A new maternal mortality classification system highlights the importance of infection as a cause of death, Jamaica (1998-2018)

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Abstract

Aim:
The causes of pregnancy-related deaths (1998-2018) were reclassified by body system regardless of whether the complication was obstetric or medical to highlight the human and other resources needed to end all preventable maternal deaths.

Methods:
The underlying cause of maternal deaths have been reclassified into seven groups: infectious; cardio-reno-vascular; haematological; respiratory; neoplasia, all other systems, and external causes. Cause-specific triennial mortality trends are presented for 1998-2018. For 2016-18, variations in age, time and region of residence are examined.

Results:
Circulatory and haematological conditions remain the leading causes of death, however with direct and indirect deaths combined infectious conditions now rank third. When late maternal and coincidental deaths are included, the upward trend in external causes are of concern, as is the contribution of cardiovascular conditions to late maternal deaths. More adolescents died from circulatory disorders or infection, while among the oldest women, haematological conditions rivalled cardiovascular disorders. The north east region differed from other regions, with blood and infectious causes of deaths prevailing.

Conclusion:
This classification system increases the visibility of infection related deaths, which could be reduced by more timely access (within 24-hours) to antibiotic therapy. Access to blood products in the north east region must be addressed. Late maternal deaths were mostly due to cardiovascular conditions.

Introduction

The 9th ICD revision (1975) classified maternal deaths into direct (obstetric) or indirect (medical) underlying causes. While effective at focusing interventions on skilled care at birth to reduce the 80% of deaths from preventable obstetric causes, it maybe a false dichotomy as conditions are managed by affected system.

In the UK, obstetric infection was the 8th cause of maternal death, but when direct and indirect cases of sepsis are combined, they now ranked second.[1] Managing sepsis, whether obstetric or not, requires similar diagnostic techniques and timely initiation of treatment. For NCDs, pre-eclampsia, peripartum cardiomyopathy and stroke utilize common skill sets and therapeutics.

The paper examines the 1998-2018 trend in maternal mortality when we combine direct and indirect deaths and classify the underlying cause by affected system.

Methods

Maternal, late maternal and non-pregnancy related deaths among women dying while pregnant or up to 364 days after pregnancy ended are coded using ICD-MM rules.[2] This yields five groups of direct deaths and a single group of indirect deaths.

To better inform clinical intervention, having previously classified indirect deaths by body system affected,[3] we extended this to direct and coincidental deaths, creating a new maternal mortality classification which we have called "system-MM." Table 1 compares the "System-MM" and "ICD-MM" strategies for classifying pregnancy related deaths. The 21 year (seven three-year periods, 1998-2018) national trend for Jamaica is presented.

Adapted from: https://www.unicef.org.uk/babyfriendly/baby-friendly-resources/implementing-standards-resources/skin-to-skin-contact/

Table 1: Method of classification with Systems-MM

System-MM groups	Examples of conditions included	ICD-MM groups included
Infectious diseases	- Obstetric infection - Septic abortion - Non-obstetric infections incl. HIV, pneumonia, H1N1 influenza	Abortive outcomes (group 1) Obstetric infection (group 4) Non-obstetric complications (group 7)
Cardio-reno-vascular	- Hypertensive disorders of pregnancy (eclampsia, pre-eclampsia, gestational hypertension) - Heart disease, cerebrovascular disease and renal disorders preceding pregnancy	Hypertensive disorders (group 2) Non-obstetric complications (group 7)
Hematological	- Obstetric haemorrhage - Sickle cell disease - Haemorrhage due to abortion	Abortive outcomes (group 1) Obstetric haemorrhage (group 3) Non-obstetric complications (group 7)
Respiratory	- Pulmonary thromboembolism - Amniotic fluid embolism - Asthma	Other obstetric complications (group 6) Non-obstetric complications (group 7)
Malignancy	- Choriocarcinoma - Breast cancer - Ovarian and uterine cancer - Other cancers	Other obstetric complications (group 6) Non-obstetric complications (group 7)
Other systems	- Endocrine and metabolic disorders - Immunological conditions - Mental health including maternal suicide linked to antepartum or puerperal depression - Gastrointestinal disorders - Musculoskeletal conditions - Congenital malformations	Other obstetric complications (group 6) Non-obstetric complications (group 7)
External causes	- Accidents (unintentional injuries) - Violence (intentional injuries) - Iatrogenic conditions (complications of medical intervention and care).	Abortive outcomes complicated by trauma, e.g. uterine perforation (group 1) Unanticipated complications of management, e.g. adverse drug reaction (group 5) Coincidental causes (group 8)

Results

Maternal, late maternal and coincidental deaths: Circulatory and haematological conditions remain the two leading causes of death, however by combining direct and indirect deaths, infectious conditions now rank third, especially since 2010. The upward trend in external causes are also of concern

