

## Retrospective Study

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A five-year review conducted at Mpilo Central Hospital in Bulawayo, Zimbabwe, examined the impact of implementing emergency obstetric drills on trends in maternal mortality in a low-resource setting

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### ABSTRACT

**Background:** Maternal deaths are very distressing to the healthcare givers and devastating to surviving family members. They decimate young, healthy women at the peak of their reproductive lives. The deaths result in orphaned children. Globally maternal deaths remain high on the agenda of the World Health Organisation (WHO) and the United Nations (UN) with the aim to reduce them. Developing nations with low/middle incomes contribute the majority of global deaths. Pregnant women in these settings face far greater risks of dying in pregnancy compared to their counterparts in rich-resourced countries. In this unit, there was an introduction of emergency obstetric drills (PROPMT®-Practical Obstetric Multi-Professional Training courses) from November 2011. These drills involved on-site training of doctors and midwives on a regular basis. This study aims to determine the effects of the introduction of such training on maternal mortality. Maternal mortality is high in the Sub-Saharan region and any reduction of the figures is welcomed.

**Aims:** The aims of the study are: 1) To determine the effect of the introduction of on-site emergency obstetric training on maternal mortality trends. 2) To document trends in maternal mortality in a low-resource setting. 3) To document the current maternal mortality ratio for the Mpilo Central Hospital.

**Methods:** This was a retrospective descriptive cohort study carried out at Mpilo Central Hospital, a tertiary teaching referral government hospital in a low-resource setting in Bulawayo, Zimbabwe. Data was obtained from the maternal mortality register of patients that had died during the period January 1, 2012 to December 31, 2016. The register contains all the demographic, clinical and outcome data. The Statistical Package for the Social Sciences (SPSS) Version 21 (IBM Corp., Armonk, NY, USA) statistical tool was used to calculate the mean and standard deviation (SD) figures. Simple statistical tests were used on absolute numbers to calculate percentages.

**Results:** During the period 1 January 2012 to 31 December 2016 there were 49,501 live births at Mpilo Central Hospital. There were 246 maternal deaths during that period. The mean age of the maternal deaths mothers was 29.6 years (SD±2.8) and the mean parity was 1.7 (SD±1.6). Tables 1-2 show most of the results. Maternal mortality has fallen since 2012 at the unit both in terms of direct obstetric deaths and the maternal mortality ratio (MMR) since the introduction of on-site emergency obstetric training for doctors and nurses in 2011. There was a 45.1% drop in direct obstetric deaths in the last 5 years. The MMR fell from 612 to 429 maternal deaths per 1,00,000 live births.

**Conclusion:** The trends in maternal mortality are that direct obstetric deaths and the MMR have been falling since 2012 in this unit, a year after the introduction of emergency obstetric drills. The current MMR for Mpilo Central Hospital is 429 maternal deaths per 1,00,000 live births. The Sustainable Development Goal of achieving an MMR of less than 70 maternal deaths per 100 000 live births by 2030 should be achieved.

**KEY WORDS:** Maternal mortality; Maternal mortality ratio; Causes; Low-resource setting; Emergency obstetric drills; Mpilo Central Hospital.

**ABBREVIATIONS:** LSCS: Lower Segment Caesarean Section; NVD: Normal Vaginal Delivery; BID: Brought In Dead; WHO: World Health Organisation; UN: United Nations; MMR: Maternal Mortality Ratio; PROMPT®: Practical Obstetric Multi-Professional Training; HIV: Human Immunodeficiency Virus; AIDS: Acquired Immunodeficiency Syndrome.

## INTRODUCTION

Maternal deaths are very distressing to the healthcare givers and very devastating to surviving family members. They decimate young, healthy women at the peak of their reproductive lives. The deaths result in orphaned children. Globally maternal deaths remain high on the agenda of the World Health Organisation (WHO) and the United Nations (UN) with the ambitious aim to reduce them. Developing nations with low/middle incomes contribute the majority of global deaths. Pregnant women in these settings face far greater risks of dying in pregnancy compared to their counterparts in rich-resourced countries.

Maternal deaths are classified as direct obstetric deaths and indirect obstetric deaths. Direct obstetric deaths are defined as those that are due to the complications of pregnancy (pregnancy, labor and puerperium), from interventions, omissions, incorrect treatment or a chain of events resulting from any of these. Indirect obstetric deaths were those resulting from previous existing disease that developed during pregnancy and which was not due to direct obstetric causes, but which was worsened by the physiologic effects of pregnancy. Three-quarters of maternal deaths cases in low-resourced countries are due to direct obstetric deaths.

The UN Millennium Development Goal 5 calls for a 75% reduction in the maternal mortality ratio (MMR) between 1990-2015. The Sustainable Development Goal aims for less than 70 maternal deaths per 100 000 live births globally by 2030. Globally the MMR fell from 385 deaths per 1,00,000 live births in 1990 to 216 in 2015 corresponding to a relative decline of 43.9% with 3,03,000 maternal deaths worldwide in 2015.<sup>1</sup> The appropriate global lifetime risk of a maternal death fell considerably from 1:73 to 1:180 of 2015.<sup>2</sup> A woman in Sub-Saharan Africa has a lifetime risk of maternal death of 1 in 39 compared with around 1 in 10,000 in industrialized countries.<sup>3</sup> The MMR remains the highest in Sub-Saharan region at between 450-500 maternal deaths per 1,00,000 live births.<sup>4,5</sup>

