Family Health Bureau

Analysis of Maternal Deaths - 2023

Final Report

Report No:MMMSU/Publication/2024/01

Maternal Morbidity and Mortality Surveillance Unit

Outcome of Maternal Death Surveillance and Response – 2023

Maternal mortality remains a critical indicator of a nation's health care system effectiveness, reflecting the overall health of women during pregnancy, childbirth and the post-partum period. It is also a key indicator of the health and well-being of women and girls, reflecting their overall health status, access to healthcare, and the responsiveness of the country's healthcare system to their needs.

Maternal Death Surveillance and Response (MDSR) systems as a critical component of public health infrastructure aims at reducing preventable maternal deaths by identifying, investigating and response planning based on issues identified. Sri Lanka introduced its MDSR mechanism in 1959, followed by a mandatory notification regulation for probable maternal deaths in 1985. Since 2009, numerous quality dimensions have been added to the MDSR process. Today, Sri Lanka has a well-structured MDSR system that is recognized as a global model.

Process of MDSR

Notification of maternal deaths has been established as a legal obligation through the issuance of a gazette notification to all practitioners providing care to women in Sri Lanka. All deaths (irrespective of cause) of women in the reproductive age group (15 – 49 years), during the pregnancy period and until one year after termination of pregnancy should be notified to the Family Health Bureau (FHB). Following this a detailed review of the case is done at field level and institutional level where the index mother has received care. At FHB, the Maternal & Child Morbidity and Mortality Surveillance Unit maintains a database and comprehensive case scenarios are developed. Institutional death reviews are held for all direct and indirect maternal deaths at the institution where the maternal death took place with the participation of institutional and field health staff involved in the care of the index case. These reviews serve as platforms for healthcare professionals involved in the care of the deceased patients to come together and discuss the findings of their investigations and generate recommendations for prevention of similar cases in the future. These cases are then desk reviewed by an expert panel comprised of different specialties related to maternal care service provision. Each maternal death is reviewed based on 3 delays – (deficiencies in seeking healthcare, reaching and treating), and the lessons learned from these reviews are then used to improve maternal health practices, programs, and policies at the district and national levels.

Definition of a Maternal Death

Sri Lanka adopts the WHO definition on maternal deaths: The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes (WHO).

Review Methodology

Family Health Bureau was notified of 146 probable maternal deaths during the year 2023. The Maternal Morbidity & Mortality Surveillance Unit gathered comprehensive information from family members, field workers, hospital staff, and medico-legal experts to create case scenarios for analysis. Institutional maternal death reviews were held for these cases with the participation of institutional and field health staff involved in the care of the index mother.

Out of the notified deaths, 62 deaths were identified as true maternal deaths due to direct or indirect causes. Central level desk reviews (n=8) were conducted for these 62 cases categorized according to major disease entities (eg. Obstetric Haemorrhage, Heart Disease, Respiratory Disease etc.) during the period 2023 –2024. A panel of experts comprised of representatives from Sri Lanka College of Obstetricians and Gynecologists, College of Anesthesiologists and Intensivists of Sri Lanka, Sri Lanka College of Internal Medicine, College of Forensic Pathologists of Sri Lanka, national program managers of maternal care, relevant Consultant Community Physicians and representatives from other related professional bodies reviewed the cases. For each index death, the desk review discussed the following;

1. Confirmation as a maternal death
2. Determination of the underlying cause of death
3. Determination of the category of maternal death (direct / indirect / incidental)
4. Identification of service deficiencies / provision of care and other issues
5. Formulation of recommendations

In the year 2022 as a further development in maternal mortality surveillance, Confidential Enquiry into Maternal Deaths (CEMD) was introduced as a pilot project for the Western and Southern provinces of Sri Lanka. 22 maternal deaths were reported from these pilot areas and were reviewed under the CEMD methodology while the remaining 38 maternal deaths were subjected to the routine MDSR methodology.

Maternal Mortality Metrics

Maternal Mortality Ratio (MMR) is the globally accepted indicator to quantify the burden of maternal deaths in a country. MMR evaluates obstetric risk, or the possibility that a woman could die during pregnancy. It is calculated as the number of maternal deaths per 100,000 live births. MMR is also used as an indicator to assess the overall maternal health and the health status of a country.

In the year 2023, out of all reported deaths, 62 deaths were categorized as maternal deaths giving a national Maternal Mortality Ratio (MMR) of 25.0 per 100,000 live births (Figure 1). Live births reported by the Registrar General's Department for the year 2023 was taken as the denominator (247,900) which showed a reduction from the 2022 figure of 275,321. Compared to the MMR figure of 2022 the reduction of MMR in 2023 is significant.

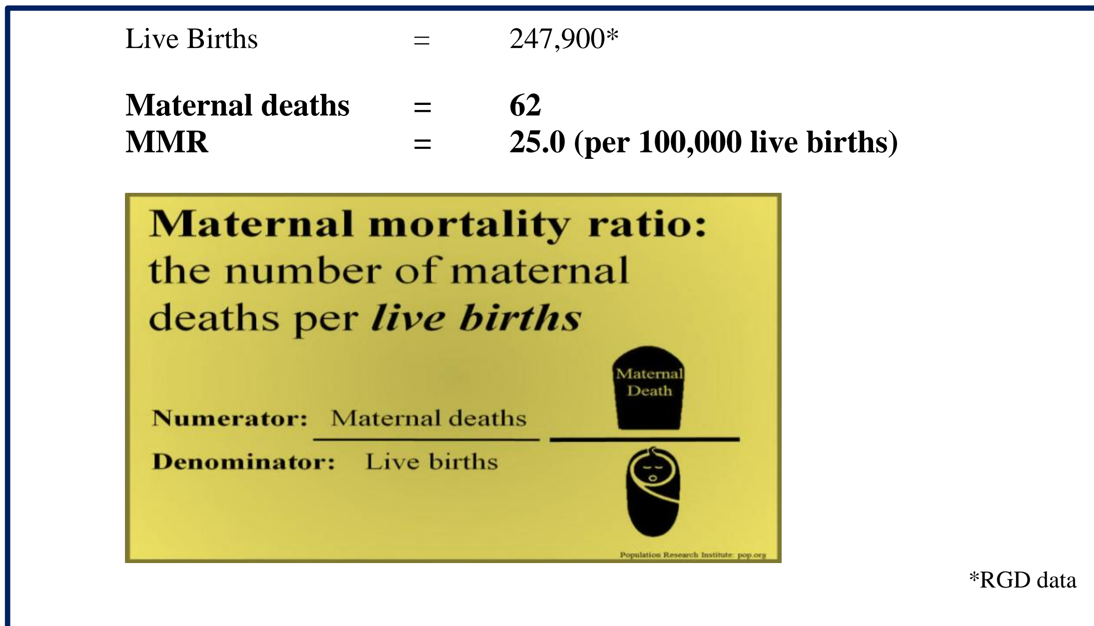


Figure 1: Calculation of National MMR 2023

A graph depicting the number confirmed maternal deaths from 2001 – 2023 is included in Figure 2. A gradual reduction in the number of maternal deaths can be seen up to 2020 however in 2021, with the height of the COVID-19 pandemic in Sri Lanka, there was a sudden and drastic uptick in the number of maternal deaths. In 2022 the number dropped back to the pre-COVID trend despite the post pandemic effect and the financial crisis effect in the country. The number of maternal deaths has displayed a significant reduction n=30 with a final confirmed number of maternal deaths as 62.

