Family Health Bureau

Ministry of Health – Sri Lanka

Analysis of Maternal Deaths - 2021

Final Report

Report No: MMMSU/Publication/2023/0

Maternal Morbidity and Mortality
Surveillence Unit

Outcome of Maternal Death Surveillance and Response – 2021

Maternal mortality is a key indicator of the health and well-being of women and young girls. It is a reflection of their overall health status, access to healthcare, and the responsiveness of their country's healthcare system to their needs.

Maternal Death Surveillance and Response (MDSR) systems aim to improve maternal health and prevent preventable maternal deaths. 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 and 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 delay model – (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 226 probable maternal deaths during the year 2021. 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 134 deaths were identified as direct or indirect maternal deaths. Central level desk reviews (n=8) of these 134 cases categorized according to major disease entities (eg. Obstetric Haemorrhage, Heart Disease, Respiratory Disease etc) were conducted during the period 2021 –2023. A panel of experts comprised of representatives from Sri Lanka College of Obstetricians and Gynaecologists, College of Anaesthesiologists 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 included;

1. Determination of the underlying cause of death
2. Confirmation as a maternal 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

Maternal Mortality Metrics

The most commonly used indicator of maternal deaths is the Maternal Mortality Ratio (MMR). 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.

In the year 2021, out of all reported deaths, 134 deaths were categorized as maternal deaths giving a national Maternal Mortality Ratio (MMR) of 47.04 per 100,000 live births (Figure 1). Live births reported by the Registrar General's Department for the year 2021 was taken as the denominator (284,848) which shows a reduction from the 2020 figure of 301,706 (16,858). It is notable that 2021 was the peak of the COVID-19 pandemic in Sri Lanka, with 60 maternal deaths being reported as caused as a result of complications associated with COVID-19 infection. These factors combined caused a marked increase in the MMR compared to previous years.

Live Births	=	284,848*
Maternal deaths	**=**	**134**
MMR	**=**	**47.04 (per 100,000 live births)**
When deaths caused as a result of COVID-19 complications are excluded,		
Maternal deaths	**=**	**74**
MMR	**=**	**25.29 (per 100,000 live births)**

*RGD data

Figure 1: Calculation of National MMR 2021

A graph depicting the number confirmed maternal deaths from 2001 – 2021 is included in Figure 2. A gradual reduction in the number of maternal deaths up to 2020 can be seen. In 2021 with the height of the COVID-19 pandemic in Sri Lanka, there is a sudden and drastic uptick in the number of maternal deaths.

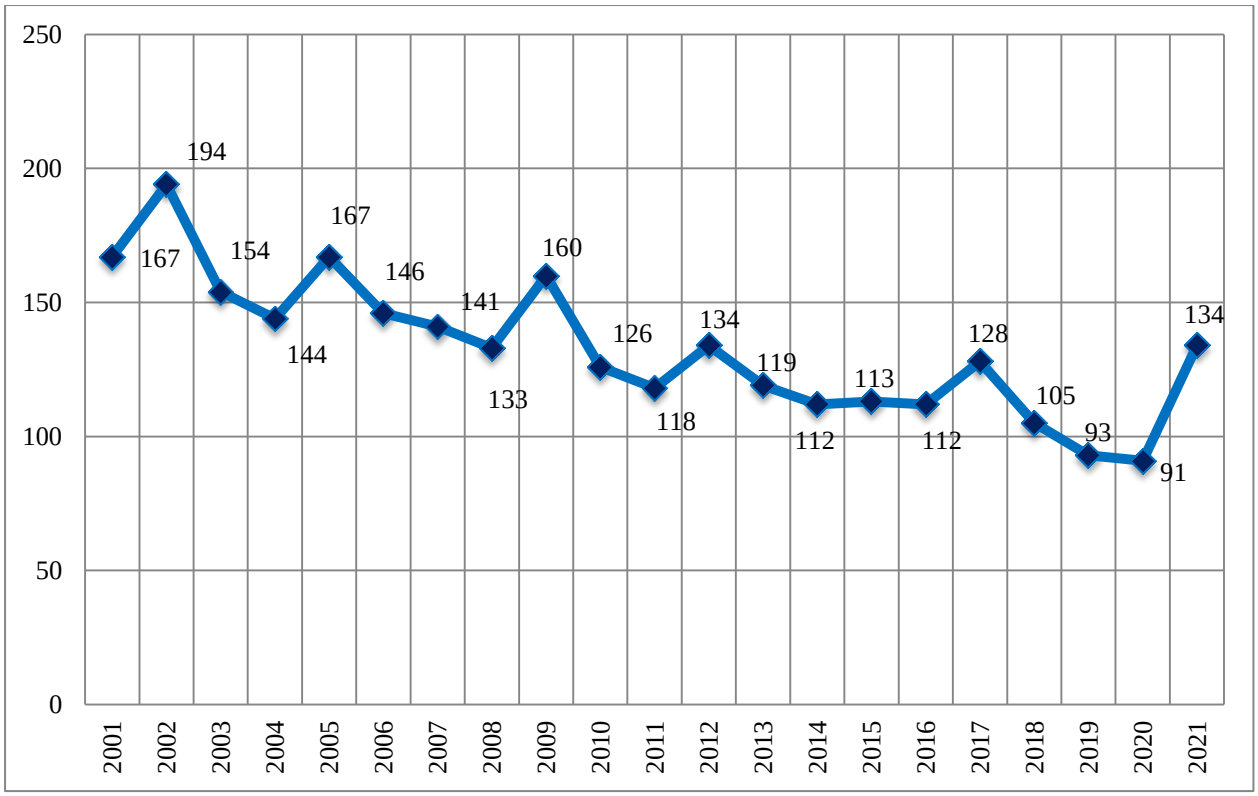

Figure 2: Number of maternal deaths (2001 – 2021)
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Figure 3 shows the trend of MMR from 2001 – 2021. While the reduction of the country's Maternal Mortality Ratio (MMR) over the years is impressive this too reflects the dramatic increase in the MMR in the year 2021 similar to the previous graph.

