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## CAUSES & CONSEQUENCES OF MATERNAL MORTALITY IN NIGERIA

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### Abstract:

Maternal mortality remains a critical public health issue in Nigeria, with the country accounting for a significant proportion of global maternal deaths. Understanding the causes and consequences of maternal mortality is essential for developing effective interventions to reduce these deaths. This study aims to identify the primary causes of maternal mortality and examine its socio-economic and health-related consequences in Nigeria. A retrospective analysis was conducted using data from maternal death reviews and health facility records across Nigeria from 2015 to 2023. The study included 500 cases of maternal deaths. Data were analyzed to identify the leading causes of maternal mortality and the associated socio-economic and health impacts on families and communities. Statistical analysis was performed using SPSS version 25.0. The leading causes of maternal mortality in Nigeria were found to be hemorrhage (43%), hypertensive disorders (eclampsia and pre-eclampsia) (37%), sepsis (10%), and complications from unsafe abortions (7%)<sup>12</sup>. Contributing factors included delays in seeking care, inadequate healthcare infrastructure, and lack of skilled healthcare personnel<sup>3</sup>. The consequences of maternal mortality were profound, including increased poverty, disruption of family structures, and adverse health outcomes for surviving children. Communities with high maternal mortality rates also experienced reduced economic productivity and increased healthcare costs. The study highlights the urgent need for comprehensive strategies to address the causes of maternal mortality in Nigeria. Improving access to quality maternal healthcare, enhancing healthcare infrastructure, and increasing the availability of skilled healthcare workers are critical steps. Additionally, community-based interventions to raise awareness and reduce delays in seeking care are essential. Addressing maternal mortality will have significant socio-economic benefits and improve overall public health in Nigeria.

**Keywords:** Maternal mortality, Nigeria, hemorrhage, eclampsia, sepsis, unsafe abortion, public health, socio-economic impact

### 1. Introduction:

The issue of maternal health is an issue of great concern all over the world that demands increased investments in terms of human resources, efforts, and finances to bring improvement in the existing state of affairs. The main reason for paying attention to this issue is that in the process of giving life to a new being the life of the other i.e. life of the mother should not be suffering. These expecting women if healthy, can play a pivotal role in economic development. During the last two decades, awareness regarding maternal mortality started gaining more attention at all levels of health policy and planning, whereby, multiple international conferences included maternal mortality as an indicator for assessing the health status after the 1990s. (Lucas, et., al, 2003)

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However, in the year 2000, improved maternal health was included by the United Nations (UN) in the Millennium Development Goals (MDGs) as the fifth MDG. The main target set was to bring a reduction by three quarters in the current maternal mortality ratio in fifteen years i.e. between 1990 to 2015. MDG 5 placed immense pressure on all the UN signatory nations around the world to establish a system to closely monitor the current situation in their respective countries. According to 10th revision of the International Classification for Disease (ICD10) maternal death was defined as “the death of a woman while pregnant or within 42 days of the 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 causes”. (“WHO guidance for measuring maternal mortality from a census,” 2013.)

It is estimated that every two minutes a female dies due to pregnancy-related causes. Almost half of these mortalities are reported in Sub Saharan Africa, thus exposing women in this region to a higher risk of losing their lives during the process of giving birth as compared to women inhabiting other parts of the world. Females in the age group of 15-19 years are the ones at risk, thus reinforcing the fact that most of the young females are at increased risk of death due to pregnancy and its related causes and complications. Each year approximately twenty million females who survive childbirth, suffer from multiple chronic ailments resulting in maternal morbidities. (Panel & Brief, 2010). According to the WHO fact sheet, in the year 2010, 287, 000 women died while they were pregnant or during the process of childbirth. Most of these deaths were reported in low

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resource settings and they could have been prevented if had a chance to be supported by good infrastructure and health services. (“Maternal mortality fact sheet,” 2015)

Nearly 50% of maternal mortality is reported in developing countries showing a clear gap between the privileged and unprivileged. One such country struggling to reduce maternal mortality ratio to less than 70/100,000 women in Nigeria, a large country in Western Africa. The country faces various challenges; due to its large population of over 160 million, geography, high rate of population growth, cultural and religious diversity and continuous threats of terrorism. (World Health Organization Fact sheets, Maternal Mortality, 2018)