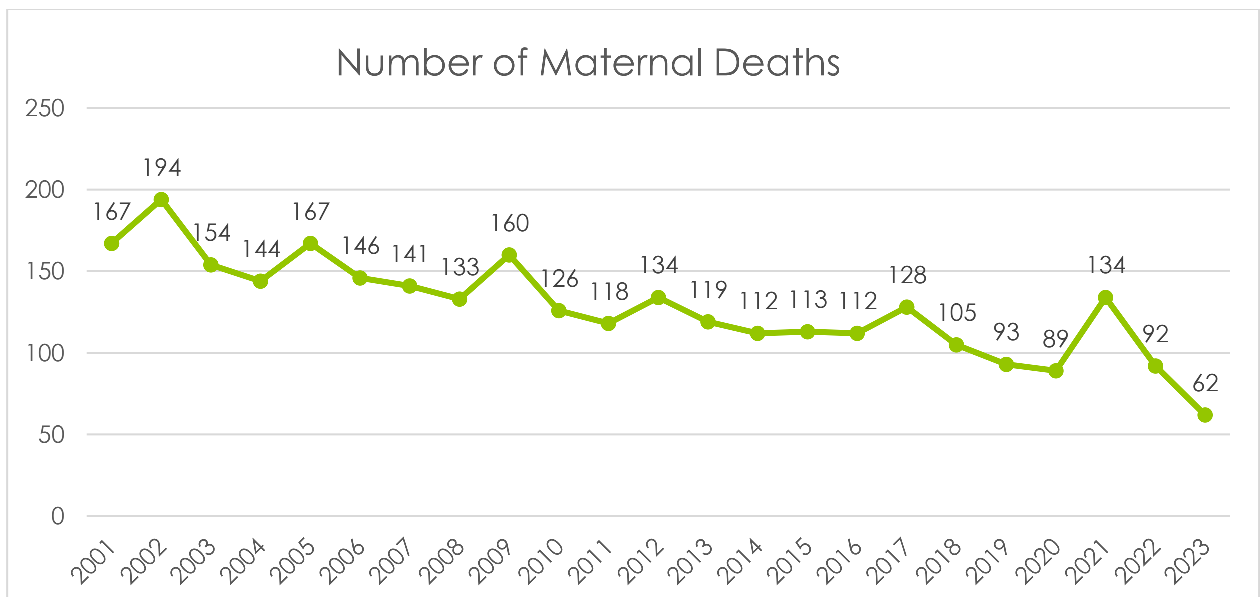


Figure 2: Number of maternal deaths (2001 – 2023)

Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Figure 3 shows the trend of MMR from 2001 – 2023. Though the gradual reduction of the country's MMR showed a drastic increase in the year 2021 due to COVID effect, in the year 2022 the MMR reduced once more. In 2023 the MMR reduced to 25 per 100,000 live births which is the lowest reported MMR in Sri Lanka.

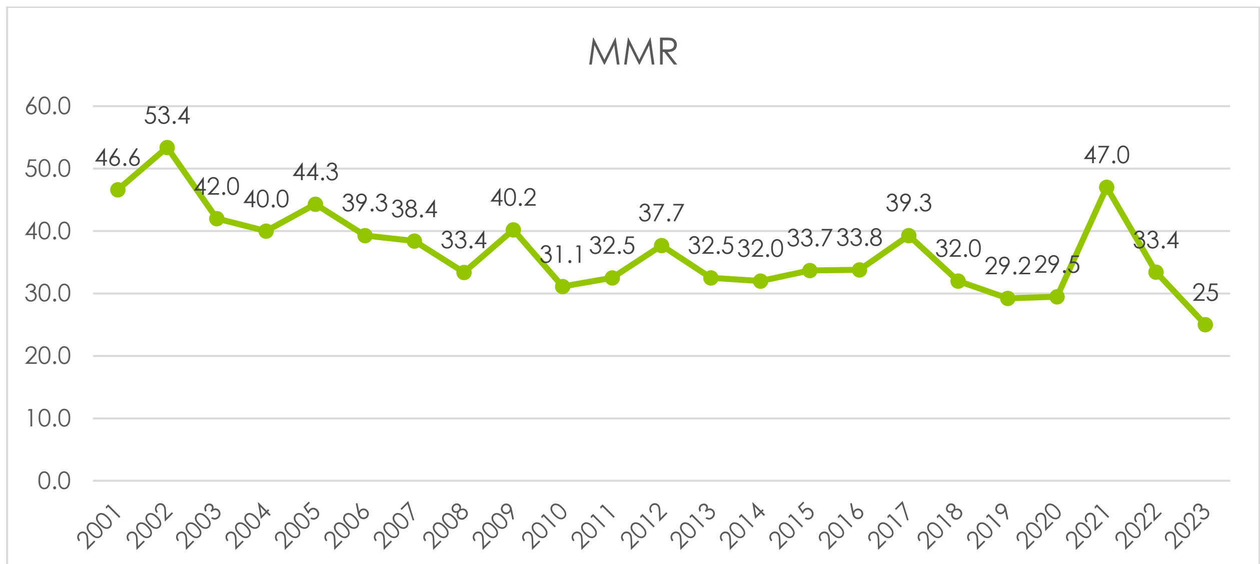


Figure 3: Maternal Mortality Ratio from 2001- 2023

Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Figure 4 shows the number of deaths and MMR of each district calculated based on the number of live births reported by Registrar General's department for each district. When considered the district variability of MMR, the highest MMR was reported from Gampaha as 62.8 per 100,000 live births (n=11). Other leading districts were Vavuniya, Mannar, Monaragala and Jaffna. Five districts (Mullaitivu, Kilinochchi, Hambantota, Nuwaraeliya and Polonnaruwa) reported zero maternal deaths which is a remarkable achievement.

