



## **Trends And Causes of Maternal Mortality in Damaturu Local Government Area (LGA), Yobe State**

by

A. W. Jajere and A. M. Abbas  
Department of Geography Department of Geography  
Yobe State University, Damaturu Federal University of Kashere  
[dradamabbas28@gmail.com](mailto:dradamabbas28@gmail.com); Gombe State  
08055565575

### **Abstract**

*For several years, complications which include: postpartum hemorrhage, eclampsia, pregnancy induced hypertensions, obstructed labour, ruptured uterus and sepsis have been known to be causes of maternal mortality. This study therefore examines the trends and causes of maternal mortality from 2011 to 2020 in the study area. A time-series analysis was adopted as the research design and a multistage stratified sampling technique was used for this study at the first stage. Thus, the local government area was first split into two strata namely urban and rural political wards. A systematic sampling was then adopted in the sampling of three urban and three rural political wards in the study area. A purposive random sampling technique was then used by the researcher in the administration of questionnaires only to the affected family members specified by the community heads, as the information on the deceased could only be gotten from their siblings or households. The study used descriptive statistics for the analysis of data. The findings further revealed the major obstetric causes of maternal mortality which are direct causes such as postpartum hemorrhage, Eclampsia/ High Blood Pressure and sepsis. Postpartum hemorrhage is the most important cause of maternal mortality in the study area. The trends of the maternal mortality based on the data from two health care facilities revealed that 2015 and 2018 had highest maternal deaths of 60 and 77 respectively. Also, 2015-2018 recorded the highest MMR of 956 and 1,586 per 100,000 live births respectively. The R value of 0.78 revealed high level of correlation between maternal mortality and socio-economic factors. However, the study further reveals that there is no significant differences in maternal mortality in the urban and rural areas. In view of this, the following recommendations are made by this study. That, the government should integrate people's believes, cultures and traditions into the healthy intervention to bring out their negative consequences in order to curb the high infant mortality rate, and health workers should be involved in house to house sensitization and mobilization of pregnant women for antenatal care.*

**Key words:** Trends, Maternal mortality, Eclampsia, Hemorrhage

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## **1.0 Introduction**

Maternal mortality has remained a major concern and challenge to the developing countries particularly sub Saharan Africa and Southern Asia, where approximately 86% of global maternal mortality takes place (World Health Organization (WHO), 2019) Furthermore, WHO (2016b) stated that, 289,000 women die each year from pregnancy-related complications globally, of which about 99% occurs in developing countries, with a decline of 44% from 1990 to 2015. And thus, 830 women die every day from preventable causes of pregnancy related complications and during child births. There were over 500,000 maternal mortality cases in the world prior to year 2000 (Ronsman and Graham, 2006). In 2010, it reduced to less than 300,000. The global maternal mortality rate (MMR) in 2013 was 210 per 100,000 live births in comparison to 380 maternal deaths per 100,000 live births in 1990 (WHO, 2016b). Sustainable Development Goal SDG-3 seeks to further reduce the death to less than (70%) per 100,000 live birth by 2030 (WHO, 2016b).

The risk of maternal mortality is highest in Africa, where countries struggle to provide health services for large number of their populations. In Africa, one out of 16 women stands the risk of dying through pregnancy and childbirth (WHO, 2014b). Furthermore, 10 countries worldwide, with the highest maternal mortality are in Africa, with maternal mortality ratio of 910 deaths per 100,000 live births (Ronsman and Graham, 2006).

Nigeria has one of the worst records of maternal deaths in the world and this situation is worsening with time. Inadequate maternal health services in the rural areas and poor organization are leading factors of maternal mortality (NPC & ICF, 2014). Omo-Aghoja (2008) opined that, health care facilities are in three tiers in Nigeria, namely; primary, secondary and tertiary. Maternal women receive antenatal and post natal at Primary Health Care (PHC), while those with related pregnancy complications access secondary and tertiary health facilities. Maternal mortality in Nigeria is continually declining with maternal ratio of 512 per 100,000 live births (NPC & ICF, 2019).

Yobe state is one of the states in the North-eastern geopolitical zone with higher maternal mortality rate (MMR) of 1,549 per 100,000 live births (NPC & ICF, 2014; 2019). For several years, pregnancy related complications which are the direct causes of maternal mortality have been noticed in Damaturu (LGA) (Kolo, Chutiya and Ibrahim, 2017). Such complications include: postpartum hemorrhage, eclampsia, pregnancy induced hypertension, obstructed labour, ruptured uterus and sepsis. NPC & ICF (2013 and 2019) have also both indicated the prevalence of such complications in the state in general and the Damaturu Local Government Area (LGA) in particular. Another problem in the study area is the general challenges faced with the Nigerian healthcare systems, which can be categorized into “resources, structures and accessibility. Although the country has adequate human resources (around 350,000 healthcare workers), women are still faced with pregnancy related crisis (Oleribe *et al.*, 2016).

