HUMANITARIAN & DEVELOPMENT PROGRAMME

REDUCING MATERNAL MORTALITY IN LOW INCOME COUNTRIES: A SOCIETAL CHALLENGE?

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Maternal mortality is an emotionally charged health indicator. The fight against maternal mortality has for decades been reduced to vertical strategies. These strategies have gradually focused on hospital care that can theoretically prevent a pregnant woman from dying. The maternal mortality level has become an indicator of health care system performance since the visible part of interventions that prevent maternal deaths are completely managed by health services. However, we must look beyond this and consider that maternal death is the result of a chain of shortcomings and lack of resources that depend on factors beyond the health care system, the result of choices made by society.

MATERNAL DEATH: AN EVENT WITH SERIOUS CONSEQUENCES FOR FAMILY AND SOCIETY

When we talk about maternal mortality we cannot help but think of the decade-old metaphor of a Boeing 747 full of healthy young women crashing every 6 hours. The emotion surrounding the death of a pregnant woman is very high, partially because it is considered avoidable with current techniques, and thus unfair. In part because the consequences of maternal death on the rest of the family can be catastrophic: the cost of childbirth care can push a poor household into extreme poverty, orphaned children are ten times more at risk of dying. In China the older children are nine times more likely to drop out of school, and the quality of life for widowers is drastically affected by the death of a mother in a family[1].

Today, mortality has been reduced by almost 50% compared to 1990[2] and yet there is still talk of a mother dying every 2 minutes in the world. This frequency is still unacceptable. Reducing maternal mortality has an overall deeper significance for reduction of premature death, the suffering of affected families and the injustice felt. Awareness of the magnitude of maternal mortality is relatively recent, at least with regards to the problems in lower income countries, as it was only in 1985 that this enormous gap in risk of maternal death between high and low income countries gained the attention of the academic world and aid agencies. At that time there were very few publications on the subject and virtually no reliable mortality figures in low income countries.

[1] Zhou H, Zhang L, Ye F, Wang H-j, Huntington D, Huang Y, et al. The Effect of Maternal Death on the Health of the Husband and Children in a Rural Area of China: A Prospective Cohort Study. *PLoS ONE* 11(6): e0157122. doi:10.1371/journal.pone.0157122, 2016.
[2] WHO, UNICEF, UNFPA, World Bank, and United Nations. *Trends in Maternal Mortality: 1990 to 2015. Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division*, Geneva: World Health Organization, 2015.

MATERNAL MORTALITY, AN INDICATOR OF HEALTH SYSTEM PERFORMANCE

The magnitude of maternal mortality has become an indicator of the performance of health systems as interventions that prevent or reduce maternal death are seemingly all managed by the health services. At the community level, health workers identify pregnant women, try to convince them to go to the prenatal clinic and explain the danger signs. The health centre identifies any problems at the prenatal consultation and either take care of them or refer them on or negotiate a birth plan. Peripheral maternity units perform normal deliveries and pick up on complications during labour in a timely manner to refer women to the district hospital. At the hospital, the complication is managed or the woman is referred to the next level up (regional or university hospital). This happens in an ideal world where poor women have full access to all the health services offered, are listened to and are respected and properly managed by competent, available and accountable healthcare professionals. This ideal world would have considerably reduced extreme poverty and inequalities. This is not the case in most countries. In any case, maternal mortality reflects the performance of a health system as a whole, as reducing mortality requires all levels of care - from community level to national level – functioning in a coordinated and optimal manner.

POLICIES TO REDUCE MATERNAL MORTALITY

Due to the reasons above, the first initiatives to reduce maternal mortality have focused on strategies that are expected to have an effect on direct determinants of mortality. In the 1980s, the aim was to increase the coverage of antenatal care. International program managers were under the impression that identifying high-risk pregnant women would enable them to effectively manage those who needed specialized care and let others (no identifiable risk) give birth at home. The problem with this strategy was the low predictive value of the identified risks and the difficulty for women to go to the hospital when necessary. Care in the nearest hospital was not always up to scratch and to receive this type of care - if there was care - was not a guarantee of survival. Perhaps worse, in most countries the risk approach has meant the antenatal consultation has focused on using a questionnaire in order to verify any possible risks, without really listening to the women or a addressing their perceived or actual problems (when the health centre had the resources to do so). The other vertical strategy initiated in the 1970s was to train traditional midwives to apply modern practices (cleanliness, razor blade for cutting the cord, etc.). Evaluations showed no benefit for mothers (in terms of survival), as the

management of severe complications requires effective hospital care[3]. On the other hand, some studies have shown a positive effect on the survival of new-borns[4].