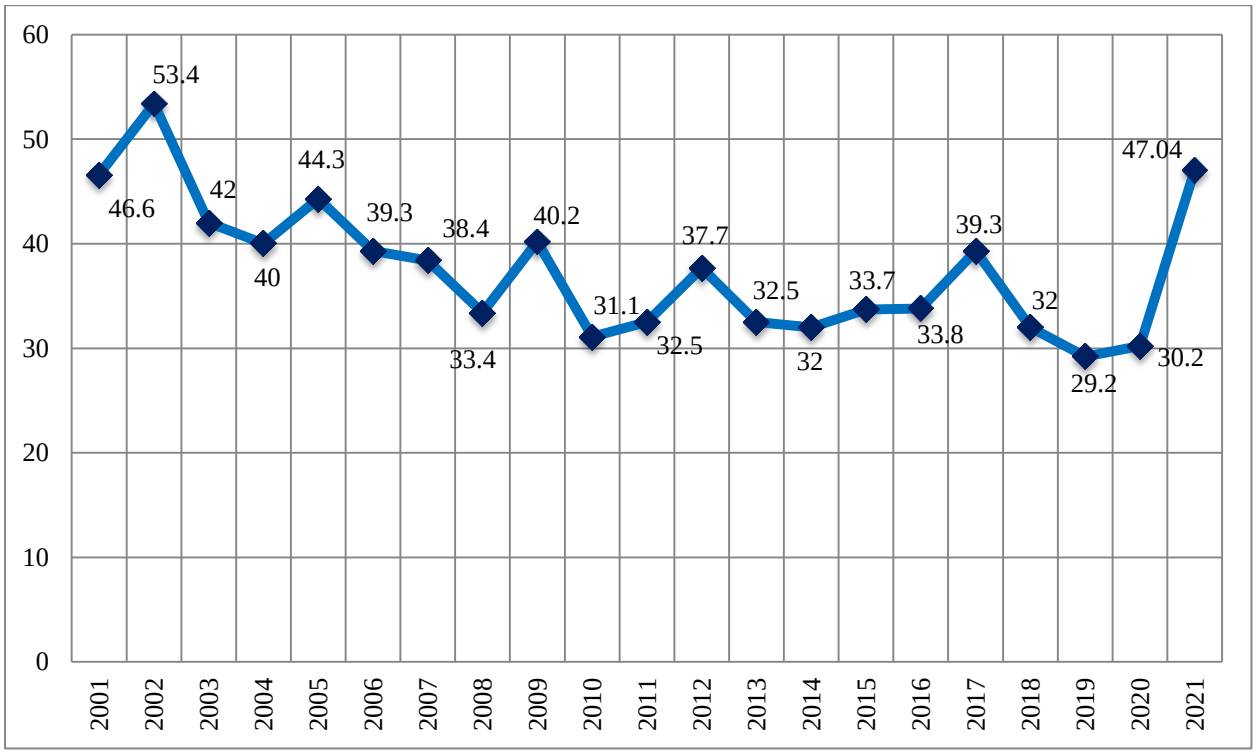

Figure 3: Maternal Mortality Ration from 2001- 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

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 Kilinochchi as 103 per 100,00 live births (n=3). Other leading districts were Kegalle, Gampaha, Nuwara Eliya and Jaffna. Two districts reported zero maternal deaths while the lowest MMR was reported in Galle as 12.2(n=2). Gampaha and Colombo districts recorded the highest incidence of maternal deaths, with each district reporting a total of 18 fatalities