Damaturu, the capital city of the state currently has high population growth rate which could be attributed to the Boko haram insurgency which led to the continuous influx of people from neighboring communities and other Local Government Areas. This had resulted in the overstretching of the existing social and maternal health care facilities, probably further compounding the maternal health care problem. As such, UNDP (2017)

reported that the displacement of people as well as the annihilation of public infrastructure (schools and health facilities) simply denotes the non-existence of these services.

So far the existing studies related to variations on trends of maternal mortality are only clinical facility based researches (Kolo, Chutiyami and Ibrahim, 2017; Kolo et al., 2017). In the study area, such studies could be regarded inadequate as even for where they exist, they are limited and restricted to only a particular health facility. This study on the other hand, aimed at conducting the research on both facility and community basis in order to identify and explore the trends over 10 years' and obstetric causes of maternal mortality in the whole of the study area (Damaturu Local Government Area, Yobe State of Nigeria). Hence, the following questions arose for answering: What are the trends of Maternal Mortality from 2011 to 2020 and what are the causes of maternal mortality in the study area? The aim of this study is therefore, to explore the trends and causes of maternal mortality from 2011 to 2020 across urban and rural areas of Damaturu LGA, Yobe State, Nigeria. The aim was achieved through the following objectives: Examining the trends of maternal mortality from 2011 to 2020 and the causes of maternal mortality in the study area.

## 2.0 Study Area

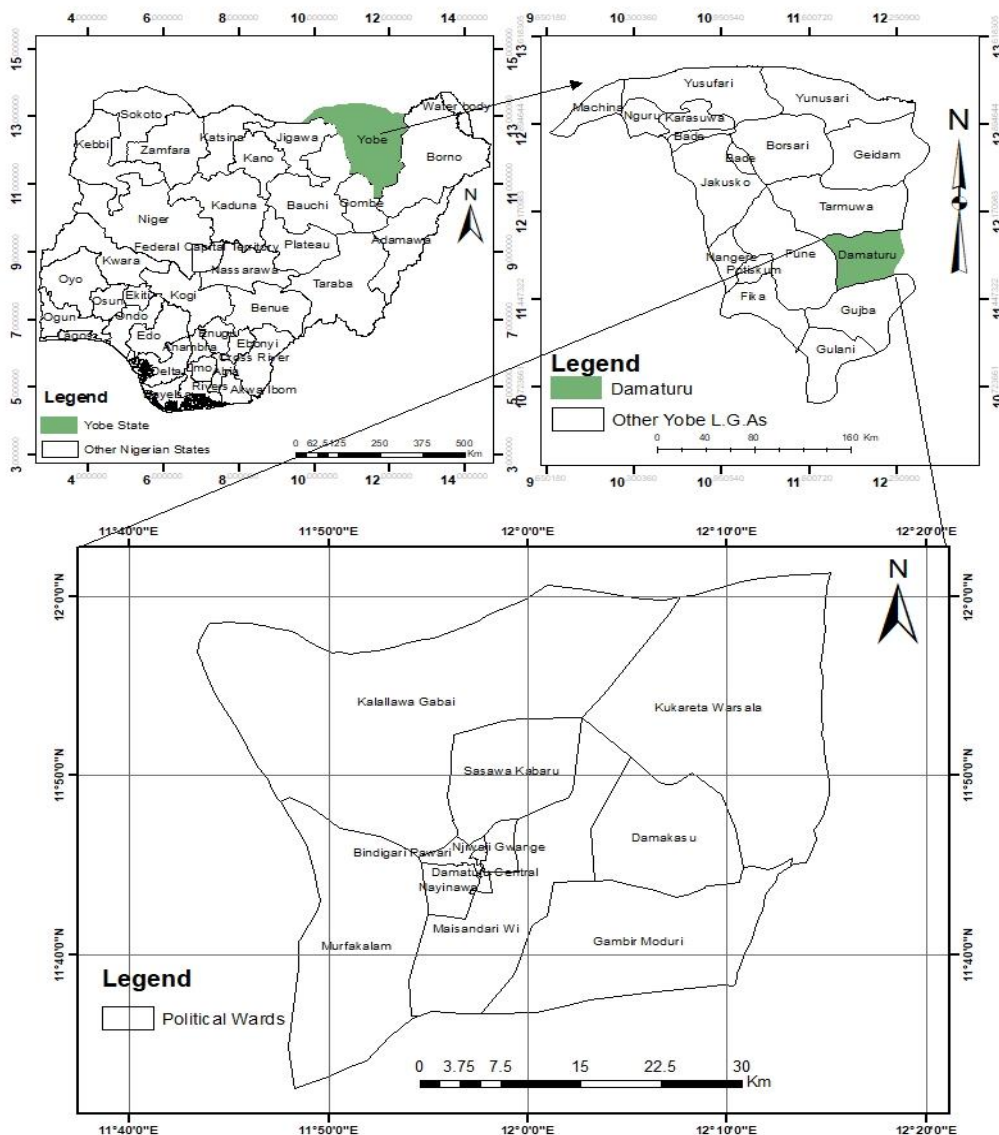
Damaturu is located between latitudes  $11^{\circ} 44' 40''$  and  $11^{\circ} 45' 00''$  N of the equator and longitudes  $11^{\circ} 57' 40''$  and  $11^{\circ} 58' 10''$  E of the Greenwich meridian. The LGA has been one of the district headquarters in the former Borno province. It was later made the headquarters of Damaturu LGA in 1976, and in 1991 it became the capital of Yobe State in Northeastern Nigeria. Damaturu covers a land area of 206,241Km<sup>2</sup> and 456 meters above sea level. As depicted in figure 2.1, it is bordered to the North, West and South by Tarmuwa, Fune and Gujba local Government Areas of Yobe state respectively and to the east by Kaga local Government Area of Borno State (Ahmed et al, 2014). The land use and land cover of Damaturu consist of settlements, agricultural activities such as farming and animal rearing, and public structures such as schools, offices, roads, and markets, etc. Being the administrative center of the state, it is inhabited majorly by civil servants and traders.

