can boost HB levels (Owusu, 2008). Another rare practice (among the *Igedes*) is female circumcision. One key discussant said that *"the problem with female genital mutilation (FGM) is that it can narrow the opening during childbirth when the woman falls pregnant"*. Lastly, the

respondents revealed that hot baths are very important to the Hausa women especially. There, *"the new mother bathes with hot water for 40-50 days. It is believed that a woman who does not take the hot baths is inviting trouble for herself, and such a woman will begin to swell all over and she will start to emit an unpleasant smell".* It has been confirmed by doctors and other studies (Iwalaiye, 2009) that hot baths can cause heart failure among women who carry out this practice in Nigeria.

Decision making was also identified to influence the level of maternal mortality. In the survey, respondents were asked about some factors that delay their decision to seek early care during pregnancy and labor. One major factor was seeking permission from the husband: among the respondents who are married, 79.6% said decision making during pregnancy is solely the responsibility of their husbands. This was confirmed in the focus group discussion where the women mentioned that they are their husbands' property; therefore their husbands make major decisions in their lives and even during emergencies. Findings of this study are similar to the findings of (Iwalaiye, 2009; Osiko, 2015) as majority of the married respondents need to seek approval from their husbands before seeking health care.

4.6 Major Determinants of Maternal Mortality

The study used principal component analysis (PCA) to assess the major determinants of maternal mortality in the study area (2010-2019). The result is presented in table 4.

Table 4: Rotated Component Matrix of the Variables

Variable	Component	
	1	**2**
Medical factors	***.731***	.662
Age	-.277	***-.844***
Booking status	***.804***	-.395
Education	-.371	***.839***
Parity	***.911***	-.302
Occupation	.241	***.800***
Distance to health facility	.567	-.396
Cost of transportation to health facility	.561	-.127
Ethnicity	-.436	.654
Religion	-.588	.660
Decision making during EmOC	-.132	***.920***
Total Eigenvalues	**4.868**	**4.389**
% Variance	**44.259**	**39.897**
Cumulative %	**44.259**	**84.156**

Extraction Method: *Principal Component Analysis*
Rotation Method: *Varimax with Kaiser Normalization*
a. Rotation Converged in 3 iterations

The result extracted two components with eigenvalues greater than one (1). These components account for 84.156% of the total variance explained in the data set, which is very high. The first and second components extracted provided relatively uniform explanation of the variation in the maternal mortality rate indicators with eigenvalues of 4.868 and 4.389, and percentage variance explanation of 44.259% and 39.897% respectively. The first component is highly loaded on medical factors (direct/indirect obstetric complications) and booking status (antenatal attendance), hence, the component is named **medical component**. This is similar with the findings of a most recent investigation by Ochejele et al. (2019) in the same LGA and region, although the order may vary. The fact that these obstetric complications match in both studies is strong evidence that they constitute a constant threat to pregnant mothers in this region, and therefore, deserve to be considered priority targets for intervention. While the second

component is highly loaded on demographic and socio-economic indicators of maternal mortality such as age (0.844), education (0.839) and occupation (0.800), therefore, the component is named **socio-demographic component**. Demographic characteristics present a major challenge and impact significantly on the health of mothers. Pregnancy-related complications are mainly caused by some factors probably due to immaturity of age, numerous numbers of pregnancies, illiteracy and low occupational status (Hemabh-Hilekaan et al., 2019; Ochejele et al., 2019). To this extend, both medical factors, social and demographic factors played a critical role in determining the rate of maternal mortality in the study area.

5.0 CONCLUSION AND RECOMMENDATIONS

The study revealed that the maternal mortality ratio (MMR) within the 10-year study period have seen a decline. Even though the MMR had a declining trend, it is still high compared to the national figure (814/100,000). There are a number of medical and non-medical, direct and indirect causes that account for the maternal deaths in the region. Most of these deaths are preventable or in the least can be better managed. The medical and socio-demographic causes must be viewed side by side because they are significantly related. A critical issue that must be given significant attention is the mix of medical and non-medical causes. Further studies should be carried out to determine the exact relationship between the two and how they play out in the maternal mortality situation in the country. Based on the findings of this study, it is concluded that medical and socio-demographic factors (age, booking status, education, occupation) are significant determinants of maternal mortality in Makurdi local government area. It is however recommended that:'

- Efforts should be made to sustain or increase antenatal services within the local government.
- Early marriage should be discouraged through changes in the minimum legal age of marriage, or encouraging later marriage (e.g. through compulsory education).
- Literacy rate should be improved so that awareness about reproductive health and use of available health resources could be optimized.

- The government should create enabling environments for empowering Makurdi women because limited economic choices and opportunities affect the women.

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