

**SIERRA LEONE REDUCING MATERNAL MORTALITY IN THE LAST SIX YEARS, 2016 – 2021:  
A SECONDARY DATA ANALYSIS ON MATERNAL DEATH SURVEILLANCE AND RESPONSE  
SYSTEM**

Zainab JuhehBah<sup>1,2</sup> Amara Alhaji Sheriff<sup>1,2,3</sup> Kassim Kamara<sup>2</sup>, Adel Hussein Elduma<sup>1,3</sup> Solomon Aiah Sogbeh<sup>1,3</sup> Umaru Sesay<sup>2,3</sup> Musu Cole<sup>2</sup> Tom Sesay<sup>2</sup> Gebrekrestos Negash Gebru<sup>1,3</sup>

Affiliations:

1. Sierra Leone Field Epidemiology Training Program, Freetown, Sierra Leone
2. Ministry of Health, Freetown, Sierra Leone
3. African Field Epidemiology Network, Freetown, Sierra Leone

**Corresponding Author:** Zainab JuhehBah Email:

**ABSTRACT**

Globally, Sierra Leone is among the countries with a high maternal mortality ratio (MMR) at 717 per 100,000 live births (DHS 2019). Since then, anecdotal reports show a rapid decline in the MMR. This study to determine the magnitude and trend of maternal deaths, to describe maternal deaths by person, place, and time, and to identify the leading cause (s) of maternal deaths in Sierra Leone. A retrospective descriptive analysis was conducted using data from 2016 – 2021 extracted from the National Electronic MDSR line-listing System database. We analyzed key variables including age, place and time of death, gravidity, and cause of death. We calculated frequencies, proportions, and ratios using Microsoft Excel. Overall, 3,491 maternal deaths were recorded out of 1,312,951 live births during the study period, with an average MMR of 266 deaths per 100,000 live births ranging from 319 per 100,000 live births in 2016 to 255 per 100,000 live births in 2021. The median age of decedent mothers was 27 years (range: 12 to 50 years). The age group 25-34 years accounted for almost half, 45% (1,552/3,491), of the deaths. The deaths were more common in multi-gravida women with 41% (1,353/3,491) of the total deaths. Of the total maternal deaths, 79% (2,767/3,491) occurred at health facilities of these, 75% (2,065/2,767) were from referral hospitals. Hemorrhage was reported the leading cause of maternal deaths at 43% (1,489/3,491), followed by hypertensive disorder at 17% (577/3,491), indirect causes at 13% (437/3,491), and the least was from abortion/ectopic 3% (97/3,491).

There was a decline in maternal death from 2016 to 2021. Hemorrhage was the leading cause of maternal death. We recommend the Ministry of Health implement targeted strategies on hemorrhage prevention and control for further reduction of maternal mortality in Sierra Leone.

**Keywords:** Maternal Death Surveillance Data Analysis, Sierra Leone, 2016 - 2021.

## INTRODUCTION

Maternal mortality is unacceptably high among pregnant women and those who have recently given birth are at risk for increased mortality (Kinney *et al.*, 2021). Mothers continue to die before, during, and after childbirth from preventable conditions. Maternal Death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (Smith *et al.*, 2017). Maternal death is a key indicator that is widely accepted for assessing population health and socioeconomic development in many countries including Sierra Leone (Menéndez *et al.*, 2008). Maternal death is a serious health problem in resource-limited countries. Fortunately, the cause and risk factors are known and preventable. Reducing maternal mortality is an important international development goal, so health policy and interventions to significantly reduce it must be evidence-based (World Health Organization, 2018).

The world is currently off-track to meeting Sustainable Development Goal (SDG) 3.1 for reducing maternal deaths - suggesting urgent action is needed to improve the health and survival of women and babies. The SDGs target is to reduce the Maternal Death Ratio (MMR) to less than 70 per 100,000 live births globally and 140/per 100,000 live births in each country. Globally, maternal mortality has declined by more than a third from 2000 to 2017 (World Health Organization, 2024b). An

estimated 211 maternal deaths per 100,000 live births occur every year with 810 women dying daily from preventable pregnancy and childbirth causes (Dzomeku *et al.*, 2021). Four sub-regions roughly halved the MMRs Central Asia, Eastern Asia, Europe, and Northern Africa. Sub-Saharan Africa has the highest maternal mortality rate (MMR) among the top 10 countries, with South Sudan having the highest rate at 1,150 per 100,000 live births. Despite this, the region has seen a 33% reduction in MMR since 2000 (World Health Organization, 2023).