Damaturu is located in the semi-arid zone of northern Nigeria with a tropical continental climate, the climate is characterized by short wet season (June to August) and long dry season (October to May) with a temperature of 43<sup>0</sup> C. The annual rainfall in the area is usually low between 500-1000 mm while evapotranspiration is also high and the month of August usually records the heaviest rainfall and the highest number of rainy days. The soils of Damaturu are mainly sandy in nature typical of semi-arid regions. They are porous and contain a lot of air spaces and with high alkali content. The vegetation on the hand is said to be closely related to environmental factors such as soil, climate, and human interference. Damaturu was founded in 1813 and it is multi-ethnic with the Fulani and Kanuri as the dominant ethnic groups. Others like Hausas, Karai-Karai, Bade, Ngezam are the minority tribes in the LGA. The population of Damaturu also increased to 124,500 in 2016 (NPC, 2016). As shown in figure 2.2, Damaturu Local Government Area is divided into Eleven (11) political wards: Damaturu central, Njiwaji/Gwange, Bindigari/Pawari/Nayinawa, Maisandari/Waziri Murfa-kalam, -kalallawa/Gabai, Sasawa/kabaru, Gambir/Moduri, Kukareta/Warsala and Damakasu (Rural areas). The indigenous tribal groups are Fulani, Kanuri, hausa, karekare, Bade, Ngezam and Babur with 48,223 households according to National Center For Diseases Control and Primary Health Care Center Damaturu (PHCD, 2019).