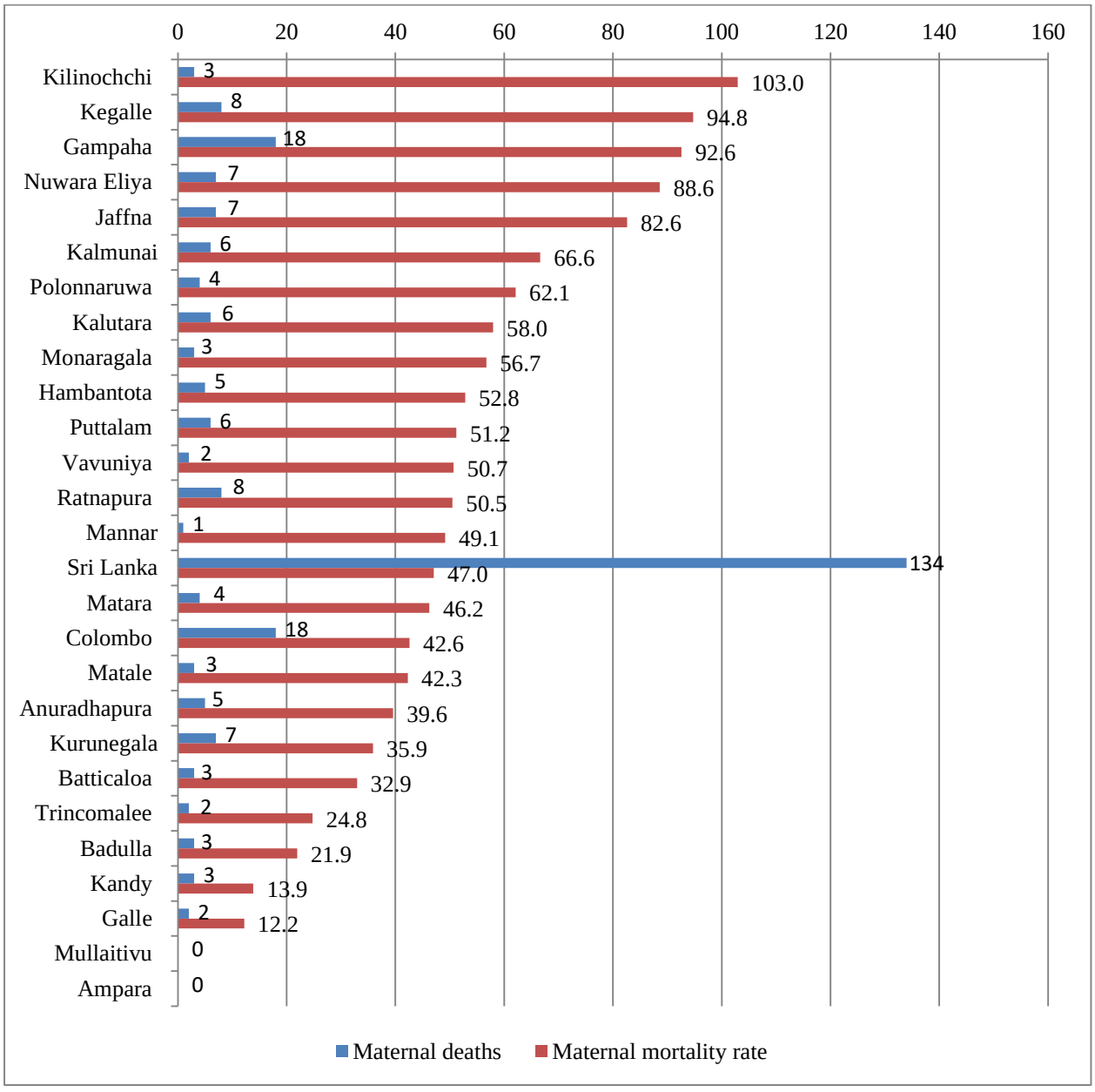

Figure 4: Maternal Deaths and MMR by District – 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

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. On the other hand, 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. Maternal deaths caused as a result of complications of COVID-19 infection were categorized as indirect maternal deaths.

A majority of maternal deaths in 2021 were indirect maternal deaths (n=92, 69%) while 42 (31%) maternal deaths were classified as direct maternal deaths.

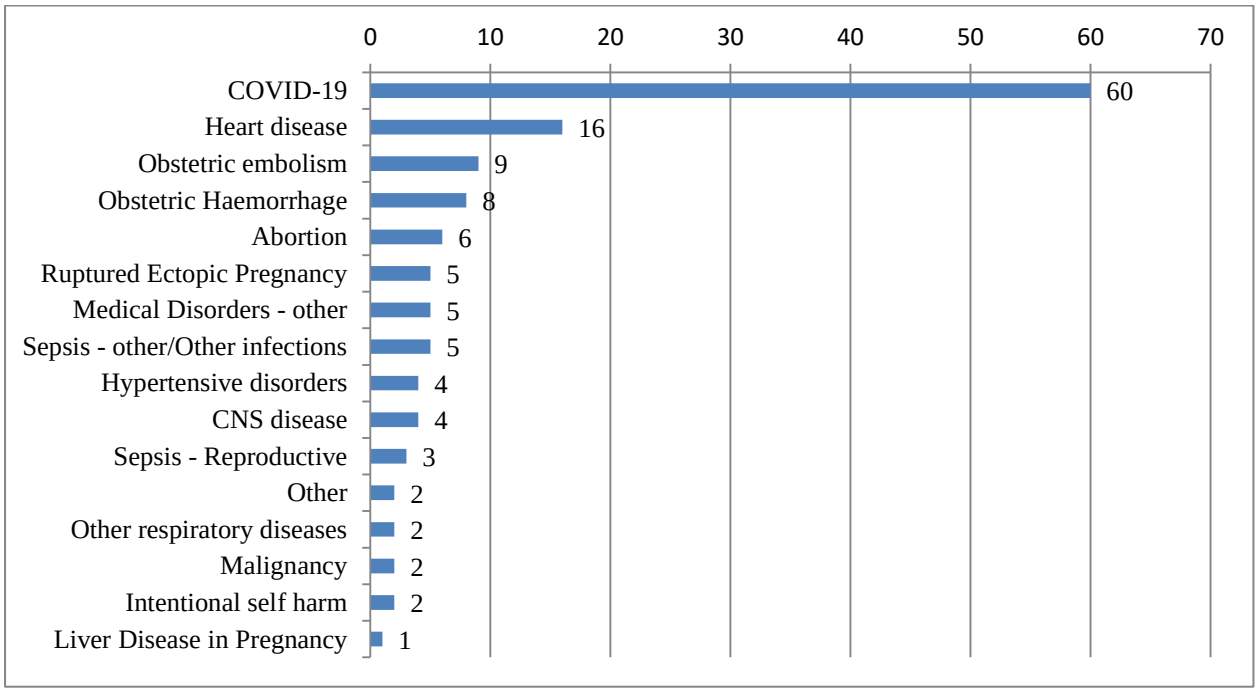

Figure 5: Causes of maternal deaths -2021

Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Figure 5 shows the causes of maternal deaths reported in 2021. The leading cause of maternal death in 2021 was complications of COVID-19 (n=60, 44.8%) which significantly outpaced the other causes. Following COVID-19 related maternal deaths, heart disease (n=16, 11.9%) was the next leading cause followed by obstetric embolism (n=9, 6.7%), obstetric hemorrhage (n=8, 6%) and abortion (n=6, 4.5%).