Sierra Leone has one of the highest maternal mortality ratios globally, with 717 deaths per 100,000 live births (DHS 2019). There has been a gradual decline in the maternal mortality ratio from 2000-2020 (443 per 100,000 live births) (World Health Organization, 2023). The Ministry of Health (MoH) has launched the Maternal Death Surveillance and Responses (MDSR) program in 2015 to reduce maternal deaths and report all maternal health issues (2015). The MDSR system investigates all suspected maternal deaths and understands possible factors associated with the cause of death (2015). Strategies for reducing maternal mortality include universal access to family planning services, quality antenatal care, skilled attendance at every birth, and prompt access to emergency obstetric care (2017). Access to antenatal care services will contribute to the prevention of maternal death, but the impact on reduction in maternal death depends on the quality of antenatal care provided like how well health workers screen for and manage complications like eclampsia or

pre-eclampsia, anaemia, malaria, and HIV infection.

The World Health Organization (WHO) recommends that pregnant women have at least eight antenatal care (ANC) visits with trained healthcare providers by 40 weeks of gestation. This was necessary because the previously proposed or recommended minimum of four ANC visits was considered insufficient to similarly improve maternal and infant survival. In Sierra Leone, the percentage of women receiving ANC from skilled providers increased from 87% in 2008 to 97% in 2013. Since MDSR was institutionalized in 2015 and reporting started in 2016, limited study and data analysis has been done for the past six years on the epidemiological distribution (person, place, and time) of maternal death, which will affect the planning activities of the program. Given the above, it is imperative to conduct data analysis on the MDSR system for six years in Sierra Leone. The objective of the study is to determine the magnitude and trend of maternal deaths, to describe maternal deaths by person, place, and time, and to identify the leading cause(s) of maternal deaths in Sierra Leone. This analysis will provide information that will guide the Ministry of Health on where to focus to help reduce the maternal mortality rate in the country.

## METHODS

### Study design

A retrospective descriptive analysis of MDSR data was conducted using secondary data collected from 2016 to 2021 in Sierra Leone.

### Study Area

The study was conducted in Sierra Leone, a country located on the west coast of Africa and bordered by Guinea, Liberia, and the Atlantic Ocean. The country is divided into five regions (Northwest, North East, South West, South East, and Western Area) with 16 districts in the country. The country has an estimated population of 8.13 million (2021), with 190 chiefdom and 1,443 health facilities divided into tertiary, secondary, and primary levels. The primary level is divided into peripheral units (PHUs) such as Community Health Centers (CHCs), Community Health Posts (CHPs), and Maternal and Child Health Posts (MCHPs). The study covers all maternal deaths that occurred in health facilities, communities and in transit.

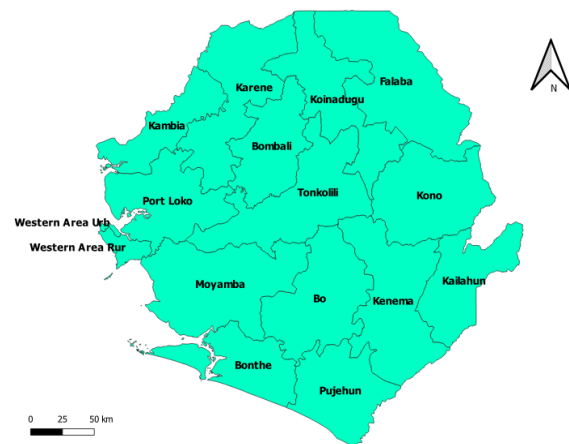


Figure 1: Sierra Leone map showing the sixteen districts (source: QGIS 3.12.2 software)

### Data collection

The maternal death data was captured through the Integrated Disease Surveillance and Response system in Sierra Leone. Six years

data, 2016 to 2021, were extracted from the national MDSR database and DHIS 2 in MS Excel 2016. The study included all maternal death cases from direct or indirect pregnancy-related causes reported nationally in all 16 districts during the study period. From 2016 to 2021, we compiled the nation's reported incidents of maternal deaths, which we then collated into an MS Excel 2016 database for program monitoring. Variables that were analyzed include maternal deaths against Birth (MMR), age, trend, mode of delivery, place of death (Facility, in-transit, and community), facility type (Government hospital, CHC, CHP, MCHP, Private hospital, and faith-base hospital), number of ANC visits, gravidity, cause of death (direct and indirect), and time of death.

**Eligibility criteria**

All reported maternal deaths were included in the study. However, we excluded maternal deaths with missing data for key variables such as age, parity, gravida, and number of ANC visits, among others.

**Data management and analysis**

Data privacy was ensured throughout the analysis period. Data was inputted, cleaned, and analyzed by using Microsoft Excel 2016. Data were analyzed by frequencies, proportion, median, and range and presented using tables, charts, and text.

**Ethical considerations**

Permission was obtained from the Ministry of Health (MoH) to use MDSR data. We

maintained the confidentiality of patient information by ensuring that personal identifiers were excluded from the data set before the analysis. The result of the analysis was only shared with authorized stakeholders and organizations.