### 3.0 Materials and Methods

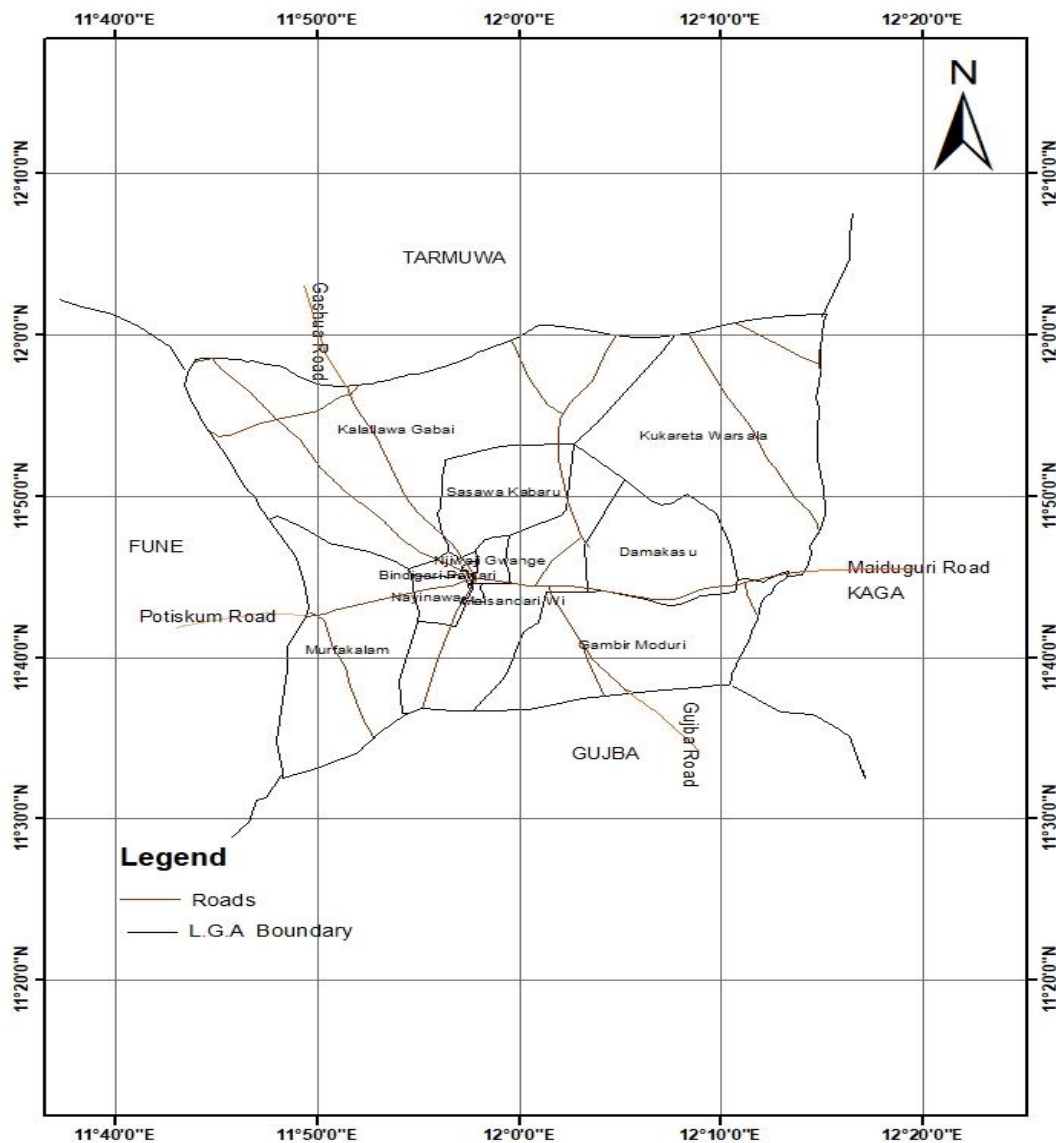
#### 3.1 Research Design

Time series analysis was used in collecting information on maternal mortality among women of child bearing age (15 – 49 years) who died as a result of pregnancy related complications in the communities of the study area. The time-series analysis was used because of the past trends and causes of maternal mortality needed to be identified from the data collected from health facility and communities. The types of data in this research were quantitative and qualitative in nature which are basically the information derived from the affected households. Sources of data were therefore both primary and secondary.



**Figure 2.1: The Study Area (Damaturu LGA, Yobe State)**

*Source: GIS Laboratory, Yobe State University, Yobe State.*



**Figure 2.2: Urban and Rural Communities in the Study Area**  
*Source: GIS Laboratory, Yobe State University, Yobe State.*

### 3.2 Methods of Data Collection

The method of data collection was field survey preceded by a reconnaissance survey. A multistage stratified sampling technique was used on this study area (Damaturu LGA). It was first split into two strata urban and rural political wards. Apart from the probability and advantage of this sampling techniques to this study, it also assist in assuring that all possible categories of respondents are considered (Burt, 1996). After separating all the political wards into two (2) groups, they were arranged in alphabetical order for further systematic sampling.

Three (3) urban political wards were then systematically selected from the five wards, namely: 1. Bindigari/Pawari, 2. Damaturu Central, 3. Gwange/Njiwaji, 4. Nayinawa, 5. Maisandari/ Waziri Ibrahim. The first one was picked while the subsequent ones were selected systematically at the interval of one. The three (3) sampled ones are 1. Bindigari/Pawari 2. Gwange/Njiwaji, 3. Maisandari/Waziri Ibrahim.

Three (3) rural were also systematically selected from the six rural political wards of the study area which are 1. Murfa-kalam; 2. Gabai/kalallawa, 3. Sasawa/kabaru, 4. Gambir/Moduri, 5. Kukareta/Warsala and 6. Damakasu (Rural areas). The three (3) selected wards from the rural residential sectors include: 1. Damakasu, 2. kalallawa/Gabai 3. Murfa-kalam.

From each of the three systematically sampled ward, sampled from the two strata (urban and rural), a total of 172 respondents were randomly selected for the interviews. A purposive random sampling technique was used for this study in the sense that the researcher administered questionnaires only to the family members specified by the community heads, as the information on the deceased could only be gotten from their siblings or households.