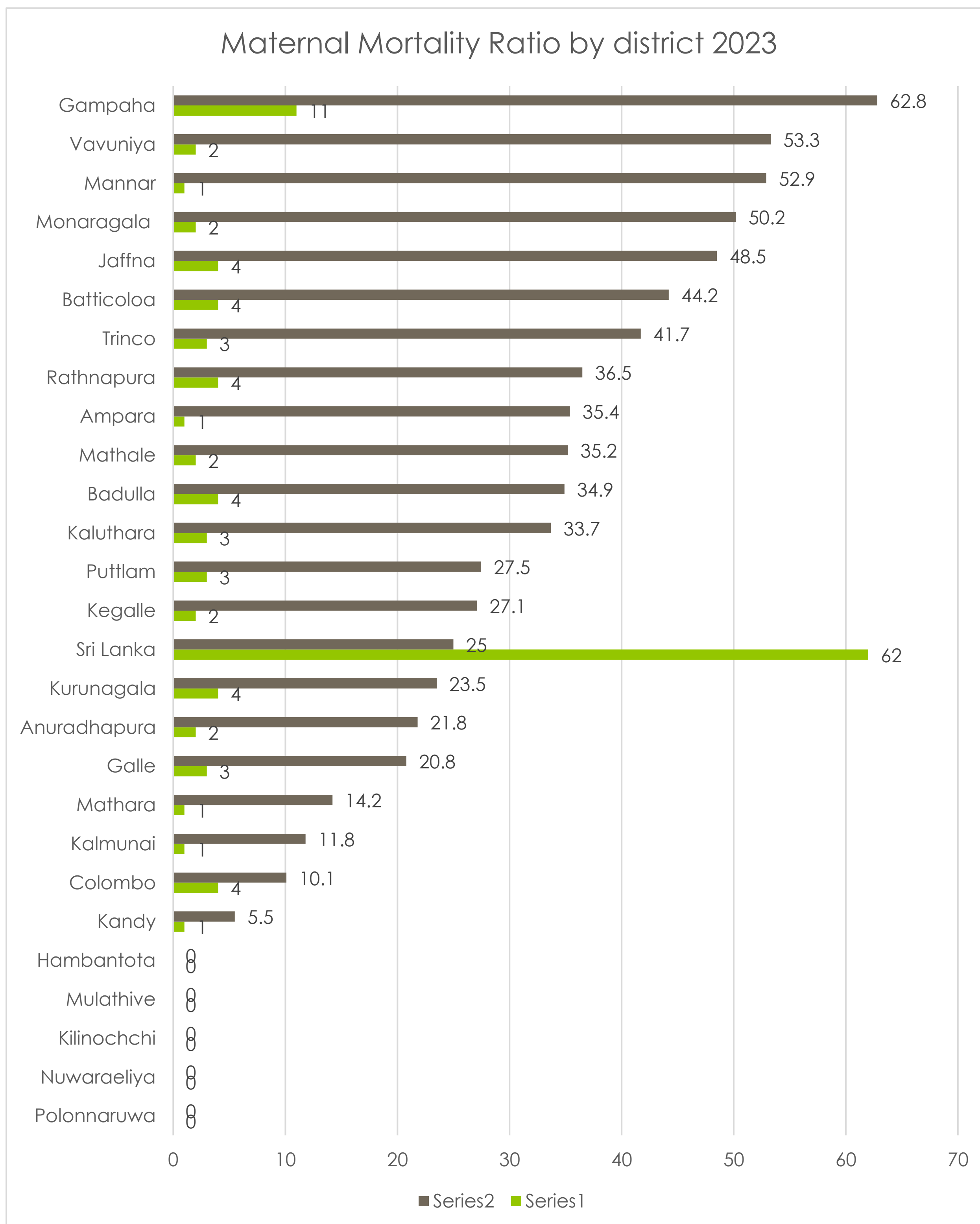


Figure 4: Maternal Deaths and MMR by District – 2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Maternal deaths are classified into two distinct categories: direct and indirect. Direct obstetric deaths arise from complications related to the pregnant state, encompassing pregnancy, labor, and the puerperium. These fatalities may stem from interventions, omissions, incorrect treatment, or the cascading consequences of any such actions.
Indirect obstetric deaths occur due to pre-existing diseases or conditions that emerged during pregnancy, independent of direct obstetric causes, but exacerbated by the physiological effects of pregnancy.

A majority of maternal deaths in 2023 were Direct maternal deaths (n=42, 68%) while 20 (32%) maternal deaths were classified as indirect maternal deaths.

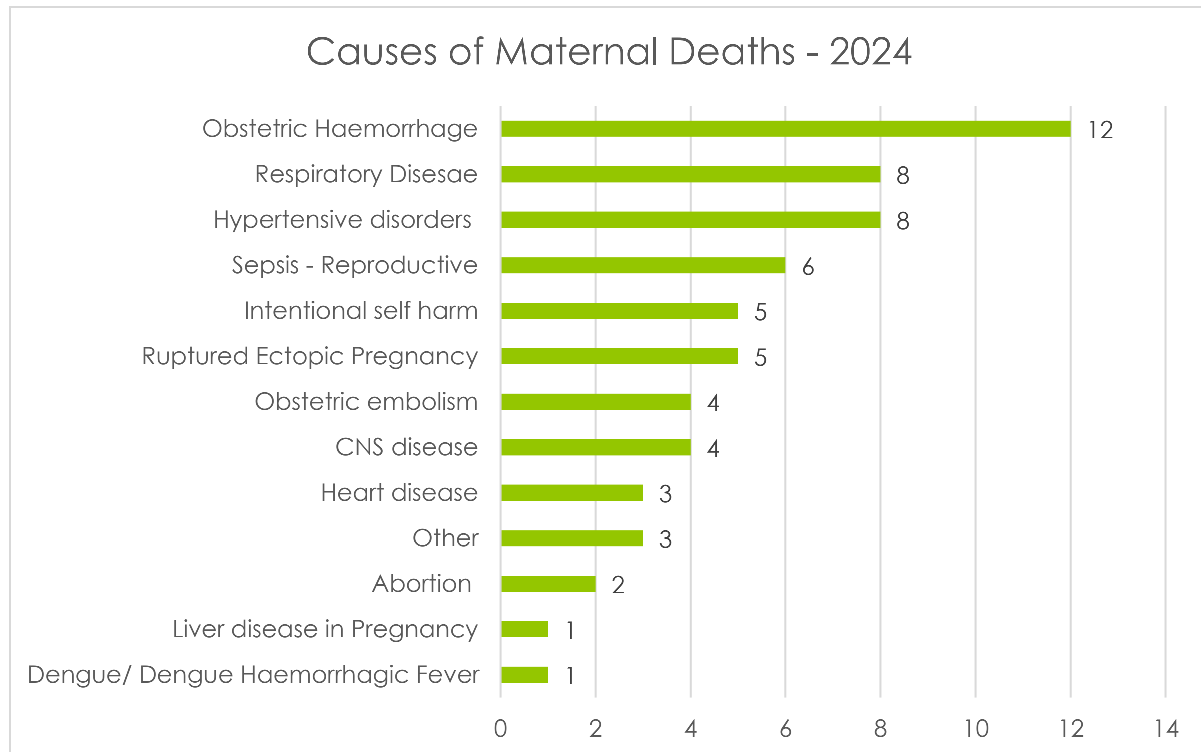
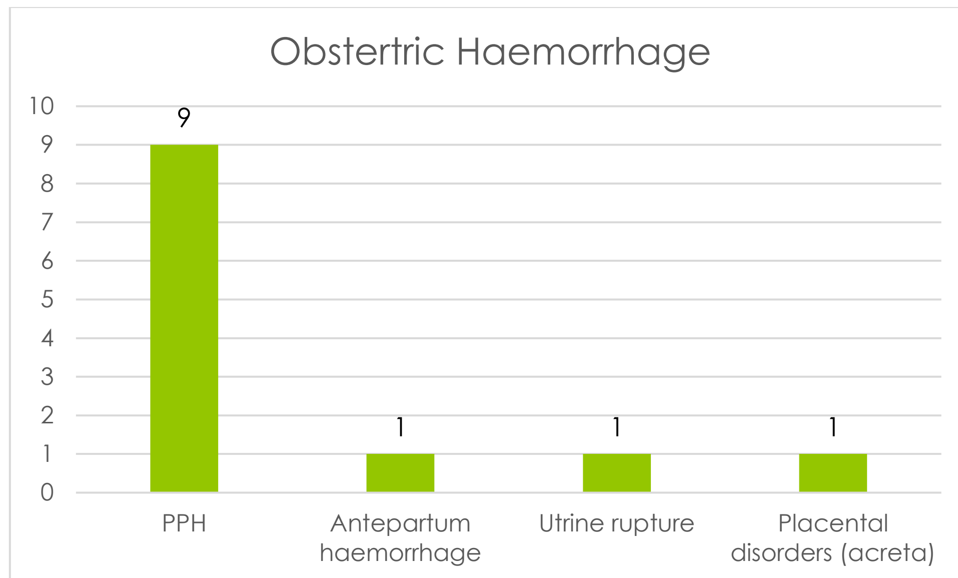