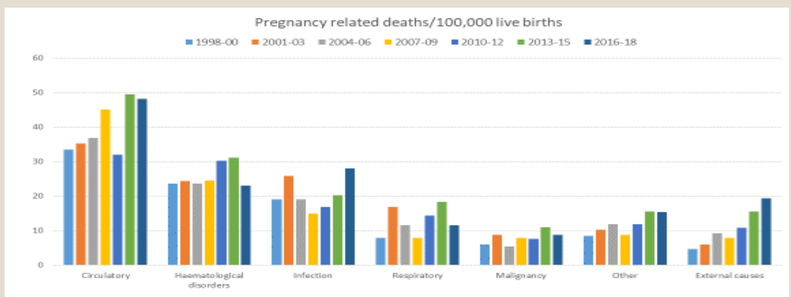

Figure 1: Maternal, late maternal and coincidental deaths by system, Jamaica: 1998-2018

With regards to maternal deaths (direct, indirect, pregnancy-6 weeks post partum) it was noted that external cause deaths are limited to iatrogenic conditions e.g. unintended complications of care.

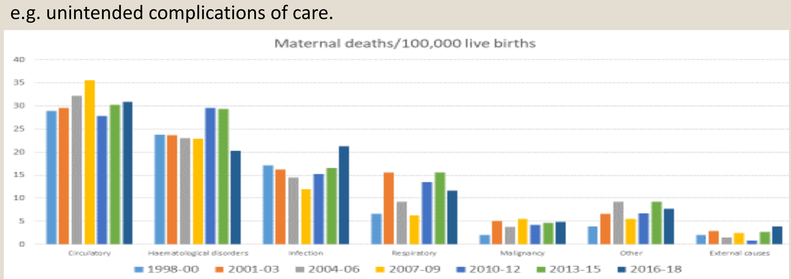

Figure 2: Maternal deaths by system:1998-2018, Jamaica

Review of maternal deaths in 2016-18, by age showed most adolescent deaths were due to circulatory disorders or infection. In the 35+ age-group, haematological conditions rivalled cardiovascular disorders.

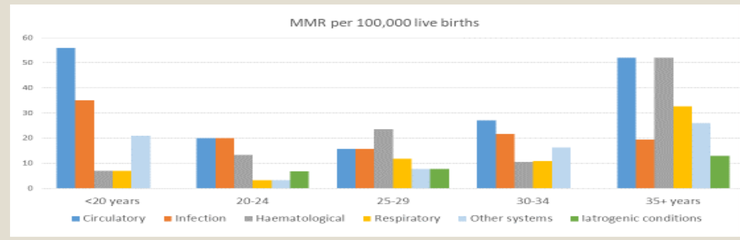

Figure 3: Maternal deaths (2016-18) by system and age at death: ratio/100,000 live births

Half of the cardiovascular deaths occurred more than six days after pregnancy ended and could be missed if we did not monitor deaths beyond traditional hospital discharge. Hematological deaths mostly occur within one week of giving birth. Infection related deaths were equally distributed across pregnancy, the first week after birth, and later.

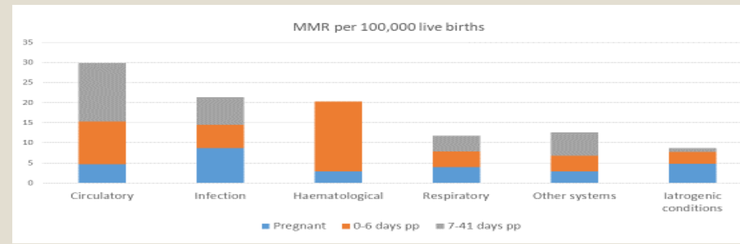

Figure 4: Maternal deaths (2016-18) by system and when death occurred

The north east region was the most different from other regions, with blood and infection related deaths more prevalent compared to cardiovascular problems elsewhere.

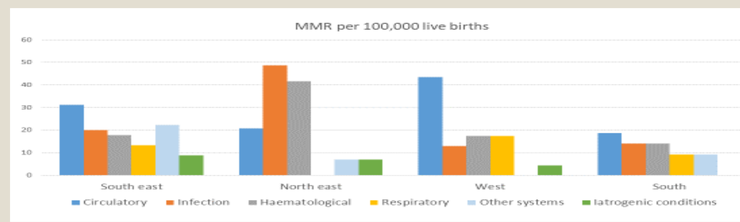

Figure 5: Maternal deaths (2016-18) by system and region of residence

Conclusion:
Use of the systems-MM strategy for classification and epidemiological evaluation of maternal death may elucidate changing aetiological patterns of maternal mortality. This should also facilitate more targeted and adaptive policy, training and clinical interventions to improve primary, secondary and tertiary prevention and help mitigate the risk of maternal death for Jamaican and other mothers globally.

References

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