Indirect causes of maternal death

A maternal death is widely regarded as one of life's most tragic outcomes. There is a cruel irony in the death of a woman who is engaged in the act of creating life, and her death is an incomparable loss for any children who are left behind. Such deaths are almost entirely preventable given proper medical surveillance and intervention, and as such maternal mortality is often viewed as a sentinel indicator of the quality of a health care delivery system.

Most countries in sub-Saharan Africa now suffer from a triple burden of disease: the backlog of common infections, undernutrition, and maternal mortality, the emerging challenges of non-communicable diseases (NCDs), such as cancer, diabetes, heart disease, and mental illness, and the problems directly related to globalization, like pandemics and the health consequences of climate change.

In the 10th Revision of the International Classification of Diseases (ICD-10), the WHO defines a maternal death as: *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 (World Health Organization, 2004)*.

Maternal deaths can be further subdivided into direct and indirect maternal deaths: direct maternal deaths are those due to obstetric complications of pregnancy (including delivery and 42 days postpartum), while indirect maternal deaths are those linked to other diseases or conditions when aggravated by the physiological effects of pregnancy. A pregnancy-related death is defined in the ICD-10 as:
The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death (World Health Organization, 2004).

Thus, maternal deaths are a subset of pregnancy-related deaths, specifically, those with a putative causal relation to the pregnancy itself (1).

There are a number of problems inherent in measuring maternal mortality: vital registration systems might be inadequate, hospital records might be poor, maternal deaths occurring outside health facilities might not be registered, pregnancy status might not be disclosed, and maternal deaths might be misclassified (2).

As indirect causes of death are assumed to be causally related to pregnancy, their identification requires establishing causality. In most developing countries, the causes of death classification rely on verbal autopsy methods that are unable to demonstrate causality. Cross *et al* (3) show that distinguishing between direct and indirect causes of maternal mortality is even more important now as maternal death due to indirect causes such as HIV/AIDS and malaria begin to outnumber deaths due to direct causes in some regions of the world. Highlighting the difference between direct and indirect causes of maternal deaths will be necessary for effective monitoring and evaluation of interventions aimed at reducing mortality.

There are significant recent advances in the measurement of maternal mortality, yet also room for further improvement, particularly in assessing the magnitude and direction of biases and their implications for different data uses exists (4-6).

The WHO systematic analysis of global causes of maternal death, the WHO maternal mortality trends report and press release as well as the Institute for Health Metrics and Evaluation report show the increasing importance of indirect causes of maternal death (7-10). Its noted that 27·5% of all maternal deaths result from these indirect causes, with the highest proportion of such deaths in south Asia and sub-Saharan Africa (7-9). There is growing direct and indirect effects of non-communicable diseases on maternal mortality (10). The authors conclude that indirect causes of maternal deaths cannot be ignored and that efforts should be focused on their reduction.

The greater relative importance of indirect causes could be a result of successful addressing of direct complications of pregnancy and childbirth, and of a change in risk factors and disease patterns (7-10). Indirect causes of death include the effects of pre-existing disorders, such as HIV infection, mental disease, and diabetes, when aggravated by pregnancy. Unfortunately, this range of indirect causes is yet to be fully explored. Prompt action to thoroughly understand these causes of death and develop appropriate responses is crucial to continue worldwide progress in maternal mortality reduction.

Despite the importance of these indirect causes, key policy and strategy documents of leading international maternal health non-governmental organizations and UN organizations do not focus much on indirect causes (11-15) of maternal mortality, except for HIV infection. Predominant attention is still given to direct causes of adverse pregnancy outcomes. In particular, poor mental health as an underlying causal factor for maternal mortality and morbidity has been ignored and remains outside the stated agenda of

these organizations. This omission is despite the fact that many studies (16, 17) have shown that poor maternal mental health has far-reaching adverse effects on mother and infant.

Furthermore, suicide, as the most severe effect of poor mental health, is a leading contributor to maternal mortality worldwide and is strongly associated with violence and abuse (16).

The situation might be helped by the WHO guidelines (18) on recording of maternal mortality cause: the International Classification of Disease—Maternal Mortality. These guidelines now deem suicides during pregnancy and 12 months postpartum as direct maternal deaths, even if underlying obstetric psychiatric disorders are not diagnosed. This revision provides hope for improved future data on suicide as a cause of maternal death and provides reason for organizations to add mental health to their agenda. Implementation of several internationally ratified human rights conventions that require governments to take action to address maternal mental health as part of health services could improve the situation somewhat. Maternal mental health is essential to safe motherhood. The worldwide maternal health community should update their agendas to ensure programme effectiveness by giving attention to indirect causes of maternal death, including mental health.