Figure 5: Causes of maternal deaths -2023

Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Figure 5 shows the causes for maternal deaths reported in the year 2023. The leading cause of maternal deaths was reported as obstetric hemorrhage (n=12, 19.3%). Out of this, 9 deaths (69%) were due to postpartum hemorrhage. Obstetric hemorrhage was reported as the fourth commonest cause in 2022 (n=8, 8.8%) which shows a significant increase has happened in 2023. Hypertensive disorder in pregnancy and respiratory disorders in pregnancy were ranked second commonest cause with each reporting 8 deaths (12.9%). Reproductive sepsis or sepsis originating in the reproductive system was ranked at the third commonest cause with 6 deaths (9.6%) being reported. Intentional self-harm was reported as the 4th commonest cause with five confirmed cases (8%), which shows an increase from the 2022 figure of 3 cases. When considering the change from 2022 to 2023, though the number of maternal death and the MMR has reduced significantly, the causality pattern of maternal deaths seems to have undergone a change as well



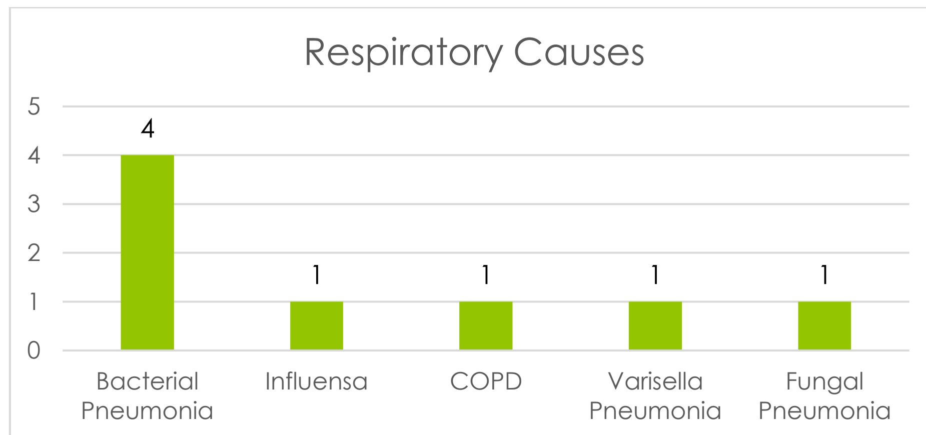


Figure 6: Breakdown of causes of maternal deaths due to obstetric haemorrhage and respiratory causes -2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Among the reported deaths, 41 deaths (66.1%) were reported from rural sector while 21 deaths (33.9%) were reported from urban sector. And notable no deaths were reported from the estate sector. The ethnic composition included; Sinhala (n=39, 62.9%), Tamil (n=14, 22.5%) and Muslim (n=9, 14.5%). A majority were married (n=58, 93.5%) while a minority were unmarried (n=4, 6.5%).
Considering the age distribution of the maternal deaths there was 1 death which happened in a mother less than 20 years of age, while the majority of deaths occurred within the age range of 20 to 35 years (n=47, 75.8%) (Figure 7).

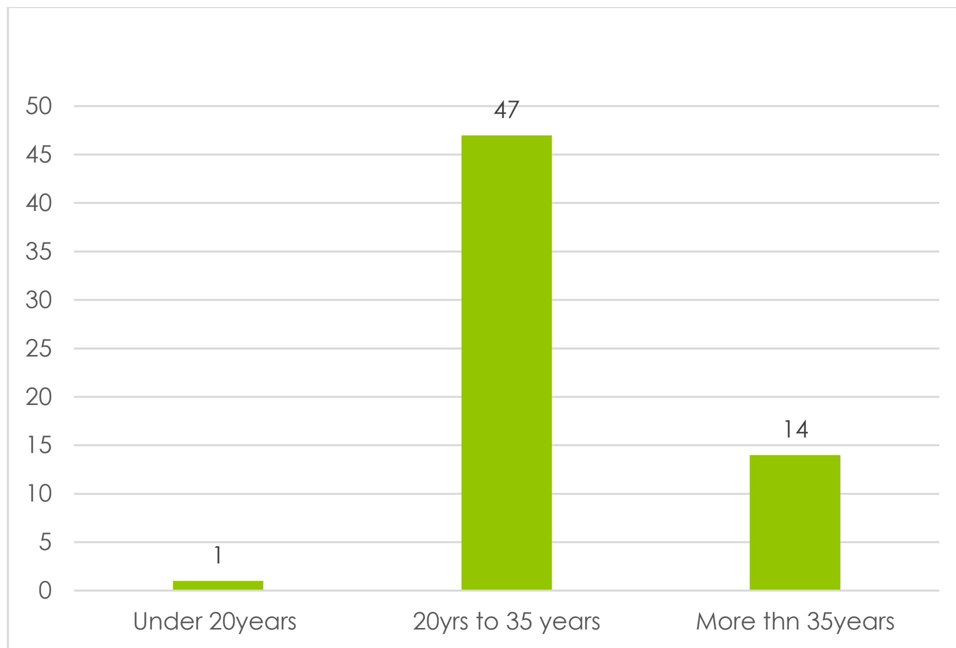


Figure 7: Age category of Maternal Deaths – 2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Of all the maternal deaths 26 mothers were primi mothers (41.9%) while 36 were multiparous (58.1%). Figure 8 shows the parity of the maternal mortality cases in 2023 and how it has changed from 2022.