### **3.3 Data Analysis**

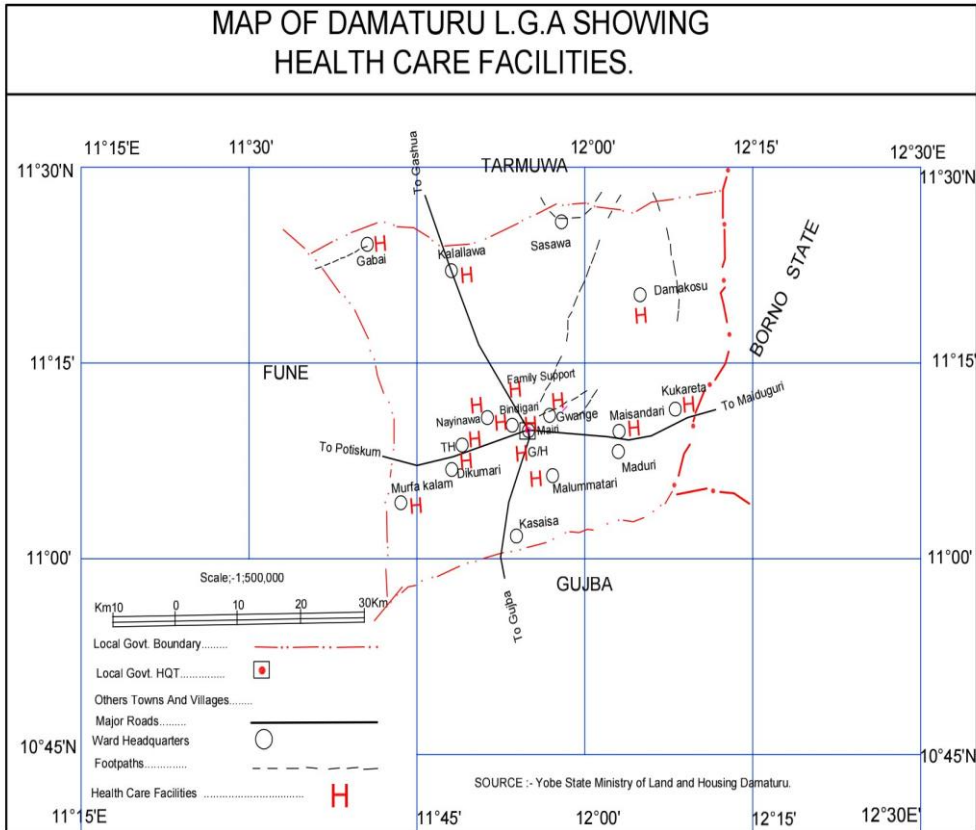
Data collected from the urban and rural political wards were sampled and manually coded, entered, cleared and analysed using excel and SPSS version 20 as platforms. In order to assess the selective importance of each predictor to the dependents variable (maternal mortality), by controlling the influence of the determinants, the following statistical techniques, using simple descriptive statistical tools such as mode and mean were used.

## **4.0 Results and Discussion**

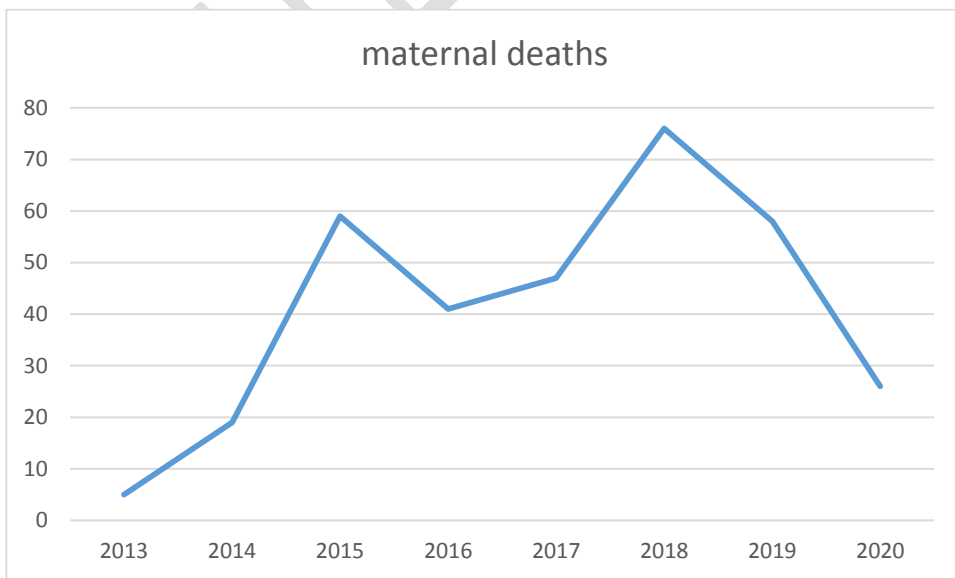
The community study was based on one hundred and seventy-two (172) records on maternal mortality in both urban and rural units of the study area from 2011 to 2020. The results were analyzed from the perspective of **distant** determinants (Socio-economic) and **intermediate** determinants (Reproductive status and health care seeking behavior). Thus, in order to address the objectives of this study, the results of the study are discussed in the following manner:

### **4.1 Trends of Maternal Mortality in the Study Area**

This section examines the spatial pattern of maternal mortality in the study area. Geography and Medical Geography in particular is concerned with the study of aerial differentiation and trend analysis and bar charts were used to show results of maternal deaths as well as the difference in maternal mortality ratio in the two healthcare facilities namely, State Specialist Hospital and Women and Children Hospital where most of maternal deaths were recorded, Figure 4.1 shows the hospitals in the study area.