Among the reported deaths, 79 deaths (59%) were reported from the urban sector while 51 deaths (38.1%) and 4 deaths (3%) were reported from the rural and estate sector respectively. The ethnic composition included; Sinhala (n=78, 58%), Tamil (n=25, 19%) and Muslim (n=31, 23%). The majority were married (n=129, 96.3%) while only a minority were unmarried (n=5, 3.7. There was three (3) maternal deaths (2.2%) reported in mothers under 20 years of age, while the majority of deaths occurred within the age range of 26 to 30 years (n=47, 35.1%) (Figure 4)

.

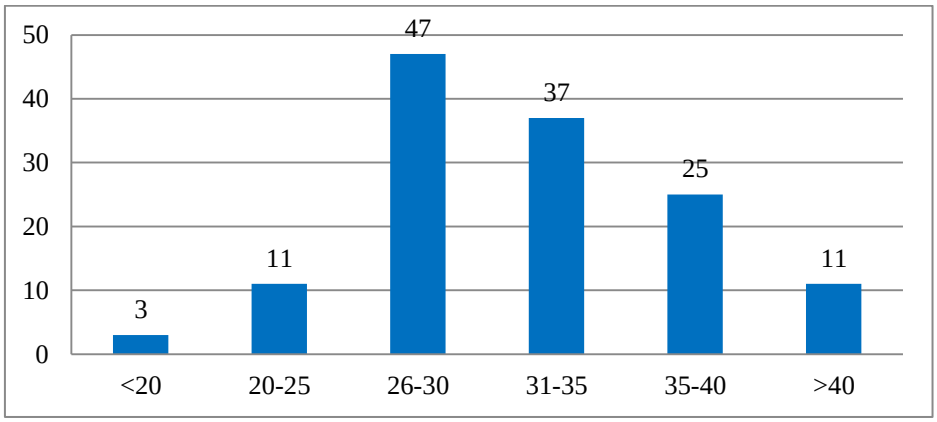

Figure 4: Age category of Maternal Deaths – 2020

Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Of all the maternal deaths 35 mothers were primi mothers (26.1%) while 99 were multiparous (73.9%). The majority of maternal deaths happened in a hospital (n-116, 86.6%) while in 7 mothers (5.2%) the death had occurred at home. In 11 cases of maternal deaths, the mother was found to be dead on admission to hospital (8.2%).

Figure 5 shows the parity of the maternal mortality cases. A significant majority of the cases were of multiparous women (n=35, 73.9%).

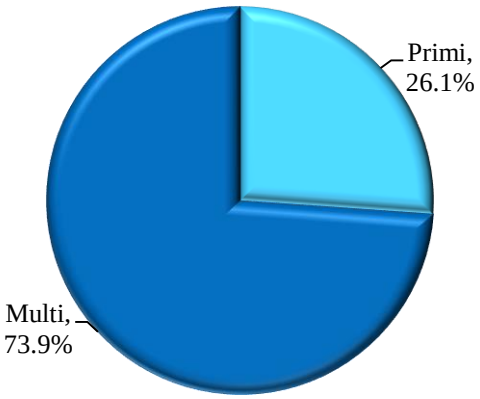

Figure 5: Parity of maternal deaths - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

The graph in Figure 6 illustrates the monthly distribution of maternal deaths throughout the year 2021. Notably, the months of August and September stood out with the highest recorded maternal deaths, reporting 27 and 22 deaths respectively. Interestingly, 20 deaths in each of these two months can be attributed to deaths arising from complications arising due to COVID-19 infections. This coincides with a peak in COVID-19 associated maternal deaths in those months.