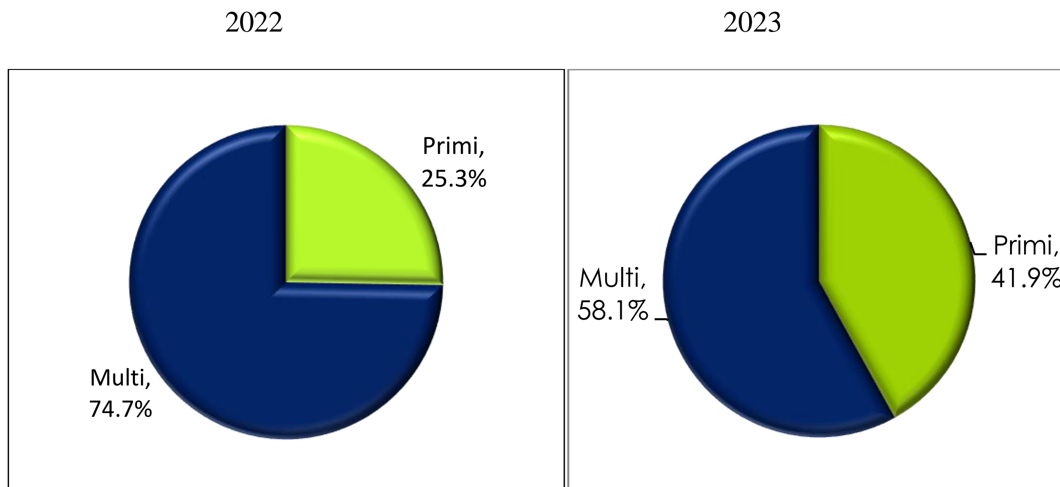
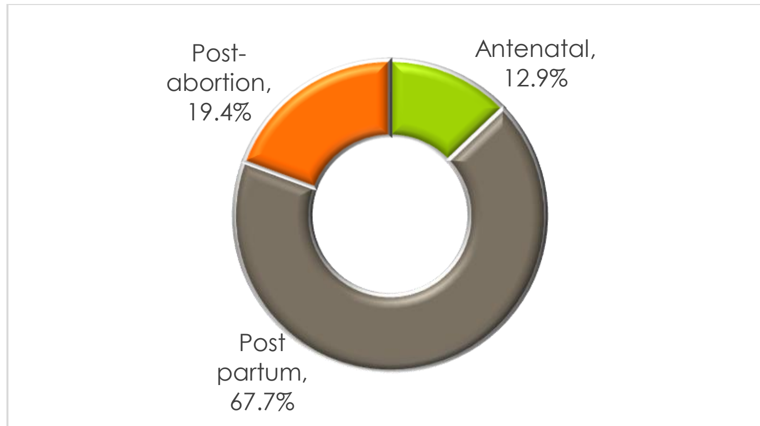


Figure 8: Parity of maternal deaths - 2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Considering the timing of the maternal death, antenatal period deaths were much less in proportion 12.9% (n =08) compared to the postpartum 67.7% (n =42) and post abortion 19.4% (n =12). Out of the postpartum and post-abortion maternal deaths, 27% occurred within the first 24 hours while majority 73% occurred during the period between postpartum day 02 - day 42. Majority of antenatal maternal deaths were in the first trimester (n=4, 50%)



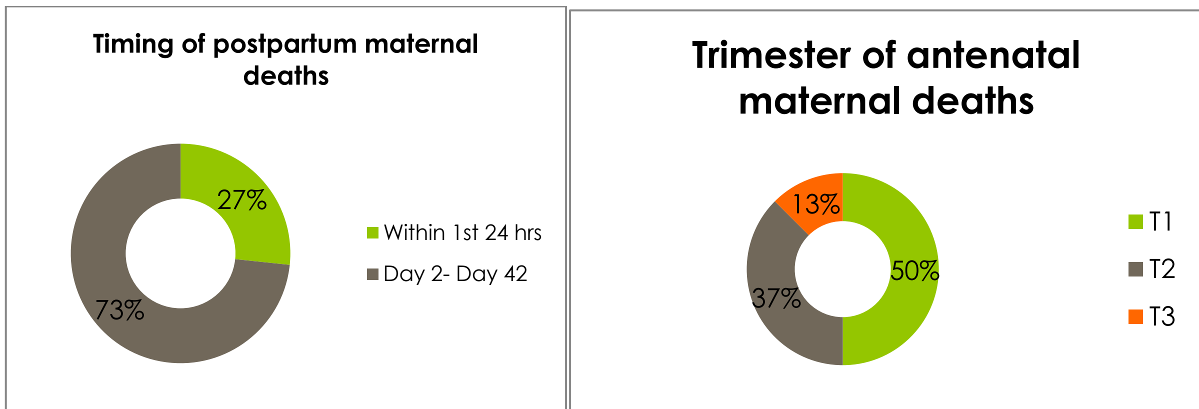


Figure 9: Timing of death of Maternal deaths - 2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

The majority of maternal deaths happened in a hospital (n-51, 82%) while in 11 mothers (14%) the death had occurred at home, while on transit or as an on-admission death.

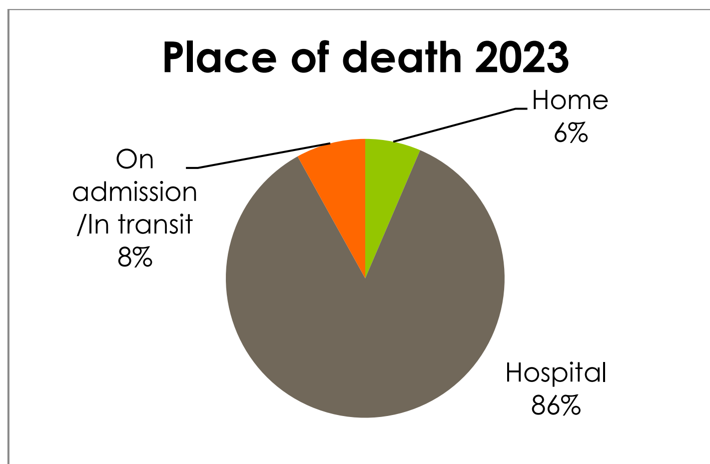


Figure 10: Place of occurrence of death **- 2023**
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Majority of hospital death occurred in teaching hospitals (n=21 33.8%) while 17 (27.4%) occurred at district general hospitals and there was one death reported from a private hospital (Figure 11).

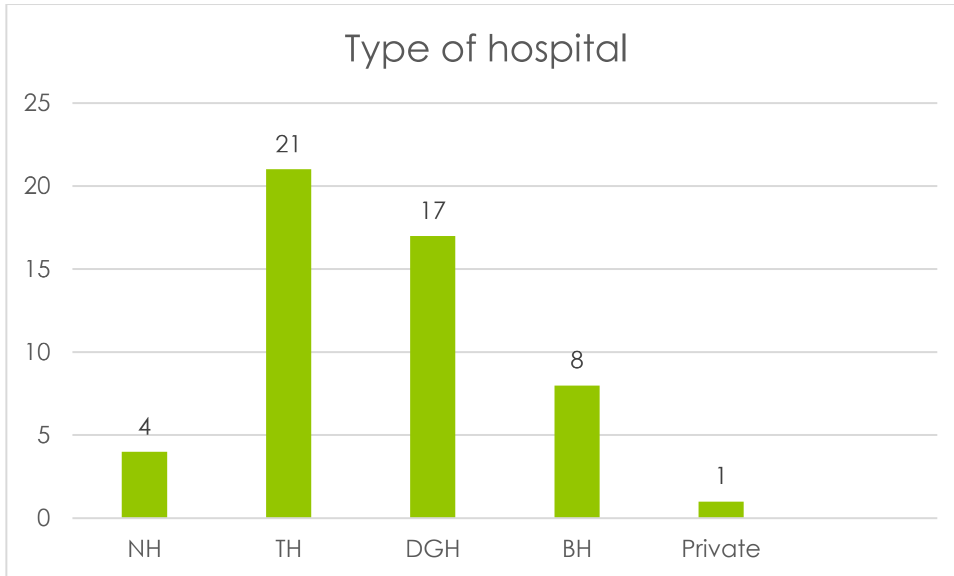


Figure 11: Place of death of Maternal deaths - 2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

In a majority of maternal death cases the present pregnancy ended up in a live birth (n=36, 58.0%) and in n=8, 12.9% cases it ended in a still birth and in n=8, 12.9% maternal deaths the outcome was an abortion. Of all maternal deaths n=5, 8% of mothers died without delivering the baby.