**Fig. 4.1: Health Care Facilities in Damaturu LGA. 2020**  
*Source: GIS Lab. Dept. of Geography, Yobe state University, 2020*



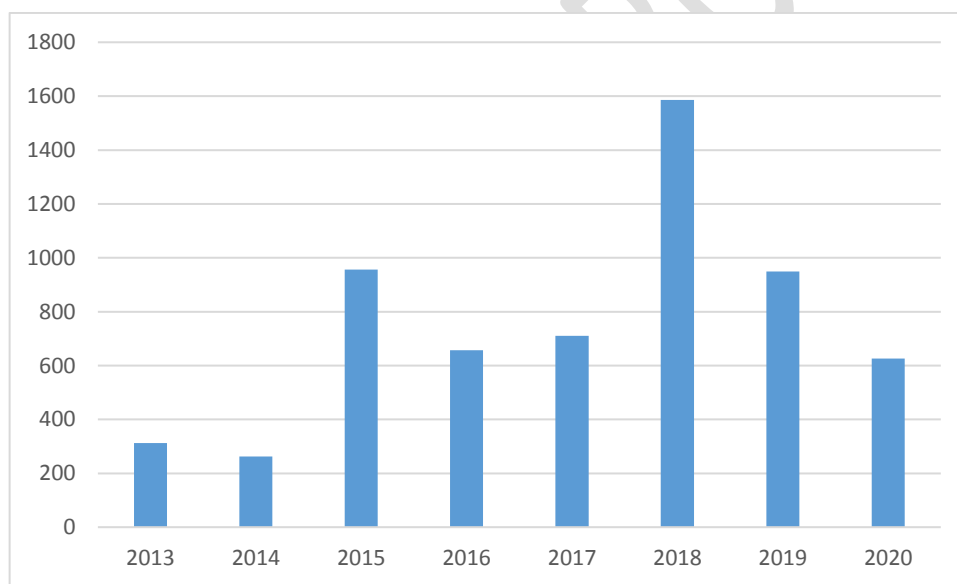
**Fig. 4.2: Combined Maternal Deaths of the Two Facilities from 2013 to 2020**  
*Source: Field Survey, 2020*

The trend analysis graph (Figure 4.2) shows maternal deaths as recorded by the two (2) healthcare facilities in the study area. It is evident from the graph that the years 2015 and 2018 recorded the highest maternal deaths, with a total number of 60 and 77 respectively. However, year 2013 and 2020 recorded less maternal deaths, with 5 and 25 deaths respectively.

**Table 4.1: Maternal Mortality for Referral Health Facilities from 2013-2020.**

S/N	Year	SSH DTR	CCH DTR	Total	MM Ratio
1.	2013		5	5	312
2.	2014	7	12	19	262
3.	2015	17	42	59	956
4.	2016	19	22	41	657
5.	2017	36	11	47	710
6.	2018	40	36	76	1,586
7.	2019	45	13	58	949
8.	2020	12	13	26	626
	Total	176	154	331	771

*Source: Field Survey, 2020*



**Figure 4.2: Maternal Mortality Ratio of the Two Facilities from 2013 to 2020**

*Source: Field Survey, 2020*

Table 4.1 above depicts the Maternal Mortality for Referral Health Facilities from 2013-2020.

The Maternal Mortality Ratios (MMRs) calculated are shown in figure 4.2. From the chart, 2015 and 2018 recorded the highest with mortality ratio of 956 and 1,586 per 100,000 live births respectively, 2013 and 2014 recorded the lowest with MMR values of 312 and 262 per 100,000 live births respectively. However, the rise in 2018 was almost twice as high as the rate of 2015. But since the peak recorded ratio in 2018, the values



reduced to almost half in 2019 and further decreased to 626 in 2020. The Maternal Mortality Ratio (MMR) at the Two Facilities from 2013 to 2020 is indicated in figure 4.2.

**Table 4.2: Maternal Mortality from 2011 to 2020.**

S/N	Urban Ward	Symbol	No of Maternal Mortality	Rural ward	Symbol	No of Maternal Mortality
1	Bindigari	BIN	18	Damakasu	DAM	47
2	Gwange	GW	11	Kalallawa	KAL	38
3	Maisandari/W Ibrahim	MAI	29	Murfa Kalam	MUR	29
	Total		58			114
	Grand Total					172

*Source: Field Survey, 2020*

**Table 4.3: Trends in Maternal Mortality in the Community**

Year	Urban		Rural		Total	
	F	%	F	%	F	%
2011	4	6.9	5	4.4	9	5.2
2012	8	13.8	10	8.8	18	10.5
2013	7	12.1	20	17.5	27	15.7
2014	9	15.5	19	16.6	28	16.2
2015	10	17.2	8	7.0	18	10.5
2016	1	1.7	5	4.4	6	3.4
2017	3	5.2	4	3.5	7	4.1
2018	8	13.8	15	13.2	23	13.4
2019	6	10.4	18	15.8	24	14.0
2020	2	3.2	10	8.8	12	7.0
Total	58	100	114	100	172	100