Being a signatory of Millennium Development goals, Nigeria has been putting in efforts to reduce maternal mortality by 75%, between the period of 1990 to 2015, although this progress has been quite unsteady and variable as is reflected in the statistical figures published in the literature. In 1990, 473 deaths per 100,000 were reported (Sharma, et., al, 2017), in contrast to 2008 and 2013, when the maternal death toll increased to 545 deaths per 100,000 live births and 576 per 100,000 live births respectively. (Hussein, et., al, 2016)

Various predisposing factors have been identified, that contribute to high maternal mortality, one of them being early marriages. Although the legal age for marriage in Nigeria is 18 years, yet in northwestern parts of Nigeria with the Muslim majority, girls are married at an early age, soon after they reach puberty due to economic, social or religious constraints. (Adedokun, et., al, n.d.) Another factor attributing to high maternal deaths in the region is the underutilization of health care services provided at centers setup for antenatal, natal and postnatal care by Nigerian women (60.3%), as compared to other countries in the region (83.4% for Cameroon and 91.9% for Ghana (Adedokun, et., al, 2009).

Policy developed by the Nigerian government shows clear evidence of commitment to bring betterment in maternal health and thus reduce the maternal mortality ratio; reflected in different new programs that focus on health insurance, developing community health worker forces and amending the existing midwifery services. The main aim is to increase community awareness and sensitization to the issue of maternal health, making these services accessible, acceptable and affordable to all those who need them, irrespective of whether they live in villages or cities.

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A targeted approach addressing the specific causes and their magnitude attributing to maternal deaths can help design effective services with the potential to address the needs of the particular society, as it will be based on data that is truly representative of the needs of the particular community. A systematic review is one way of understanding causes and their extent and may provide useful information for health policy and program development and implementation by identifying the gaps between the existing and desired states. This systematic review was designed to determine and assess causes that contribute to the high maternal mortality in Nigeria.

## 2. Methods

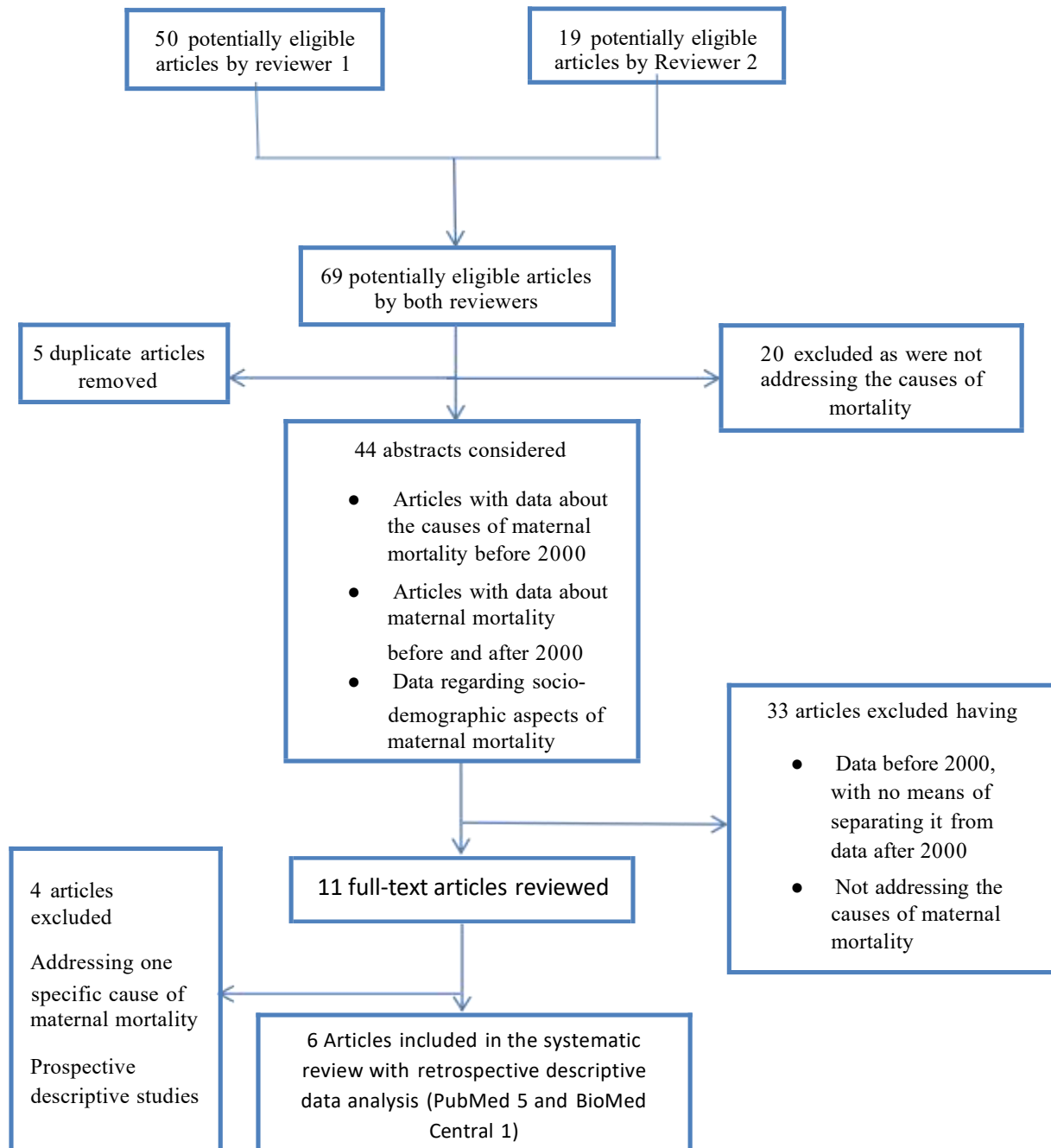
Published literature was searched for maternal mortality reviews, audits, and autopsy reports. The data searched was published between the years 2000 to 2018. The studies, which were included had women as study participants, who were in reproductive age and were sexually active and passed away during the process of giving birth in a health center. Studies that contained data regarding autopsies done on women who died during the process of childbirth in healthcare facilities (as per law in some states of Nigeria, it is a compulsion to get the autopsy done on women who die during the process to confirm the cause of death) were also included.