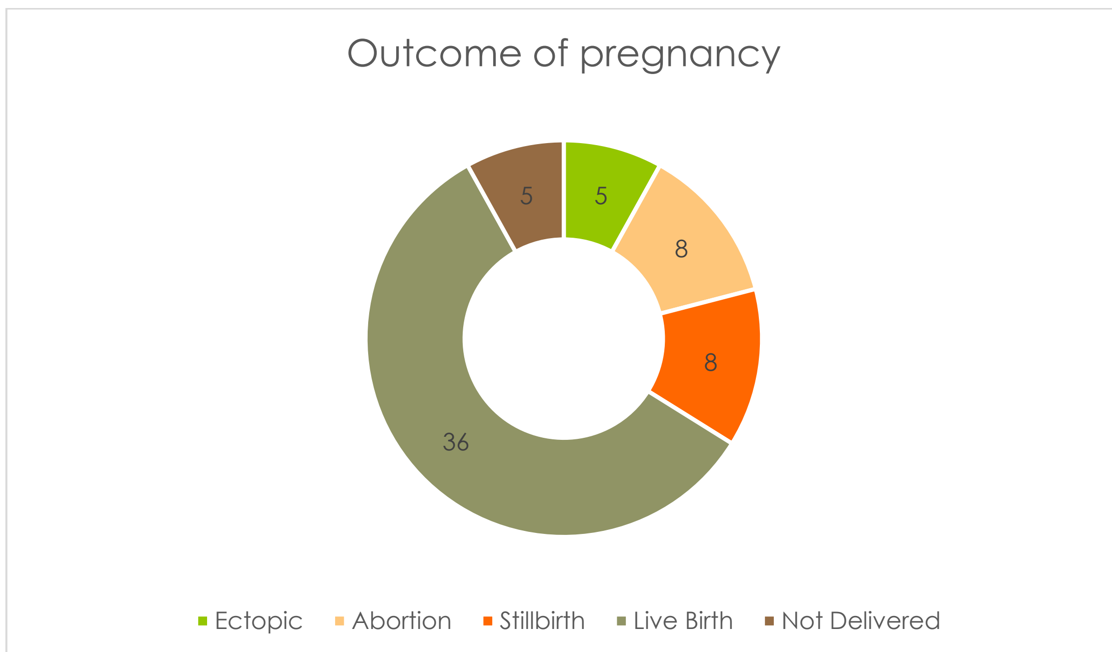


Figure 12: Outcome of pregnancy **- 2023**
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

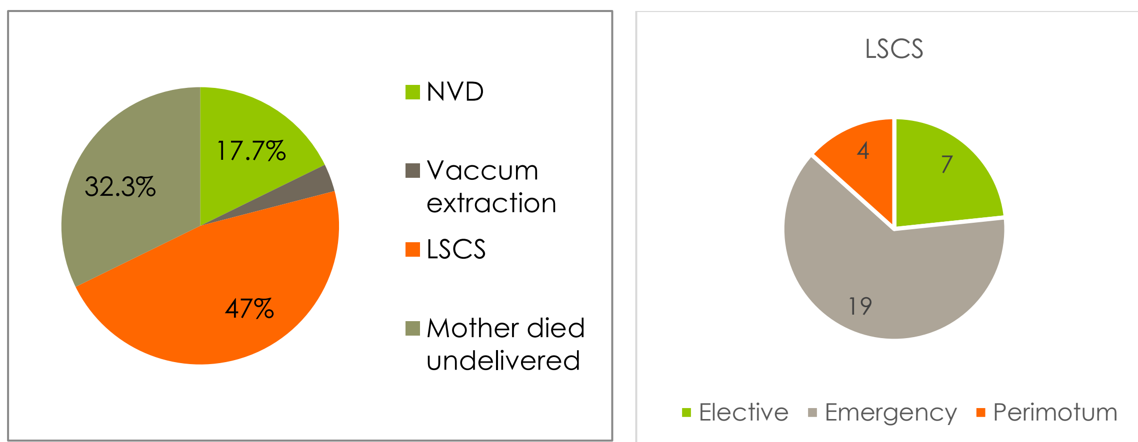


Figure 13: Mode of delivery of Maternal deaths - 2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Cesarean section (47%, n =30) was reported as the commonest mode of delivery among the mothers who ended up as a maternal death, out of which n= 19 (62%) were reported as emergency and n=7 (23.3%) were performed as elective sections. while another 13.3% (n =4) mothers underwent perimortem caesarian sections prior to death as an attempt to save the life of the baby. Majority of the LSCS's were performed by the consultant (n=15, 50%) while n=10 (30%) were performed by the senior house officer and the rest by other categories including registrars and senior registrars (n=5, 20%)

The graph in Figure 14 illustrates the monthly distribution of maternal deaths throughout the year 2023. Notably, the months of May and November reported the highest number of maternal deaths which was 10 while June and July reported the lowest number which was 2.

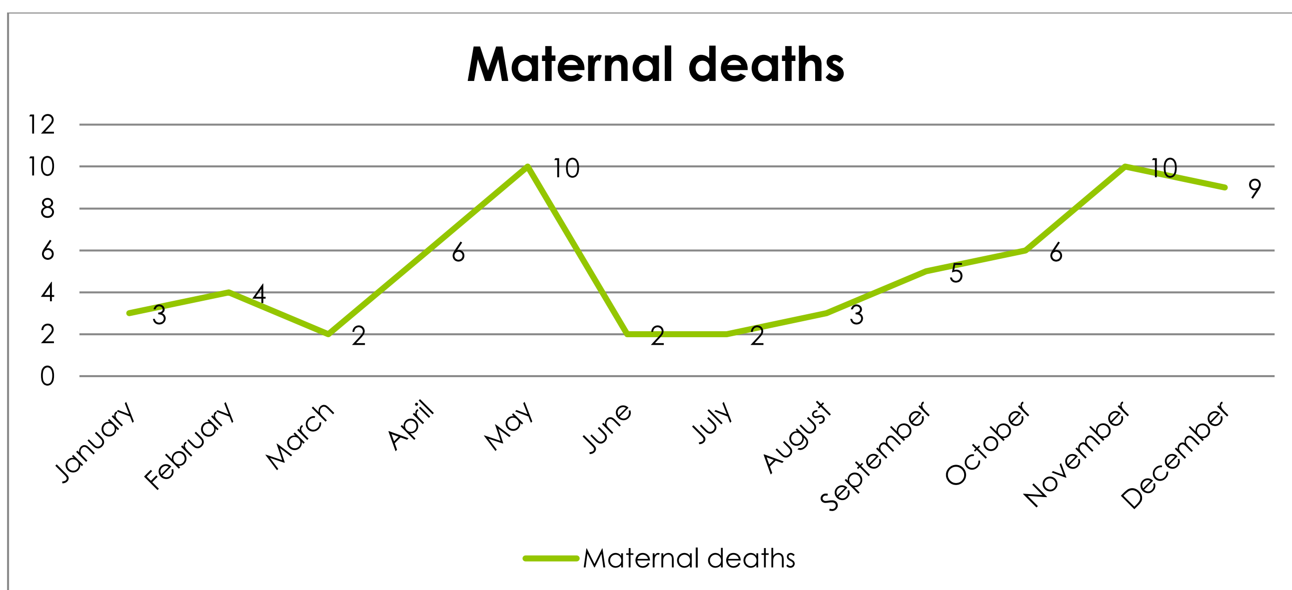


Figure 14: Monthly Frequency of maternal deaths - 2023
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