**RESULTS**

Table 1: Maternal mortality notification, investigation, and review, Sierra Leone, 2016 to 2021

Variable	Frequency	Percentage
<b>Maternal deaths investigation</b>		
Investigated and reviewed	2948	84
Investigated and not reviewed	246	7
Not investigated and not reviewed	297	9

Notification		
Notified within 24 hours	2465	90
Notified within 48 hours	74	3
Notified within 72 hours	185	7

From 2016 to 2021, a total of 3,491 maternal deaths, and 1,312,951 live births were recorded nationally, given a maternal mortality ratio (MMR) of 266 deaths per 100,000 live births. Of the 3,491, maternal deaths, 2,948 (84%) were investigated and reviewed by district MDSR committees, 297 (9%) were not investigated and reviewed, and 246 (7%) were investigated but not reviewed. Also, 2,465 (90%), 74 (3%), and 185 (7%) were notified within 24hrs, 48hrs and 72hrs respectively. The median age of the deaths was 27 years with arrange between 12 and 50 years.

**Trends of maternal mortality ratio 2016-2021**

The highest MMR was recorded in 2016 with 319 deaths per100,000 live births and the lowest was in 2021 with 225 deaths per100,000 live births. There was a gradual MMR decrease from 2018 to 2021.

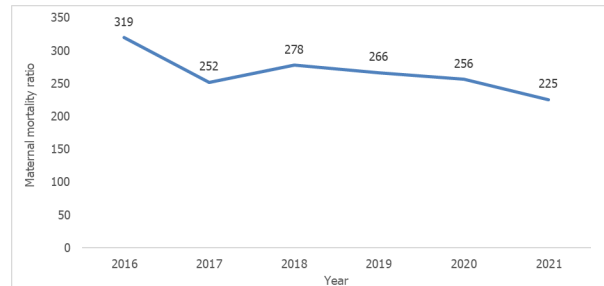
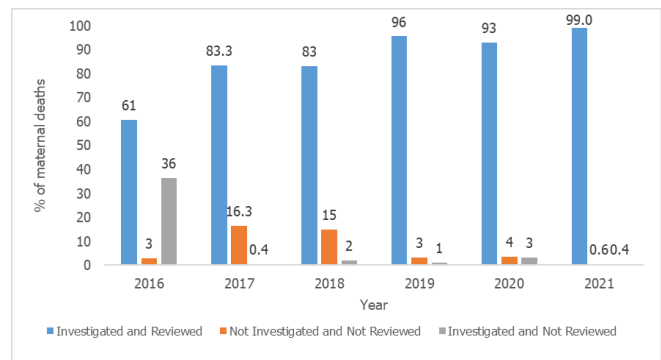


Figure 2: Trend of maternal mortality ratio, Sierra Leone, 2016-2021.

**Number of maternal deaths investigated and reviewed in Sierra Leone, 2016-2021**

From Figure 3 below, 2021 recorded the highest proportion of maternal deaths investigated and reviewed followed by 2019, with 99% (501/507) and 96% (557/581), respectively. The highest proportion of maternal deaths not investigated and not reviewed were recorded in 2017 and 2018 with 16% (88/551) and 15% (89/599), respectively.

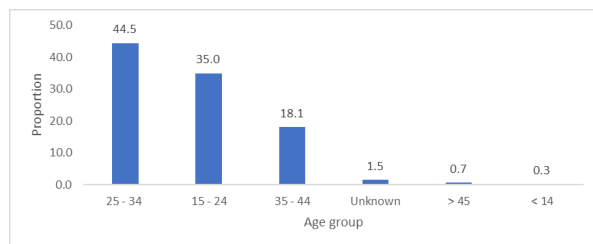


**Figure 3:** Proportion of maternal deaths investigated and reviewed in Sierra Leone, 2016-2021

**Maternal deaths by person, place and time in Sierra Leone, 2016-2021**

**Maternal deaths by Person (Age categories)**

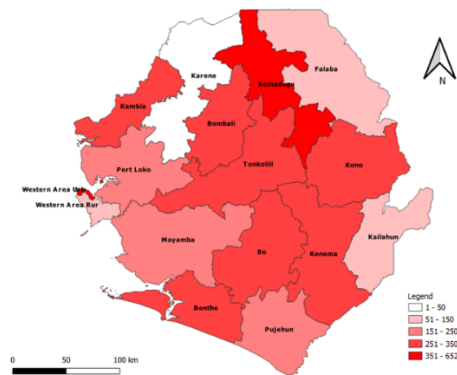
Of the 3491 maternal deaths reported, the majority, 44.5% (1552/3491) were among those ages 25-34 years while the lowest proportion was among those less than 14 years with 0.3% (10/3491).