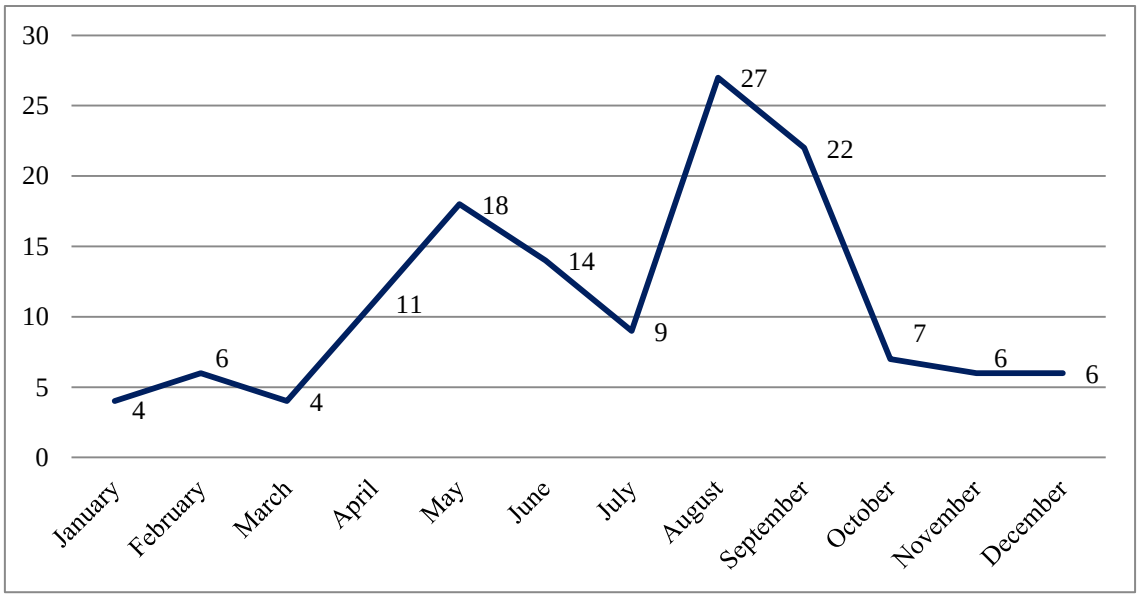

Figure 6: Monthly Frequency of maternal deaths - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Figure 7 shows the timing of maternal deaths. A majority (n=88, 66.7%) had died in the post-partum period. And 37 mothers had died in the antenatal period (27.6). While for 9 other cases (6.7%) the maternal deaths happened during the post abortive period.

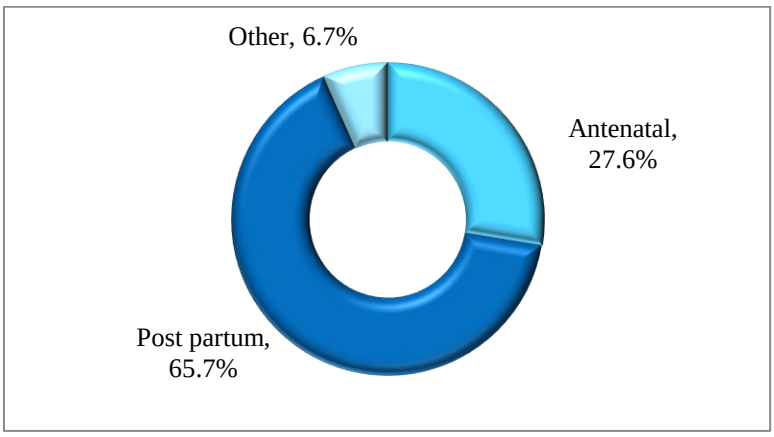

Figure 7: Timing of maternal deaths - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Table 1 shows the mode of delivery which the deceased mothers had undergone. The majority had delivered by Cesarean section (n=68, 50.7%), while 13.4% (n=18) delivered by normal vaginal delivery (NVD) and 33.5% (n=45) had died prior to delivery or experienced abortions.

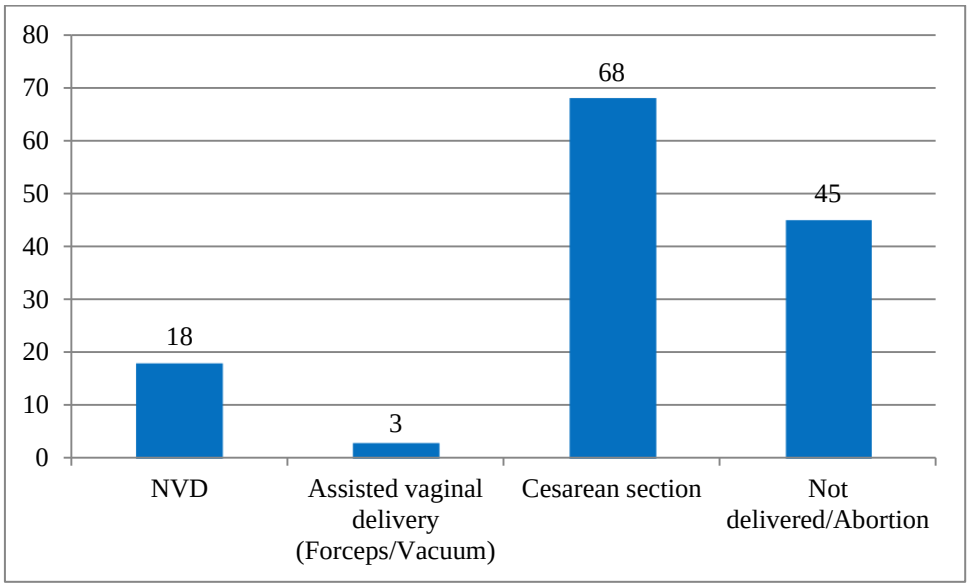

Figure 8: Mode of delivery among maternal deaths - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

In a majority of maternal death cases the present pregnancy ended in a live birth (n=72, 53.7%) and in 20 cases it ended in a still birth (14.9%).

With regard to service provision, the relevant field Public Health Midwife (PHM) area was vacant in 11 (8.2%) cases of maternal deaths. In 23 cases of maternal deaths there was an unmet need of family planning (17.2%). The provision of antenatal field care for the index cases was deemed satisfactory in 118 (88.1%) of the cases while this figure was 113 (84.3%) with regard to antenatal hospital clinic care.