According to the three delay model which is used in analysis, among all maternal deaths in the year 2023, 80.6%, (n=50) showed one or more delay types while 19.3% (n=12) reported no delays. When the specific delay types were considered among the maternal deaths, 51.6% reported delay one (delay in decision to seek care) either as the single delay or associated with other types of delays, while 54.8% reported delay three. This is an increase compared to the 45.1% value for delay three in 2022. Remarkably delay two (delay in Reaching a Health care institution) was only seen in 6.4% of maternal deaths.

Delay	**N**	**%**
No delay	12	19.3
Delay present	50	80.6
Type of delay (n=62)		
Delay 1	32	51.6%
Delay 2	4	6.4%
Delay 3	34	54.8%

Table 2: Analysis of delays

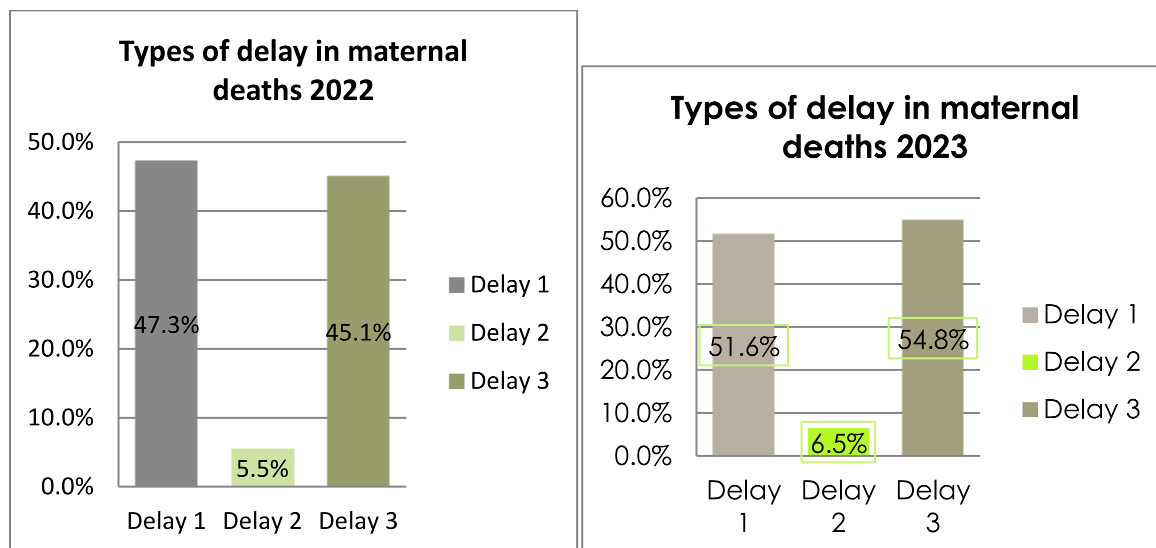


Figure 16: Types of delay in maternal deaths – **2022 / 2023**
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Not all maternal deaths are non-preventable. One of the main objectives of maternal mortality surveillance is to identify the preventability of maternal deaths. The national and global target is to achieve zero prevalence of preventable maternal deaths. Over the years the preventable portion of maternal deaths was in a reducing trend till 2021 when COVID maternal deaths increased the preventable portion to a very high figure. In 2022 the preventable portion of maternal deaths had reduced to 53 % but unfortunately though the number of maternal deaths have reduced in 2023 the

percentage of preventable maternal deaths have increased up to 66.1% (n=41). The commonest cause of maternal deaths being obstetric hemorrhage could have contributed for this increase in the preventable maternal deaths indirectly. 10 deaths were deemed to be not preventable (16.1%) and in 11 deaths (17.7%) the preventability of the death could not be established.

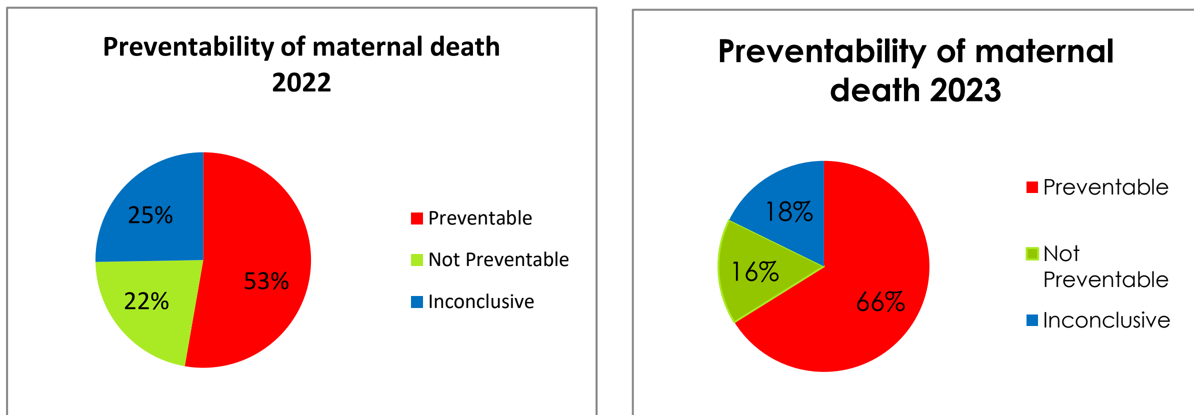


Figure 17: Preventability of maternal deaths - 2023
Source: Maternal Morbidity, Mortality Surveillance Unit – FHB

The service provision for maternal care is an important area to follow as the pregnancy outcome is greatly influenced by it. Unmet need of family planning is one indicator to assess the service provision in Maternal health. Unmet need of family planning is defined as a woman or couple who are sexually active but do not practice a credible family planning method despite the fact that they do not intend to conceive and have a baby for a period of at least two years. Considering the maternal deaths in 2023, 21% (n =12) displayed unmet need of family planning while 79% (n =50) deaths did not show any unmet need of family planning. This figure is much higher compared to the prevalence of unmet need of family planning among the eligible families in Sri Lanka for the year 2022 which is 5.4%.