**Figure 4:** Proportion of maternal deaths by age categories, Sierra Leone, 2016 – 2021

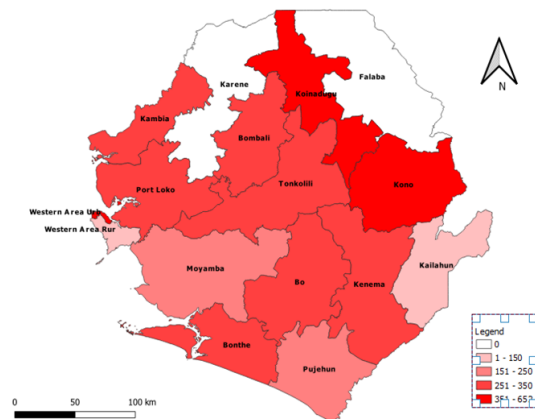
**Maternal deaths by Place (District)**

From 2016 – 2021, Koinadugu District recorded the highest MMR of 561 deaths per 100,000 live births, followed by Western Area Urban with an MMR of 423 deaths per 100,000 live births. The district with the lowest MMR was Karene with 37 deaths per 100,000 population (Figure 5).



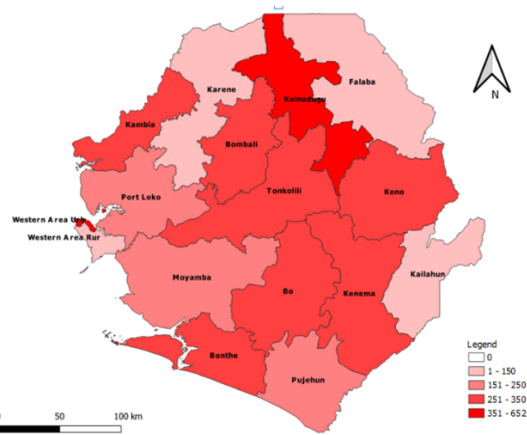
**Figure 5:** Maternal mortality ratio by districts, Sierra Leone, 2016 – 2021

From Figure 6 below, Koinadugu District recorded the highest MMR of 652 deaths per 100,000 live births followed by Western Area Urban with 479 deaths per 100,000 live births from 2016 to 2018. The lowest number of MMR was recorded in Karene and Falaba districts with zero MMR.



**Figure 6:** Maternal mortality ratio by districts, Sierra Leone, 2016 – 2018

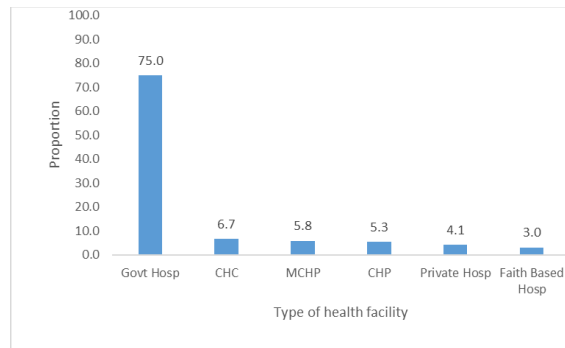
As shown in Figure 7 below, Koinadugu District recorded the highest MMR, followed by Western Area Urban with MMRs of 479 and 353 deaths per 100,000 live births from 2019 - 2021, respectively. Karene district recorded the lowest MMR for the period under review with 78 deaths per 100,000 live births.



**Figure 7:** Maternal mortality ratio by districts, Sierra Leone, 2019 - 2021

**Maternal deaths by Specific Health Facilities**

A total of 2767 maternal deaths occurred in health facilities. Of these, 75% (2065/2767) occurred in Government hospitals, and about 7% (190/2767) occurred in community health centers, and the lowest proportion, 3% (82/2767), occurred in faith-based facilities.



**Figure 8:** Proportion of maternal deaths by health facility level, Sierra Leone, 2016 - 2021

**Maternal Death by Cause and other factor in Sierra Leone, 2016-2021**

**Maternal death by cause**

Haemorrhage (this including, APH-, PPH, IPH, and rupture of the Uterus) accounted for 42% to 47% of all causes of death. In 2016 to 2021, hypertensive disorders (Eclampsia, Pre-eclampsia, and PIH) (5-16%), Other Obstetric complications (Obstructed Labor, Obstetric death of unspecified, Obstetric Embolism, Stroke/CVA, and Complication of anesthesia) accounted for 10% to 19%, Sepsis 10% to 20%, and Abortion/Ectopic pregnancy 3% to 11%). Indirect causes (HIV/AIDS, COVID-19, Sickle Cell, Malaria, and Tuberculosis) accounted for 5% to 11%) and undetermined /unknown causes accounted for 5%.