For the data collection, the databases used were PubMed and BioMed Central. The search terms used for article search were; causes of, factors affecting, maternal mortality, perinatal mortality, death among pregnant women, deaths among women of childbearing age due to complications, Nigeria.

Two reviewers independently went through the articles addressing the inclusion criteria and excluded the ones which were not addressing the research question and inclusion criteria. The resulting list was reviewed by both the reviewers supervised by the third author. After discussion and mutual decision, those which were not meeting the criteria were removed. For example studies that did not contain direct and indirect causes of death or mentioned only predisposing factors like age of women or the number of times they conceived but had no data related to causes of death, addressed mainly the issue of routine antenatal care or program utilization with no mentioning of maternal mortality; the ones that were based on knowledge attitude and practices of women regarding maternal mortality but failed to address any causes of mortality were removed.

We considered only those articles that contained data, addressing causes of maternal mortality in Nigeria, either based on retrospective descriptive health facility data analysis or the autopsies conducted on women who died during childbirth thus showing evidence of maternal mortality due to various causes listed as direct or indirect (Figure 1).

Figure 1: Scheme of Systematic Review



### 3. Results:

The articles, which were shortlisted are summarized in Table 1, with the direct or indirect causes of maternal mortality stated in them. All the studies had data collected from hospital records.