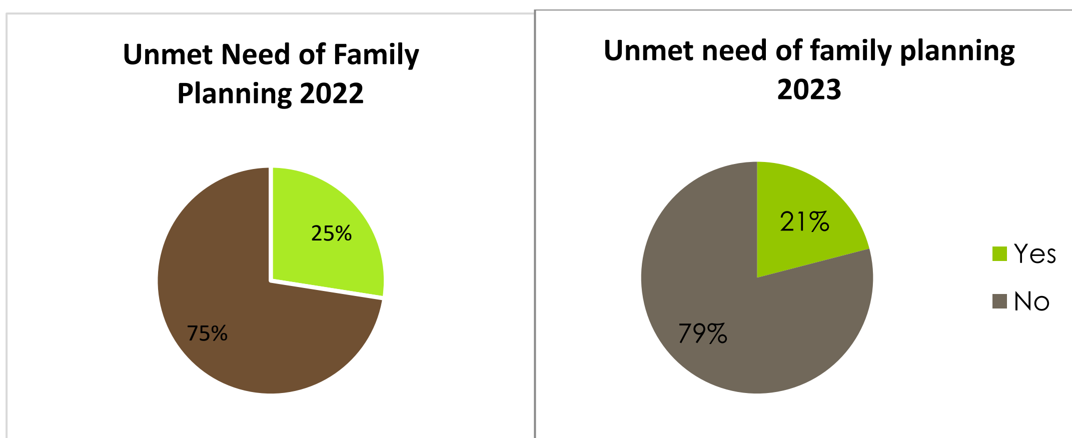


Figure 18: Unmet need of family planning among maternal deaths **-2022 2023**
Source: Maternal Morbidity, Mortality Surveillance Unit – FHB

Considering service provision, the relevant field Public Health Midwife (PHM) area was vacant in 7 (11.3%) cases of maternal deaths. The provision of antenatal field care for the index cases was deemed satisfactory in 36 (58.0%) of the cases while this figure was 44 (70.9%) with regard to antenatal clinic care.

Confidential Enquiry in to Maternal Deaths (CEMD)

This system of maternal Death review was introduced as a pilot project in 2022 with the collaboration with the Sri Lanka College of Obstetricians and Gynecologists (SLCOG). The pilot areas being the western and Southern provinces covered six districts. During the year 2022, there were 22 maternal deaths reported from the pilot areas. All 24 maternal deaths were subjected to CEMD expert panel meetings and covered at seven meetings conducted at central level. Recommendations made had been communicated to the national level and also the regional and institutional level.

The island wide uptake of the system is planned by the year 2025. The central level strengthening for the review process is currently happening. The training programs on the process will be carried out throughout the country.

The main objective of this new system is to use individual level information and observations in a confidential manner to make general recommendations on the management of all pregnant mothers.

Maternal and Perinatal Death Surveillance and Response (MPDSR) system

As a step towards further reduction of maternal and perinatal mortality Sri Lanka has adopted the WHO initiative of MPDSR to enhance the already established maternal death surveillance system in the country. Adaptation of this new initiative is expected to provide a forum for planning and follow up of recommendations implementation, generated from the maternal and perinatal death reviews. Establishment of MPDSR committees at Central level, regional level and the institutional level conducting regular meetings is expected to have a positive impact on the process of implementation. The membership of these committees should be decision making level individuals of the institutions.

The system has been introduced to the entire country and the trainings conducted in Western and Southern provinces in the year 2022. The trainings in Central province were completed in the year 2023.

Issues

Following key issues were identified during the review of the cases;

1. Poor socio economical background leading to delay in seeking care due to family commitments lack of support leading to delay one and also lack of compliance by patients to attend necessary referrals and follow up
2. Poor awareness of the mother and the family members regarding high risk conditions danger sign identification and the emergency actions to be taken in case of danger signes.
3. Inadequate pre-pregnancy and interpregnancy period preparation of high-risk mothers specially inappropriate family planning methods used resulting in unwanted pregnancies and poorly controlled chronic illnesses due to poor referral systems and follow up mechanisms
4. The sub optimal postpartum care services received by mothers specially related to quality of the postpartum visits.
5. Delayed recognition, diagnosis, initiation of treatment and delayed escalation of management of medical and obstetric emergencies including obstetric hemorrhage sepsis, preeclampsia and amniotic fluid embolism.
6. Lack of adequate number of specialist staff including obstetricians and gynecologists anesthesiologist's pediatrician and neonatologists specially in the peripheral health care institutions.

7. Human resource inadequacy, Skilled trained staff including medical officers nursing staff midwifery and other staff categories to provide a quality care to the public in both field and institutional level
8. Service unavailability and provision for pregnant women with special needs like psychological issues physical disabilities
9. Shortage of some essential medications, facilities or other logistics at hospital level in managing sick women, specially at the first contact institutions
10. Inappropriate and inadequate management of critical symptoms such as shortness of breath (SOB) at GP level.
11. Certain mothers have not registered at field level and continued management exclusively at private sector causing them to be missed by the field staff.
12. Late or inadequate multidisciplinary team (MDT) approach to patient management.

Recommendations

Main recommendations formulated are as follows:

1. All pregnant women and their relatives should be educated on the danger features during the pregnancy and post-partum periods and the need for attending to the nearest hospital early this planning should be done considering the social and environmental conditions of the individual.
2. High-risk mothers should be observed more frequently and be advised regarding danger signs and symptoms and the referral and the follow up mechanism need to be strengthened.
3. Protocols and guidelines should be prepared on management of medical and obstetric emergencies and all staff should have in service training sessions to update their knowledge and practices based on the protocols and guidelines.
4. Pre-pregnancy counseling and preparation of mothers with medical conditions should be initiated at the field level specially if the condition is contra indicated for pregnancy.
5. Introducing an appropriate family planning method, considering the requirement of the client as well as medical conditions, and following uptake of a method, ensure regular and responsible follow up to be done by the field staff.
6. Develop short videos and posts on danger signs in pregnancy and steps to be taken if noted, to be used at antenatal clinic settings and through social media.
7. Introducing a checklist for PHM's for observation of postpartum mothers in their postnatal home visits and a methodology to plan the postpartum visit based on the history of the relevant mother. specially including PR and RR with the expected ranges.
8. MOs attached to MOH offices, peripheral hospitals and GPs should be given an opportunity on continues learning process to update and revise their knowledge on important areas in clinical medicine and link it to CPD point system
9. Patients with critical medical conditions on discharge should have a comprehensive follow plan which should be agreed by a Multi-Disciplinary Team of Consultants who cared for the mother at the hospital and should be communicated to the mother and the field team clearly.
10. Circular to be issued on registering all mothers attending private sector antenatal clinics, in the field clinic as well to ensure proper antenatal and post-natal follow up.
11. Ensure adequate human resources including consultants, medical officers, nursing and midwifery staff and other staff for smooth functioning of the health care institutions

Acknowledgements:

We note with appreciation the lead supportive role played by the Sri Lanka College of Obstetricians & Gynecologists (SLCOG). The expertise and collaboration rendered by Sri Lanka College of Anesthesiologists & Intensivists, College of Forensic Pathologists of Sri Lanka, Sri Lanka College of Internal Medicine, reviewers from other professional colleges, National Program Managers of FHB, other CCPs are thankfully acknowledged. The support given by Provincial and district CCPs, MOMCH, RDHS, Hospital Administrators, MOOH and MO PH was appreciative.

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