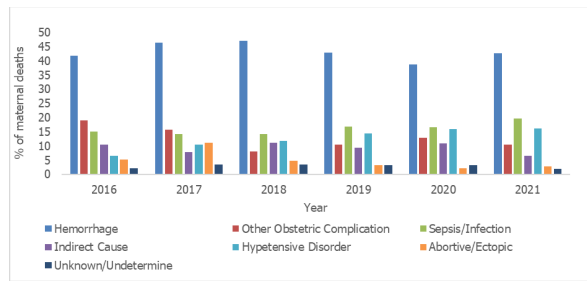


Figure 9: Causes of maternal deaths, Sierra Leone, 2016-2021

Maternal death by ANC visits

Of the 3491 maternal deaths recorded during the review of the obstetric history, the majority 71.9% of the women who died had attended a least 1- 4 ANC visits/contacts, while only 390 (13.9%) women had never attended any ANC. Those who attended ANC 5-8 accounted for 13.8%, and the least number of women who died, and attended 8 and more ANC accounted for 0.4% respectively.

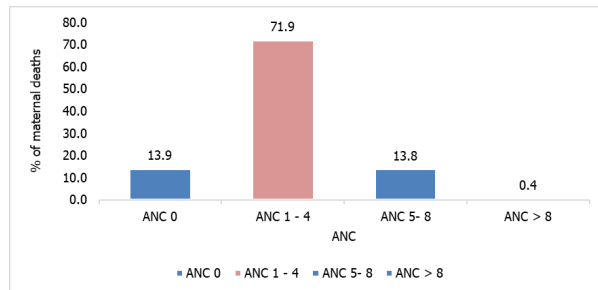


Figure 10: Maternal deaths by number of ANC visits, Sierra Leone, 2018 – 2021

Maternal death by Stage of deaths

To understand the causes of mortality and provide timely intervention, an analysis of maternal death by stage of pregnancy was performed. The majority of women died after delivery (2146, 66%), followed by during pregnancy (868, 27%) and during delivery (242, 7%).

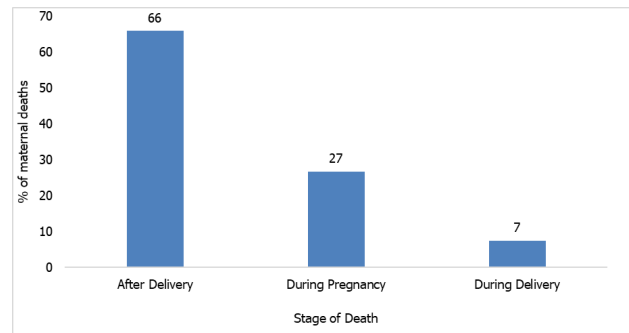
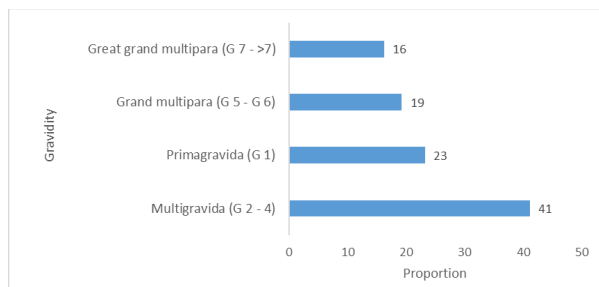


Figure 21: Maternal Deaths by Stage of Death, Sierra Leone, 20216-2021

Maternal death by gravidity

Figure 12 shows a summary of maternal deaths based on the gravidity. It is shown in . Out of 3,491 women with obstetric , 1,353 (41%) of the deaths, occurred in women between the gravida 2-4. The highest numbers of death, primigravida recorded the second highest with 766 (23%), followed by great grand multi-gravida with 534 (16%), indicating they had seven pregnancies.





**Figure 12:** Maternal deaths by gravidity, Sierra Leone, 2016 - 2021.

## DISCUSSIONS

This study assessed the trend and causes of maternal death at all levels (Communities, In Transit, and Facilities) over six years (2016-2021) in Sierra Leone.

This study found a high maternal mortality rate with 2016 recording the highest MMR of 319 deaths per 100,000 live births. There was a gradual decrease in the maternal mortality trend from 2018 to 2021. In 2021 the highest proportion of maternal deaths (investigated and reviewed) was reported, with 99% (557/581). A greater proportion of the deaths were among those aged 25 – 34 with 44.5% (1552/3491). Overall, the highest MMR was recorded in Koinadugu District with 561 deaths per 100,000 live births while three-fourths of the maternal deaths occurred in government hospitals. Hemorrhage was the leading cause of death, accounting for 42.7% of all maternal deaths while more than half of the deaths had attended between one to four ANC visits.