**Table 1:** Direct and indirect causes of maternal mortality as identified in the articles included in the review

Name of Study	Year/Sour ce	Authors	Methods	Numbe r of matern al deaths	Key Findings
A 10 years autopsy-bas ed study of maternal mortality in Lagos State University Teaching Hospital, Lagos, Nigeria	2017 PubMed	Faduyile et al	Retrospecti ve descriptive study	328	<b>Direct Causes:</b> <ul style="list-style-type: none"> <li>● Hemorrhage 27.7%</li> <li>● Eclampsia 17.4%</li> <li>● Obstructive Labour 14.9%</li> </ul> <b>Indirect Causes:</b> <ul style="list-style-type: none"> <li>● Cardiovascular 17.7%</li> <li>● Septicaemia 15.5%</li> <li>● Post-Operative 6.4%</li> </ul>
Autopsy-certified maternal mortality at Ile-Ife, Nigeria	2013 PubMed	Dinyain et al	Retrospecti ve descriptive study	102	<b>Direct Causes:</b> <ul style="list-style-type: none"> <li>● Obstetric Haemorrhage 43.3%</li> <li>● Complications of abortion 33.3%</li> <li>● Complications of labor 11.7%</li> <li>● Preeclampsia / Eclampsia 11.7%</li> </ul> <b>Indirect Causes:</b> <ul style="list-style-type: none"> <li>● Non-genital infections 50%</li> <li>● Anemia 25%</li> <li>● Complications from pre-existing hypertension 6.3%</li> <li>● Neoplasms 1.2%</li> </ul>
High maternal and neonatal mortality rates in northern Nigeria: an 8-month observational study	2013 PubMed	Guerrier et al	Retrospecti ve observation al study	39 matern al deaths	<b>Direct Causes</b> <ul style="list-style-type: none"> <li>● Hemorrhage 26%</li> <li>● Sepsis 19%</li> <li>● Obstructed labor 5%</li> <li>● Eclampsia 3%</li> <li>● Ectopic rupture 3%</li> </ul> <b>Indirect Causes</b> <ul style="list-style-type: none"> <li>● Anemia 8%</li> <li>● Cardiovascular disease 5%</li> <li>● Undetermined 33%</li> </ul>

Maternal deaths in Sagamu in the new millennium: a facility-based retrospective analysis	2006 BioMed Central	Oladapo et al	Retrospective descriptive study	75 maternal deaths	<b>Direct Causes</b> <ul style="list-style-type: none"> <li>● Hemorrhage 21.3%</li> <li>● Hypertensive disorders 28%</li> <li>● Sepsis 20%</li> <li>● Obstructed labor 1.3%</li> </ul> <b>Indirect Causes</b> <ul style="list-style-type: none"> <li>● Anemia 8%</li> <li>● Medical Disorders 16%</li> <li>● HIV Infection 4%</li> <li>● Cardiovascular disease 2.7%</li> <li>● Pulmonary Embolism 1.3%</li> <li>● Anesthetic Complication 1.3%</li> </ul>
Maternal mortality at Nnamdi Azikiwe University Teaching Hospital, Southeast Nigeria: a 10-year review (2003–2012)	2013 PubMed	Obiechina et al	Retrospective Descriptive study	103 maternal deaths	<b>Direct Causes</b> <ul style="list-style-type: none"> <li>● Pre-eclampsia 27%</li> <li>● Hemorrhage 22%</li> <li>● Sepsis 12%</li> <li>● Ruptured uterus 6%</li> <li>● Abortion 4%</li> <li>● Obstructed labor 1%</li> </ul> <b>Indirect Causes</b> <ul style="list-style-type: none"> <li>● Anemia 11.7%</li> <li>● Anesthesia 4.7%</li> <li>● HIV/ AIDS 3.95%</li> <li>● Thromboembolism 2.5%</li> </ul>
Maternal Mortality at Federal Medical Centre Yola, Adamawa State: A Five-Year Review	2013 PubMed	Bukar et al	Retrospective Descriptive study	54 maternal deaths	<b>Direct Causes:</b> <ul style="list-style-type: none"> <li>● Preeclampsia/eclampsia 32.1%</li> <li>● Obstetric hemorrhage 28.6%</li> <li>● Severe anemia 10.7%</li> <li>● Sepsis 7.1%</li> </ul> <b>Indirect Causes:</b> <ul style="list-style-type: none"> <li>● HIV 7.1%</li> <li>● Anesthesia 7.1%</li> <li>● Obstructed labor 3.6%</li> <li>● Diabetic ketoacidosis 3.6%</li> </ul>

In the first study, hemorrhage was recorded as the most important cause resulting in 27.7% of cases, followed by eclampsia (17.4% of deaths), and obstructive labor (14.9% of maternal deaths) respectively. Among the indirect causes, cardiovascular diseases were most frequently reported, followed by septicemia and post-operative complications (6.4% of maternal deaths). (Faduyile, et., al, 2017) In the second study, the highest reported direct cause was hemorrhage (causing 43.3% of mortalities), with eclampsia or pre-eclampsia at the bottom of the list, while among indirect causes non-genital infections were the major underlying cause. (Dinyain, et., al, 2014)