Developing countries accounted for approximately 99% of global maternal deaths in 2015 with Sub-Saharan Africa alone accounting for roughly 66%.<sup>2</sup> In 2007 the MMR for Zimbabwe was 725 maternal deaths per 1,00,000 live births.<sup>6</sup> The MMR for this unit has not been documented before in the

literature. In a similar low-resource setting in a Nigerian hospital it was found to be 645 maternal deaths per 1,00,000 live births<sup>7</sup> and 438 maternal deaths per 10,000 live births in a Ugandan hospital.<sup>8</sup>

The global causes of maternal mortality are haemorrhage, hypertensive disorders and sepsis, which account for more than half of the global deaths.<sup>9</sup> In Sub-Saharan region, AIDS-related deaths also contribute a significant portion and efforts to eliminate them are being done.<sup>10</sup>

## METHODS

This was a retrospective descriptive cohort study carried out at Mpilo Central Hospital, a tertiary teaching referral government hospital in a low-resource setting in Bulawayo, Zimbabwe. The PROMPT® involved regular on-site training for doctors and midwives 3 or 4 times. It also involved placing clearly labelled and regularly stocked boxes in the labour ward. These boxes were for the common obstetric emergencies like postpartum hemorrhage (PPH). The Ethics Committee at Mpilo Central Hospital gave a waiver for retrospective and non-intervention studies to go ahead in the institution as long as the data remained anonymous. No ethical issues arose during the study as all the data were anonymous. No patient consent was necessary. Minutes of the Committee's inaugural meeting held on the 13<sup>th</sup> October 2016 set out the requirements of all the studies at the institution.

Data was obtained from the maternal mortality register of patients that had died in the period January 1, 2012 to December 31, 2016. The register contains all the demographic, clinical and outcome data. The Statistical Package for the Social Sciences (SPSS) Version 21 (IBM Corp., Armonk, NY, USA) statistical tool was used to calculate the mean and standard deviation (SD) figures. Simple statistical tests were used on absolute numbers to calculate percentages.

## RESULTS

During the period 1 January 2012 to 31 December 2016 there were 49,501 live births at Mpilo Central Hospital. There were 246 maternal deaths during that period. The mean age of the maternal deaths mothers was 29.6 years (SD±2.8) and the mean parity was 1.7 (SD±1.6). Tables 1-2 show most of the results.

Maternal mortality has fallen since 2012 at the unit both in terms of direct obstetric deaths and the MMR. There were 60 maternal deaths recorded in 2012 and 39 maternal deaths by 2016. There was a 45.1% reduction in direct obstetric death figures. The MMR fell from 612 to 429 maternal deaths per 1,00,000 live births.

Direct obstetric deaths constituted 80.5% of the total maternal deaths, indirect obstetric deaths 17.5% and 2.0% were of unknown causes. The direct maternal deaths fell to 71.8% at

**Table 1:** Trends in Maternal Mortality.

Year	Live births	Maternal deaths	MMR/100000 live births
2012	9800	60	612
2013	11198	52	464
2014	10411	50	480
2015	9008	45	500
2016	9084	39	429
Totals	49501	246	497

**Table 2:** Trends in Direct and Indirect Obstetric Deaths.

Year	Maternal deaths	Direct obstetric deaths	Indirect obstetric deaths	Unknown
2012	60	51 (85.0%)	8 (15%)	0
2013	52	42 (80.8%)	9 (17.3%)	1 (1.9%)
2013	50	43 (86.0%)	6 (14.0%)	0
2015	45	34 (75.6%)	10 (22.2%)	3 (6.7%)
2016	39	28 (71.8%)	10 (25.6%)	1 (2.6%)
Totals	246	198 (80.5%)	43 (17.5%)	5 (2.0%)

the end of the study.

## DISCUSSION

Maternal mortality trends showed encouraging statistics. There has been a 45.1% reduction in direct obstetric deaths since the introduction of on-site emergency training for doctors and nurses in the unit. There has been a sustained fall in the MMR since 2012 from the high of 612 maternal deaths per 1,00,000 live births to 429 maternal deaths per 1,00,000 live births by 2016. This is a reduction of 29.9%. The current MMR is slightly similar to figures from a similar hospital in Nigeria (465) and Uganda (438). The current MMR for the unit is below the 450-500 maternal deaths per 1,00,000 live births recorded for the Sub-Saharan Africa region. The falling trends in maternal mortality are in keeping with the recorded fall in global maternal death figures.

The introduction of regular obstetric drills,<sup>11,12</sup> is associated with quality improvements. Regular audits and accountability<sup>13</sup> for each and every poor perinatal outcome may also help improve outcomes. Routinely collected obstetric data could help in monitoring and guide quality improvement.<sup>14,15</sup>

Priorities in reducing the mortality burden are provision of safe caesarean section, prevention of sepsis and appropriate care of women in labour.<sup>16</sup> The association between unbooked mothers and poor outcomes was found in this study with 76% of maternal deaths being unbooked. Antenatal care should be a universal norm for all pregnant women if we are to tackle the problems of global maternal deaths.

## CONCLUSION

The trends in maternal mortality show that direct obstetric deaths and MMR have been falling since the introduction of on-

site emergency obstetric training. This is in keeping with global trends in maternal mortality. Direct obstetric deaths fell by 45.1%. The current MMR for Mpilo Central Hospital is 429 maternal deaths per 1,00,000 live births, similar to figures reported in the literature of similar hospital in low-resource settings.

More efforts should be applied to reduce these maternal death figures further. The goal of achieving an MMR of less than 70 maternal deaths per 1,00,000 live births by 2030 should be achieved. The provision of universal antenatal care with accessible and affordable healthcare facilities would go a long ways in helping pregnant women fulfill their reproductive rights without having to die to achieve this right. Young pregnant women are still dying of preventable direct obstetric causes that are largely preventable as seen in rich-resourced countries.

## DECLARATIONS

**DISCLOSURE:** The author reports no conflict of interest in this work.

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