In the current study, the MMR of 423 per 100,000 live births from the MDSR analysis 2016-2021 was remarkably lower than the MMR of 717 per 100,000 live births reported

the 2019 SLDHS. This difference may be due to under-reporting in the MDSR system or it may reflect the true picture of maternal deaths. Even though the MMR is declining as shown in this study, the system is still not capturing all deaths which could mask the true picture of the maternal mortality. A study conducted in Guinea by Tamba M. Millimouna 2019 (Millimouno *et al.*, 2019) reported that MDs are grossly under-reported. The poor vital registration system in Sierra Leone continues to be a challenge and may have negatively impacted the validity of the MMR in MDSR over a 6 year period. Contrary to our findings, a study conducted in Nigeria by Joseph A. Olamijulo *et al.* reported a higher MMR compared to the estimated MMR by the WHO. This discrepancy could be attributed to over or under-reporting of MMRs (Olamijulo, Olorunfemi and Okunola, 2022).

Investigating and reviewing all maternal deaths are key national indicators of the MDSR system to provide information about the underlying contributing factors and how they can be tackled. By investigating a woman's death, MDSR inherently places value on her life, providing an important form of accountability for families and communities. The MDSR system provides essential information needed to stimulate and guide actions to prevent future maternal deaths and improve the measurement of maternal mortality, allowing for classification using the standard ICD 10 coding. However, not all maternal deaths were investigated and reviewed in this study, as the national target of 90% was not achieved in 2016-2018, while target was achieved in 2019-2021. A similar analysis conducted in Guinea by

Tamba M. Milimouno 2019 (Millimouno *et al.*, 2019) showed that not all maternal deaths were investigated and reviewed.

In our data analysis conducted the age range between 15-24 & 25-34 years accounted for the highest number of maternal deaths. A similar study conducted in Ethiopia by Biniam Getachew in 2020 (Getachew *et al.*, 2020) showed that women in the age group 30-34 years have a high maternal death. Other factors contributing to maternal death included the mode of delivery and gravidity. However, according to the WHO, the highest risk of maternal death is among adolescent girls under the age of 15 years, while complications from pregnancy and childbirth are high among adolescent girls aged 10 to 19 years (World Health Organization, 2024a).

Our analysis shows that Koinadugu followed by Western Area Urban have recorded the highest MMR compared to other districts in Sierra Leone. The differences in the reported MMR across districts could be due to varying reporting rates. Falaba and Karene started reporting maternal death data through the MDSR process in 2019. Karene recording the lowest MMR could be attributed to the district not have a main referral hospital, hence most of their cases are referred to Makeni Government Hospital.

Government hospitals have recorded the highest proportion of maternal deaths. The percentage of deliveries taking place at health facilities has increased over time, while there has been a significant decrease in deliveries occurring at home (Ministry of Health, Sierra Leone, 2019). The government facilities are where Comprehensive Emergency Obstetric

and Newborn Care (CEmONC) activities are carried out with all the eleven signal functions are performed. Therefore, it is common for most deaths to occur in the government hospitals. The faith-based facilities recording a low MMR could be a result of the low number of delivery cases they receive and the low attendance of pregnant women at clinics in those facilities. However, the high numbers of maternal deaths reported in the government hospital could be linked to late referrals by PHUs and issues around the quality of care even though there is no evidence of this during the study.

The leading cause of maternal deaths in this analysis was hemorrhage. Haemorrhage has been the leading cause of maternal death since Sierra Leone began publishing MDSR reports in 2016. Similar analysis conducted in Senegal and Mali have also shown that haemorrhage is the leading cause of maternal death (Tort *et al.*, 2015).

The findings of our analysis showed that, despite attending more than 8 ANC visit, pregnant women are still at risk of losing their lives. The majority of maternal deaths occurred during ANC visits 1-4. Also, when combining ANC visit 1 through more than nine, more women died compared to those who did not attend any ANC at all (referred to as ANC 0). Similar study conducted in Ghana (Ekholuenetale, Nzoputam and Barrow, 2021) as more maternal death occurred to women who attended ANC.

This study revealed interesting findings that stakeholders in the healthcare sector can learn from. The availability of essential drugs and supplies including equipped blood banks and

effective referral systems are critical for the reduction of maternal mortality. Attending five or more ANC visits could lead to good maternal delivery outcomes as shown by this study.

## STUDY LIMITATION

Our study has some limitations. Despite the large size of the data analysis, we did not have sufficient data to analysis and examine the association between maternal death and demographic status like marital status, educational background, religion, tribe, and other potential factors that may be associated with maternal death.

Despite these limitations, this study is valuable because it provides relevant information that can be used by the MOH to improve the MDSR system and focus on areas to reduce maternal mortality.