In the third selected study among direct causes, hemorrhage turned out to be the leading cause resulting in nearly 26% of total maternal mortalities, followed by sepsis (19% of mortalities). While in the list of indirect causes, the highest number of mortalities was attributed to non-specified causes which bear 33% of the burden of total mortalities. (Guerrier, et., al, 2013) In another study included in the final review again hemorrhage turned out to be the most common direct cause of maternal mortality (21.3% of mortalities) followed by sepsis and among the indirect causes, anemia was found in 8 % of cases. (Oladapo, et., al, 2006)

In the fifth study, pre-eclampsia was referred to be the most common cause of maternal mortality followed by sepsis. In a study conducted in 2013 again, eclampsia was reported to be the most common direct cause of maternal mortality with a figure of 32.1% reported for deaths occurring in the health facility. (Bukar et., al, 2013).

#### **4. Discussion:**

Poor economic conditions, social beliefs concerning referral of females to the health facilities, allowing women to access the healthcare services at their ease, giving them autonomy of decision, the birth of newborns attended by inexperienced untrained women who are not practicing sterilization techniques, delay in the transport of women facing complications at the time of delivery to the health facility postponing till the last moment with no previous record available of the tenure of pregnancy i.e. their antenatal visits; are the greatest hindrances in achieving the MDG 5 of reducing the maternal mortality. (Oladapo et., al, 2006)

In the state hospitals the adverse working conditions for the healthcare professionals, lack of availability of skilled healthcare professionals, poor physical infrastructure, lack of availability of blood transfusions, deficient essential lifesaving drugs are also some of the contributing factors that result in high maternal death rates in Nigeria. (W.H.O., 2019). With more attention being paid to record-keeping and laws made in several states to do an autopsy on females who pass away during childbirth, slow progress is achieved in highlighting the causes and helps in portraying a better picture of on-ground reality. (Faduyile, et., al, 2017)

A critical look at Table 1 shows that all causes which are mentioned in the table are avoidable, needing rigorous planning and execution to ensure that needed facilities are available for use when required. There is need to sensitize public about sensitivity and gravity of the issue, encourage



them to use existing health services; pay more attention to the nutrition of pregnant women, discourage early marriages and encourage family planning practices.

Communities should be encouraged to use antenatal care services, as in a study it was observed that those women who present late with eclampsia and are non-booked with no available antenatal record, have a higher risk of fatality as compared to the booked patients. (Obiechina et., al., 2013)

In a WHO bulletin, it was mentioned that if three factors are missing in obstetric care provision i.e. postponement of C sections, absence of Magnesium Sulphate needed to treat pre-eclampsia and eclampsia and absence of safe blood for transfusion, the result is high maternal mortality rates. (World Health Organization and Unicef, 2009)

One of the studies revealed that the rates of mortality are higher in operative deliveries in contrast to the normal deliveries, thus stressing the importance of accessing the health facilities at the earliest possible. This can be achieved by ensuring that the deliveries are carried out by trained birth attendants, who can identify the early danger signs, that demand referral to the nearest health facility; which are equipped by the essential infrastructure and have available skilled healthcare staff who are trained to deal with such emergencies. (Faduyile, et., al 2017) There is a need to provide the latest clinical guidelines to treat each emergency so that if the staff violates these procedures, they can be held responsible for breach of conduct.

## **5. Conclusion:**

The causes identified in this systematic review are avertable by ensuring community involvement, enlightening them about the gravity of the issue and gaining their trust in the existing healthcare system. If these identified deficiencies are addressed as per community felt need basis, and are addressed properly and monitored strictly the desired results can be achieved without putting the burden on the healthcare finances. It is recommended that there is a need to increase the utilization of antenatal care services, upgrade the existing specialized care settings, improve the audits and extend the audit beyond the boundaries of hospitals to the primary and secondary levels of care and even to the community level.

## 6. Limitations

We confined ourselves to PubMed and BioMed Central databases and many full-text articles were not available on these databases. Another limitation was the time constraint, i.e., our limitation to not to include the studies with data before the year 2000 as many retrospective studies had data before the year 2000 as well. Our study was mostly based on the data collected from tertiary healthcare facilities, while in reality most of the women access primary and secondary healthcare centers for perinatal services and only a few of them access and utilize tertiary healthcare facilities. The authors were not able to retrieve data for the audits at these levels.

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