All cases of maternal deaths were assessed for the presence of 3-delays (seeking, reaching & treating) by a multidisciplinary panel of experts (Table 2). It was found that any form of delay was present in 109 of the cases (81.3%) which was a significant increase from the figure of 51.7% in the year 2020. The COVID-19 pandemic as well as the resultant lockdowns/travel restriction in 2021 might have been a contributing factor to this increase. Further reinforcing this possibility, it was found that 105 maternal death cases had a Type 1 delay (78.4%). Interestingly, Delay 3 was reduced compared to last year at only 13 cases found to have it (9.7%).

Type of delay	**N**	**%***
Delay 1 (Seeking care)	105	78.4
Delay 2 (Reaching care)	8	6.0
Delay 3 (Treating)	13	9.7

Table 1: Analysis of delays
*out of 134 maternal death cases

Similarly, when preventability of the maternal deaths was evaluated by the panel of experts it was found that 99 cases (73.9%) were in fact preventable (Figure 8). The main reason for the high proportion of preventable deaths was due to the fact that majority of the COVID maternal deaths were considered preventable deaths at the review process.

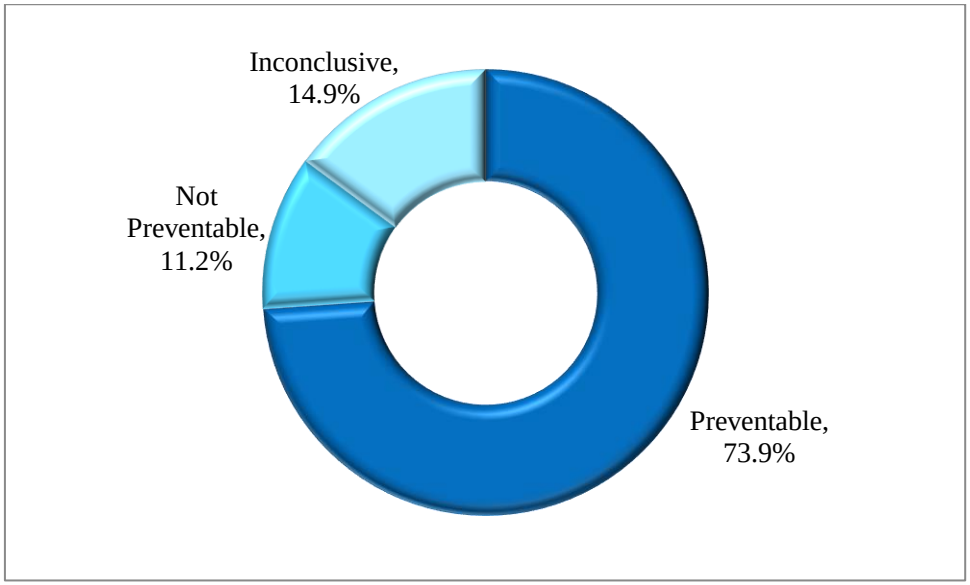

Figure 9: Preventability of maternal deaths -2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Coverage of conducting postmortem was 98.5% and it was not conducted in two cases of maternal deaths.

Impact of COVID 19 infection on Maternal Morbidity and Mortality In 2021

The COVID-19 pandemic which started in 2020 experienced its most profound peak in 2021 with around 10,140 deaths in the general population in that year. This pandemic had a profound effect on the maternal health in Sri Lanka during this same time.

A total of 72 deaths were reported in connection with COVID-19 infections. Among these, 60 deaths were attributed directly to COVID-19, primarily caused by COVID pneumonia or related complications. In the remaining cases, a positive PCR test was recorded, but the cause of death was attributed to other factors.

As the number of reported COVID-19 cases and hospital admissions among pregnant mothers surged in 2021, so did the fatalities. Figure 9 depicts the distribution of maternal deaths in 2021 on a monthly basis.

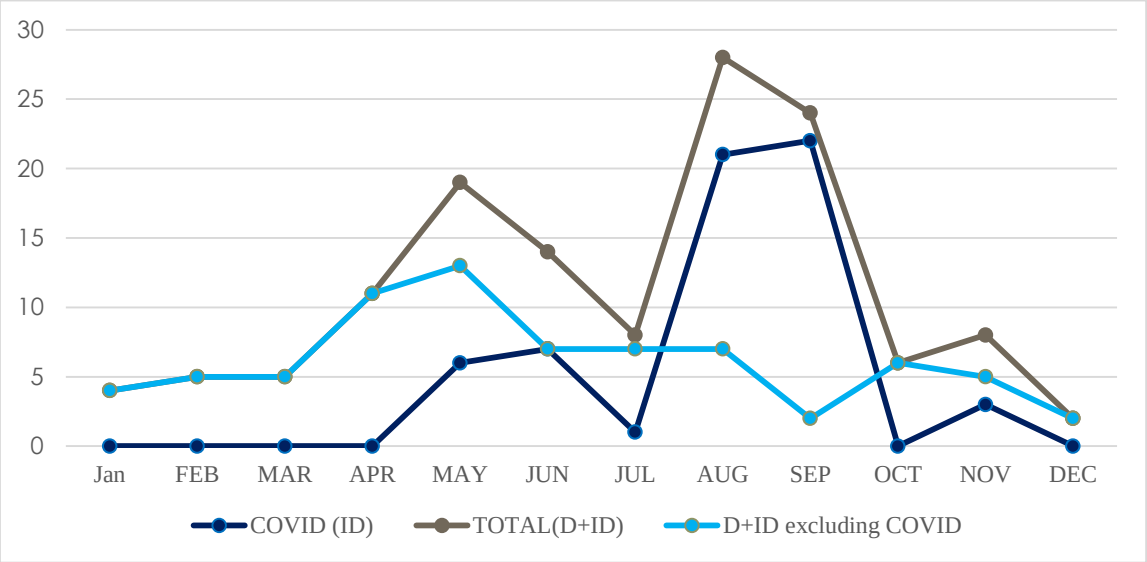

Figure 10: Monthly Frequency of maternal deaths - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

This graph shows two peaks during May and August, with the August peak being more profound than the other. The main reason for this rise in cases was due to the increase in the COVID-19 related maternal deaths.