In Kenya, estimates of maternal mortality show that about fifteen women die every day due to pregnancy related complications in Kenya and 20% of all deaths among mothers in the country are AIDS-related (19).

In order to improve maternal and child health outcomes in the country, the First Lady of Kenya, Margaret Kenyatta launched the 'Beyond Zero Campaign' on 24 January 2014 capital Nairobi. The new initiative also aims to accelerate the implementation of the national plan towards the elimination of new HIV infections among children. "I am deeply saddened by the fact that women and children in our country die from causes that can be avoided. It doesn't have to be this way," said Mrs Kenyatta. "This is why I am launching the 'Beyond Zero Campaign' which will bring prenatal and postnatal medical treatment to women and children in our country" (20,21).

A study by Osoro *et al* (22) on predictors of maternal mortality found that among the 72 maternal deaths recorded during the study period 42 (58.3%) were as a result of direct obstetric complications which included haemorrhage, post-partum sepsis, pre-eclampsia and abortion. Thirty-three (45.8%) were as a result of indirect causes such as peritonitis, heart disease, HIV/ AIDS, anaemia and convulsive disorders.

Muriithi *et al* (23). in a study on screening for Gestational Diabetes Mellitus (GDM) found the prevalence of an abnormal screening test in a group with risk factors was 12.0% (95% CI: 6.0% to17.9%) and in a group without risk factors it was 19.1% (95% CI: 9.5% to 28.7%). GDM prevalence was 1.08% and impaired glucose tolerance 8.65%. Obesity was the commonest risk factor (35.7% with BMI > 30).

Tsimbiri (24) in a study on perception of urgency to seek treatment for medical disorders during pregnancy found that a high percentage of women attending antenatal clinics had good perception on urgency to seek treatment in regard to obstetric emergences and fetal wellbeing.

Female Genital Mutilation/Cutting (FGM/C) is an all too painful reality for generations of women and girls, in Kenya, even in 2014. It is one of the underlying causes of increased maternal and neonatal mortality. The practice of FGM/C has immediate and lifelong psychological affects on the estimated 100 to 140 million women and girls who have been subjected to this procedure. The experience has also been related to a range of psychological and psychosomatic disorders. It is very important that this aspect is not ignored when discussing the problem of maternal mortality in Africa. This can only be changed by uncompromising political will and leadership, backed up by robust legislation, law enforcement, judicial action and community mobilization aiming at changing the social norm that drive the practice at community level. The good news is that this is happening in Kenya (25).

A recent data review in Kenya showed that 15 out of 47 counties account for 98.7% of the total maternal deaths in the country (26). The report further showed that, Out of the total number of women of reproductive age who had died, 21% was as a result of pregnancy related causes. This emphasizes the need for more accurate up-to-date context-specific data to enable specific targeting of interventions. Difficulties with measurement must not be allowed to discourage efforts to reduce maternal mortality. Regions must be encouraged and enabled to count maternal deaths and act. Use partnerships to improve the quality and availability of maternal death data. Meanwhile, continue to develop and adapt tools to measure maternal death and distinguish between direct and indirect causes of maternal mortality.

There is now evidence that the poorest in developing countries face a triple burden of communicable disease, non-communicable disease and socio-behavioural illness including obesity (27).

More detailed information, available in some

contexts, could guide targeted investment in indirect causes and could, in the long term, contribute to a reduction of maternal mortality. But at present, in regions such as sub-Saharan Africa where data are insufficient and health systems are weak, efforts and funding should not be diverted from interventions that address known causes. Examples of these interventions include skilled birth attendance; reduction of mortality from haemorrhage, sepsis, pre-eclampsia, and obstructed labour; and provision of safe abortion care and contraceptives.

Given the current slow progress in tackling maternal mortality, it is critical that effective interventions are implemented. Clearly, careful monitoring and evaluation of these interventions is crucial for determining what works and for ensuring that scarce resources are allocated effectively. This is particularly true for regions, where maternal mortality is highest and access to maternal health services is poor. There is a need to show progress in terms of impact: reduced maternal mortality, complications and disabilities, and improved health. Safe motherhood programmes are usually complex and their results strongly depend on the conditions of the country or area in which the programme is carried out.

Other than more and better evaluation to find out how and why packages of interventions work, why not try something new like the cash On Delivery Aid (COD Aid) idea from the Centre for Global Development (CGD)? (28). The possibility of applying this fresh thinking to maternal and neonatal mortality, the many challenges about addressing maternal mortality—weak health systems for service delivery and measurement—loom large.

Because intervention against either health problem will affect the other, intervening jointly against non-communicable and infectious diseases, rather than competing for limited funds, is an important policy consideration requiring new thinking and approaches as well as supporting and strengthening the health systems.

I declare no competing interests.

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