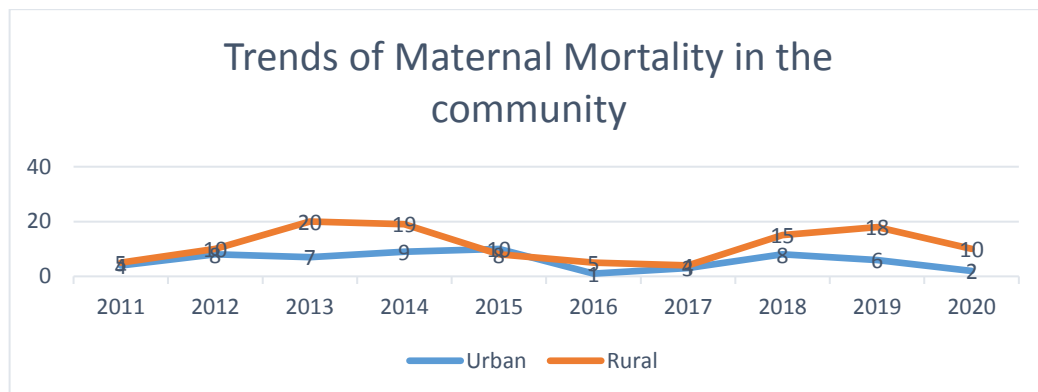
*Source: Field Survey, 2020*

The trend shows maternal mortality occurred in the communities of the study area. Table 4.2 shows that, years 2014, 2013, 2018 and 2019 recorded the highest maternal deaths, with a total percentage of 16.2, 15.7, 14.0 and 13.4 respectively. However, in 2016 and 2017, lowest maternal mortality, of 3.4 and 4.1 percent respectively were recorded.

## 4.2 Trends of Maternal Mortality

From the interview, it was revealed that the causes of high hospital deaths in the year 2015 and 2018 was because of complications like, Postpartum Haemorrhage, Anaemia and eclampsia/HBP during pregnancy and after birth. The ignorance on the importance of Ante-natal care (ANC) also contributed to the high death rate in the hospital, as most of the deceased only visited the health care facilities between 1 to 3 times. As such, those in the urban areas were more patronizing more than their counterparts in the rural areas, as majority of emergency complications are those from the rural localities. The following causes of maternal mortality was also revealed from the interview: the unavailability, inadequacy of drugs, and inadequacy of delivery items, bleeding before coming to the hospital, delay in accessing health service, over stressing of the health facility, and as such, most of the patients can't afford to buy expensive drugs". Also lack of modern equipment

and well skilled birth attendance, and displacement of people from insurgency contributed to the high number of deaths. Figure 4.2 shows the trends of maternal mortality in the study area.



**Fig. 4.2: Trends Analysis. 2011-2020**

*Source: Field Survey, 2020*

### 4.3 Causes of Maternal Mortality in the Study Area

Generally, the cause and effect analysis develops from the assumption that previous causes can explain observed phenomena. Since the causal relationship is not a simple device, hence it demands the usage of some kind of statistical techniques or factor analyses. This study used statistical techniques to arrive at some of the results. Table 4.3 depicts the different causes of maternal mortality along with their respective magnitudes. Postpartum Haemorrhage is almost half of the total.

Thus, Table 4.4 above shows that the direct causes of Maternal Mortality in the urban political wards are Postpartum Haemorrhage 24 (41%), Anaemia 12 (20%) and eclampsia/HBP 9 (15%). In the rural wards, deaths from Postpartum Haemorrhage was recorded to be 54 (45%) with 24 (41%), eclampsia/HBP deaths was 22 (18%) and Anaemia deaths was 15 (16%). As such, deaths from Malaria and HIV AIDS which constitute the major indirect causes were not much. The results presented above correlate with the studies of Amoniyi (2008) and (WHO) 2019 which indicated that 70% of the world maternal deaths were attributed to direct causes of Haemorrhage, hypertension, sepsis, and eclampsia.

**Table 4.4: Causes of Maternal Mortality**

VARIABLES	Direct	URBAN			Σ	%	RURAL			Σ	%
		BIN	GW	MAI			DAM	KAL	MUR		
<b>Causes of deaths</b>											
	PPH	7	7	10	24	41.4	17	17	20	54	45.4
	Eclampsia and HBP	3	2	4	9	15.5	10	8	4	22	18.0
	Sepsis	0	0	2	2	3.5	3	1	0	4	3.5
	Anemia	5	1	6	12	20.7	7	5	3	15	16.3
	<b>Indirect</b>										
	Malaria	2	1	2	5	8.6	5	3	2	10	8.7
	HIV	0	0	1	1	1.7	0	2	0	2	1.7
	Unknown	1	0	4	5	8.6	5	2	0	7	6.4
	<b>Total</b>	18	11	29	58	100	47	38	29	114	100