## CONCLUSION

We found a gradual decrease in MMR from 2016 to 2021, with Koinadugu and Western Area Urban recording higher MMR compared to other districts, while haemorrhage was identified as the leading cause of maternal death. Almost half of the maternal deaths were among women aged 25 to 34 years, Gravida 1, and those who had made four ANC visits or fewer. Women. Reduction of maternal mortality can be achieved by addressing factors that lead to maternal related haemorrhage in Sierra Leone.

## Recommendations

We recommend the RCHD and NCRA to collect data o women of childbearing age and to investingate suspected maternal deaths to have the true estimates of MMR. Also, the Directorate

of Hospital and Laboratory and DHMT to enforce activities in reducing factors leading haemorrhage such as ensuring functional blood banks, organizing blood donor drives, and requiring all pregnant women to bring suitable blood donors, to improve and maintain blood bank services in all hospitals.

DHMT/District Partners and hospital management staff should evaluate the quality of care providing during ANC visits at PHUs and hospitals through regular supportive supervision. All referral hospitals have to implement activities to reduce factors that lead to haemorrhage like functional blood banks, Blood donor drives, and ensuring that all pregnant women have suitable blood donors available in the case of emergencies. Therefore, it is important that a robust MDSR response include appropriate intervention targeting hospitals and PHUs.

Community leaders should support their Community Health Workers in referring pregnant women for regular ANC visits. They should also encourage households to provide blood donors in preparation for delivery and enforce bylaws on institutional delivery for all pregnant women.

## REFERENCES

Dzomeku, V.M. *et al.* (2021) 'Prevalence, progress, and social inequalities of home deliveries in Ghana from 2006 to 2018: insights from the multiple indicator cluster surveys', *BMC Pregnancy and Childbirth*, 21(1), p. 518. Available at: <https://doi.org/10.1186/s12884-021-03989-x>.

Ekholuenetale, M., Nzopotam, C.I. and Barrow, A. (2021) 'Prevalence and Socioeconomic Inequalities in Eight or More Antenatal Care Contacts in Ghana: Findings from 2019 Population-Based Data', *International Journal of Women's Health*, 13, pp. 349–360. Available at: <https://doi.org/10.2147/IJWH.S306302>.

Getachew, B. *et al.* (2020) 'Age, period and cohort analysis of age-specific maternal mortality trend in Ethiopia: A secondary analysis', *PloS One*, 15(1), p. e0224220. Available at: <https://doi.org/10.1371/journal.pone.0224220>.

Kinney, M.V. *et al.* (2021) 'Maternal and perinatal death surveillance and response in low- and middle-income countries: a scoping review of implementation factors', *Health Policy and Planning*, 36(6), pp. 955–973. Available at: <https://doi.org/10.1093/heapol/czab011>.

Menéndez, C. *et al.* (2008) 'A Randomized Placebo-Controlled Trial of Intermittent Preventive Treatment in Pregnant Women in the Context of Insecticide Treated Nets Delivered through the Antenatal Clinic', *PLOS ONE*, 3(4), p. e1934. Available at: <https://doi.org/10.1371/journal.pone.0001934>.

Millimouno, T.M. *et al.* (2019) 'Evaluation of the maternal deaths surveillance and response system at the health district level in Guinea in 2017 through digital communication tools', *Reproductive Health*, 16(1), p. 5. Available at: <https://doi.org/10.1186/s12978-019-0671-3>.

Ministry of Health, Sierra Leone (2019) *Demographic and Health Survey*.

MOH RCH Directorate (2015) 'National Technical Guideline 1st Edition, July 2015'.

MOH RCH Directorate (2017) 'Reproductive, Maternal, Neonatal, Child, Adolescent Health & Nutrition Strategy Sierra Leone'.

Olamijulo, J.A., Olorunfemi, G. and Okunola, H. (2022) 'Trends and causes of maternal death at the Lagos University teaching hospital, Lagos, Nigeria (2007–2019)', *BMC Pregnancy and Childbirth*, 22(1), p. 360. Available at: <https://doi.org/10.1186/s12884-022-04649-4>.

Smith, H. *et al.* (2017) 'Implementing Maternal Death Surveillance and Response in Kenya: Incremental Progress and Lessons Learned', *Global Health: Science and Practice*, 5(3), pp. 345–354. Available at: <https://doi.org/10.9745/GHSP-D-17-00130>.

Tort, J. *et al.* (2015) 'Factors associated with postpartum hemorrhage maternal death in

referral hospitals in Senegal and Mali: a cross-sectional epidemiological survey', *BMC pregnancy and childbirth*, 15, p. 235. Available at: <https://doi.org/10.1186/s12884-015-0669-y>.

World Health Organization (2018) *WHO recommendations on antenatal care for a positive pregnancy experience – Highlights and Key Messages*. Available at: <https://www.who.int/publications/i/item/WHO-RHR-18.02> (Accessed: 9 December 2024).