Figure 10 shows the geographic breakdown of COVID-19 related maternal deaths in 2021. This shows that the highest number of COVID-19 related maternal deaths were reported from the Colombo district with a total of 13 deaths while Gampaha showed the second highest amounting to nine confirmed deaths. Six districts including Galle, Anuradhapura, Ampara and Badulla did not report any fatalities due to COVID 19 infection

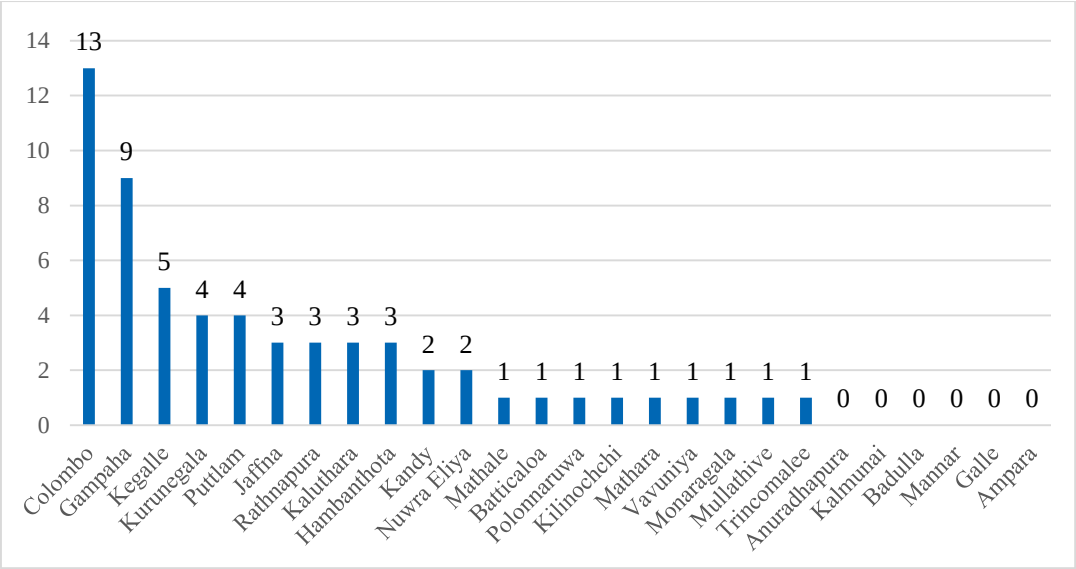

Figure 11: COVID-19 maternal deaths by district - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Figure 11 shows the age breakdown of maternal deaths caused by COVID-19. This shows the highest number of cases was reported in the 20-25 year and 35-40 year age groups.

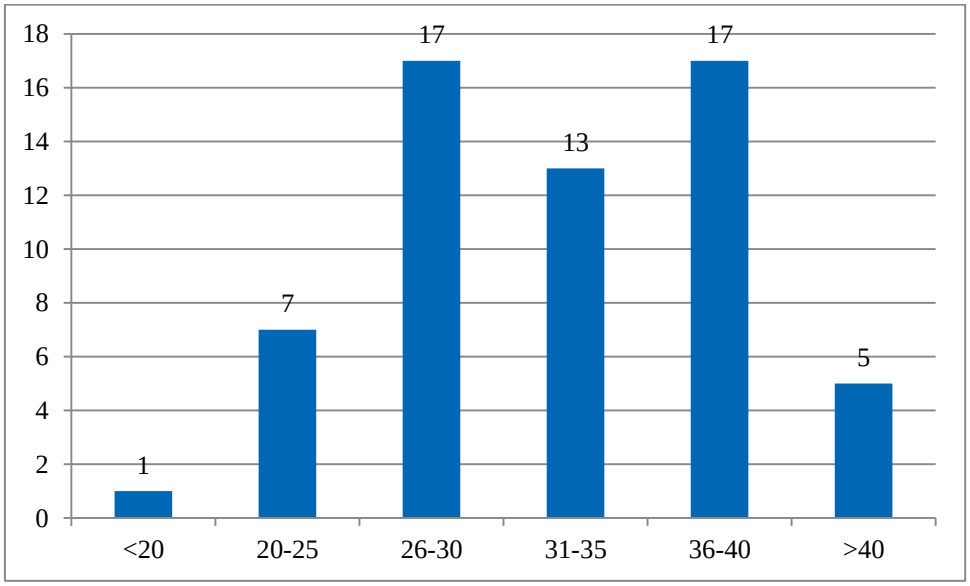

Figure 12: COVID-19 maternal deaths by age - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit – FHB

Figure 12 shows the parity distribution of COVID-19 related maternal deaths in 2021. The majority of mothers who dies due to complications of COVID were multiparous women (n=48,80%) while only 20% of them were primi mothers indicating a higher risk among multiparous women.