*Source: Field Survey, 2020*

#### 4.4 Causes of Maternal Mortality

Results from this study showed that postpartum haemorrhage and eclampsia were the most prominent causes of maternal mortality, while studies carried out in Southern part of Nigeria found that haemorrhage and abortion were the leading causes of maternal mortality (Omo-Aghoja, 2008). Studies conducted in North Western zone of Jigawa state are in agreement with this study's outcome that, postpartum haemorrhage, eclampsia and hypertension in pregnancy were the leading causes among pregnant women (Abdulkadir, 2017). It is important to delve into the health belief model prevalent among women in this region of the world in order to understand the non-biologic pathway that makes postpartum haemorrhage and eclampsia the most common cause of deaths. While postpartum haemorrhage is caused by delay in seeking health services within the early stage of the complication. Pregnant women affected by eclamptic fit are believed to be possessed by evil spirit Aremu, lawoke & Dalal, 2011 that have gained access into the body system of the patients, since such ailments are generally considered to be beyond the realm of modern therapy, the expertise of traditional birth attendant are sought first and foremost to exorcize the evil spirits and care the affected mother. Such a situation in considerable delay in seeking modern obstetric care. Furthermore, delay in seeking and receiving obstetric care in general, has been identified as the major pre dispensing factor in the cause of maternal mortality in the developing countries (WHO, 2016b).

The four direct causes and the two indirect causes identified in the study (PPH, eclampsia, sepsis, malaria and HIV) are more similar with the findings of the most recent investigation conducted within the same socio cultural zone (kolo, Chutiyaami & Ibrahim, 2017) the facts that five of these obstetric complications match in both studies is strongly evidence that they constitute a constant threat to pregnant mothers. This study reveals that most mothers who had complications actually sought care at health facility or hospital. This is contrary to earlier studies from developing countries where most maternal mortality were reported to have occurred as result of care being received from traditional Birth Attendant (Harrison, 2009) In rural areas with presumably less available or access (transport) to health facility, more women died at home which is similar to studies in developing countries (Ronsman and Graham, 2006) which is contrary to this study.

#### 4.5 Summary of Findings

*Question 1:* What are the trends of Maternal Mortality from 2011 to 2020 in the study area?

The assessment of maternal mortality trends in the two health care facilities (State Specialist Hospital, and Women and Children Hospital) revealed that MMR was at its peak in 2018 and recorded a low ratio in 2013, but has since 2018 been decreasing until 2020. Also, assessment on maternal deaths was also at its peak in 2018 and also decreased in 2020.

*Question 2:* What are the causes of Maternal Mortality in the study area?

It was revealed from this study that **Direct** causes such as Postpartum Haemorrhage, Anaemia and eclampsia/HBP are the major causes of maternal mortality in the study area.

#### 5.0 Conclusion

This study has pointed that the community's knowledge of maternal mortality is fairly good. However, one must stress the importance of community mobilization and

advocacy as some community members are having poor knowledge of maternal mortality or having it with full of misconceptions. It is thus sad to discover that in the 21<sup>st</sup> century some families still visit TBAs during pregnancy. The findings of this study also show that maternal mortality remains a problem in the study area and reveal its levels and determinants. Although there was increase in 2015 and 2018, its occurrence has been reducing since 2018. Despite the reduction, it was concluded that Damaturu LGA is still far from reaching its target of reducing maternal mortalities in spite of the advances and progress made over the years. Therefore, Government, Non – Governmental Organizations (NGOs) and Philanthropists should help in providing modern equipment, recruitment of more staff and enhancing primary health care services. Thus, since almost all the health personals mentioned one or more implications of maternal deaths in their facilities, these identified implications can be utilized to intensify campaigns on reducing maternal mortalities and morbidities. Emphasis on these implications will surely convince husbands that have over-whelming control on the women's activities and minds, to allow their wives to attend antenatal care services regularly.

## **6.0 Recommendations**

- I. The Ministry of Health and the other relevant stakeholders need to target younger married mothers more compared to single mothers on pregnancy matters to reduce the high numbers of mortalities in pregnancy amongst them. Also the same should be applied to the mothers at older age as they are associated with high likelihood of maternal mortality. In order to tackle this problem head-on, governmental and non-government bodies should intensify the conduction of campaigns especially in the rural area. Also, health workers should be involved in house-to-house sensitization and mobilization of pregnant women for antenatal care. In order to implement this, the government needs to finance the training and increase the numbers of community healthcare workers in the study area and other rural areas in the country. The importance of these officials cannot be contested as they serve as they link between pregnant women and the healthcare systems. Additionally, community heads should be engaged by the Federal Ministry of Health, as they can encourage their people (especially the Kanuri's with the highest rate of maternal mortality) on the use of skilled-birth professionals.
2. There should be continuous education to enhance knowledge and deter the people on the effect of the interpretation of happenings around them to the mechanization of witches and wizards and the operations of the gods to encourage the utilization of orthodox health facilities. This dissertation echoed the effect of education on maternal mortality. Nevertheless, most of the deceased victims had no/limited educational qualification. However, there is need for the Nigerian Government to implement fresh schemes to facilitate the attendance of women in schools, especially in the Northern region. Such schemes could comprise improved retention strategies of teachers as well as incentives. For example, incentives should be awarded to teachers who accepts tutoring posts in the Northern parts of the country.

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