World Health Organization (2024a) *Adolescent pregnancy*. Available at: <https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy> (Accessed: 9 December 2024).

World Health Organization (2024b) *Maternal mortality*. Available at: <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality> (Accessed: 9 December 2024).

World Health Organization (2023) *Trends in maternal mortality 2000 to 2020: estimates by WHO, UNICEF, UNFPA, World Bank Group and UNDESA/Population Division*. Available at: <https://www.who.int/publications/i/item/9789240068759> (Accessed: 9 December 2024).

ANNEX

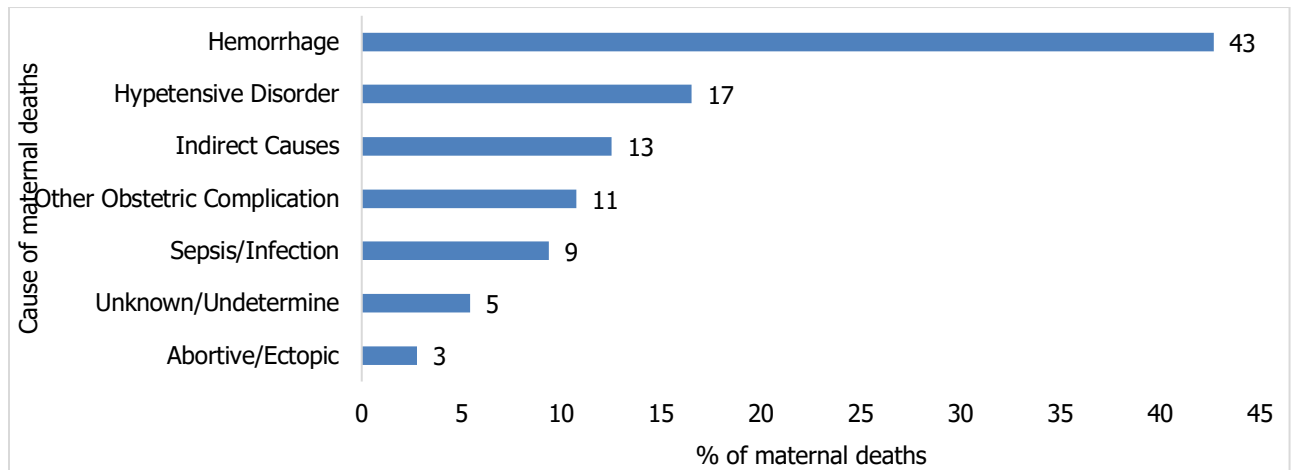


Figure 13: Maternal Death by Causes, Sierra Leone, 2016-2021

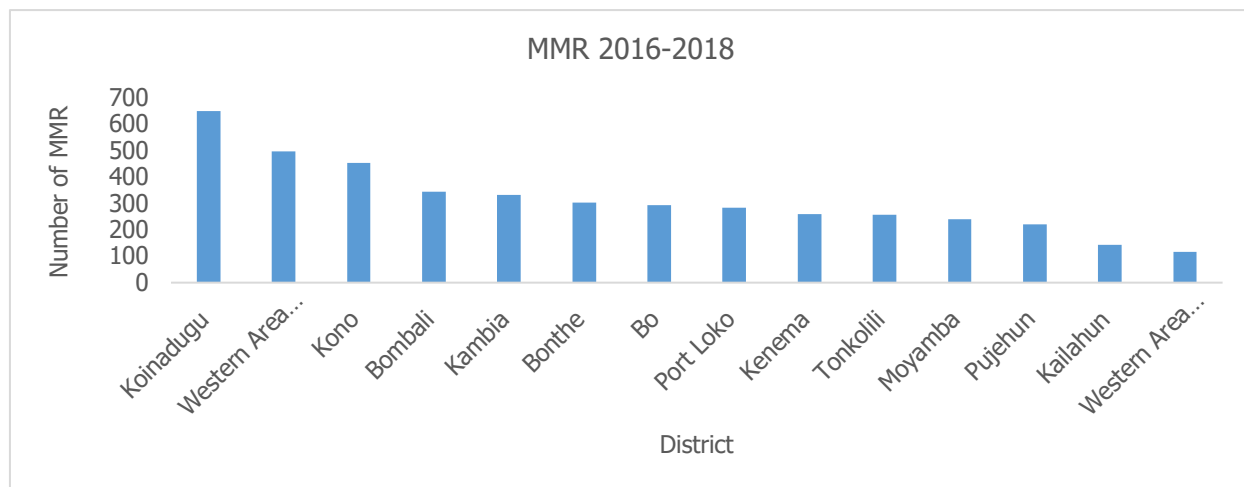


Figure 143: MMR by District, 2016-2018