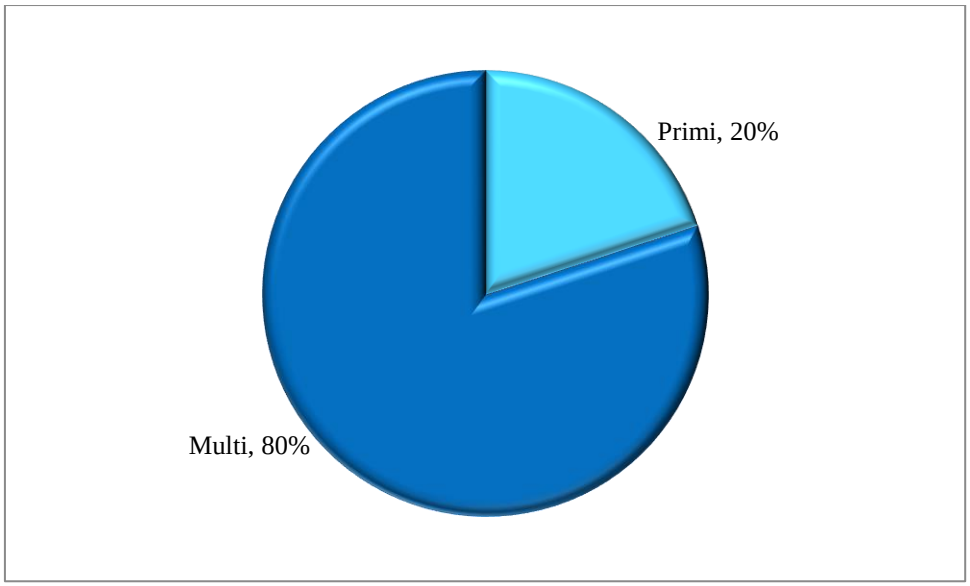

Figure 13: COVID-19 maternal deaths by parity - 2021
Source: Maternal Morbidity, Mortality Surveillance Unit - FHB

Issues

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

1. Delays in seeking care due to multiple reasons at home level, exacerbated due to fear of Covid-19 or enforcement of curfew.
2. Delayed recognition, diagnosis, initiation of treatment and delayed escalation of management of medical and obstetric emergencies including sepsis, preeclampsia and amniotic fluid embolism.
3. Unavailability of required medications, facilities or other logistics at hospital level in managing sick women.
4. Inadequate pre-pregnancy preparation of high risk mothers specially inappropriate family planning methods used resulting in unwanted pregnancies.
5. Inappropriate and inadequate management of critical symptoms such as shortness of breath (SOB) at GP level.
6. In some cases post- mortem findings are incompatible with the clinical history.
7. Lack of compliance by patients to attend necessary referrals and follow up.
8. Certain mothers have not been registered at field level and continued management exclusively at private sector causing them to be missed by the field staff.
9. Late or inadequate multidisciplinary team (MDT) approach to patient management.
10. Certain private health care institutes don't have adequate resuscitation facilities, HDU, ICU, transport facilities etc.
11. Patients are not treated promptly at critical times due to irrational fears regarding COVID-19 infection among certain healthcare workers
12. Lack of critical care facilities for pregnant women during the peak periods of covid

Recommendations

Main recommendations formulated are as follows:

1. All pregnant women and their relatives should be educated on the danger signals during the pregnancy and post-partum periods and the need for admitting to the nearest hospital.
2. High-risk mothers should be observed more frequently and be advised regarding danger signs and symptoms.

3. Protocols and guidelines should be prepared and all the medical staff should be made aware of the management of medical and obstetric emergencies. Skill building and adherence to guidelines to achieve optimal outcomes
4. Pre-pregnancy counseling and preparation of mothers with medical conditions for pregnancy should be strengthened at the field level.
5. Introduction of an appropriate family planning method, taking into account of the client's needs and medical conditions. Strengthen regular follow up care by the field staff.
6. Include a page in the CHDR to educate mothers of the early warning signs that they should pay attention during the postnatal period.
7. Introducing a checklist for PHM's for observation of postpartum mothers in their postnatal home visits, specially including PR and RR with the expected ranges.
8. Critical symptoms such as sudden onset SOB in a pregnant woman should be taken seriously and be advised to admit.
9. MOs attached to MOH offices, peripheral hospitals and GPs should be given an opportunity on continues learning process to update their knowledge on important areas in clinical medicine.
10. Post mortems of all the maternal deaths should be done by the Consultant JMO.
11. Patients with medical conditions should be admitted and investigated when referred rather than managing at clinic level.
12. Upon diagnosis of a chronic medical condition necessitating long-term follow-up, a comprehensive management plan, considering the patient's social and economic context, should be devised, incorporating a multidisciplinary team (MDT) approach. And this plan should be communicated with the mother/spouse.
13. Circular to be issued on registering all mothers attending private sector antenatal clinics at the field clinic to ensure proper antenatal and post natal follow up.
14. Develop a system to conduct early and onsite or preferably bedside multidisciplinary team care of pregnant and postpartum mothers. New circular should be issued to that effect.
15. When registering a private hospital offering inpatient care, it should meet minimum standards, including transportation availability, provision of HDU/ICU facilities, presence of trained personnel, and the availability of appropriate equipment and resuscitation facilities.

Acknowledgements:

We note with appreciation the lead supportive role played by the Sri Lanka College of Obstetricians & Gyanecologists (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's, RDHS, Hospital Administrators, MOOH and MO PH was appreciative.

A special thank goes to DGHS, DDG (PHS II), Director – MCH, DD – FHB, FHB staff – Accountant, Office staff, Drivers and MMMS Unit team members for administrative and logistic support.