This type of vertical programme was financed by donors first through country programmes and then through NGOs when confidence in the public governance lessened. Unfortunately, estimates of maternal mortality did not show any real decline. Donors then gradually focused on emergency obstetric care at peripheral and district hospitals, but again the estimates did not show any reduction considering the amount invested in this type of intervention. The proportion of aid given by major donors to maternal health has always been less than programmes tackling diseases such as HIV/AIDS or vaccine-preventable diseases (GAVI). This is partly due to the effective communication of AIDS activists and partly because the solutions proposed to reduce maternal mortality have proven to be too complex, with a delayed benefit that is barely attributable to a specific intervention financed by the aid[5].

MEASURING MATERNAL MORTALITY

The issue of monitoring maternal health policies in terms of reducing mortality ratios was raised. This was the case for monitoring the achievement of Millennium Development Goal 5 and it is equally crucial for monitoring progress towards the Sustainable Development Goals. Donors then pushed researchers to improve their methods of measuring maternal mortality. The most common way to measure it is to express it in terms of ratio of maternal deaths per 100,000 live births. Until 1989, the only way was to base the calculations on the registration of maternal deaths in the civil registry. However, at that time very few low income countries had a reliable civil registry (and this is still the case today in many low income countries), which assumes that for every death of a woman of reproductive age, the cause of death has been certified medically. In 1989, Graham and Brass proposed an estimation method based on a population survey and relying on a series of simple questions to a sample of women about the death of their sisters. This method was then included in the Demographic and Health Surveys (DHS) to produce estimates of maternal mortality. The disadvantage is that even with samples of several thousand households, the confidence intervals are very wide (often ± 25% around the figure found) making it impossible to compare if the interval between two surveys is less than 10 years. This is not very encouraging for donors who want to immediately see the effects of the interventions they have funded.

[3] V. De Brouwere, R. Tonglet, and W. Van Lerberghe. Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialized West? *Trop Med Int Health* 3 (10):771-782, 1998.
[4] A. Wilson, I. Gallos, N. Plana, D. Lissauer, K. Khan, J. Zamora, C. MacArthur, and A. Coomarasamy. Effectiveness of strategies incorporating training and support of traditional birth attendants on perinatal and maternal mortality: meta-analysis. *BMJ* 343:doi: 10.1136/bmj.d7102, 2011.
[5] Katerini T. Storeng and Dominique P. Béhague. "Guilty until proven innocent" the contested use of maternal mortality indicators in global health. *Critical Public Health* 27 (2):163-176, 2017.

And especially donors who want to measure cost effectiveness of grant proposals. The Bill & Melinda Gates Foundation, USAID and Grand Challenges (funded by USAID, Canada and Norway) clearly set the criteria for granting funds, and directly ask the following question: how many lives are saved by the intervention you are proposing?

Donors then funded alternative methods, in particular mathematical modelling from different data sources. This is what the Institute for Health Metrics and Evaluation (IHME), headed by Christopher Murray, the father of the DALYs, does. This is also done in a coordinated manner by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division, which have published their own figures from 2010 to 2015, which are of course different from those of the IHME and national figures from the DHS.

In 2013, WHO and UNFPA launched an initiative to improve identification of maternal deaths and their causes: Maternal Death Surveillance and Response (MDSR). Monitoring shows slow progress. In 2016, out of 103 low and middle income countries, 86 have a national policy to notify all maternal deaths, but only 46 have an MDSR committee that meets at least twice a year[6]. Where the reported deaths were compared with the number estimated by the model, the coverage is well below 50% of estimated deaths[7]. In short, reliability is yet to be achieved! It must be acknowledged that this is not really better in high income countries where research has shown that, between notification of maternal deaths to the civil registration and more precise measurements by researchers, the gaps could be enormous (sometimes less than half deaths were reported correctly), forcing high income countries to systematically increase the figures provided to the civil registration by 50% to estimate the 'real' level of maternal mortality.

We are in a somewhat paradoxical situation where 'vertical' interventions, or at least very specific interventions, have to influence an outcome - maternal mortality - that is too imprecise, delayed and too dependent on external factors in order to be useful for monitoring interventions. Is it essential? Politically speaking, yes, all governments in low and middle-income countries use the ratios just short of obsessiveness (to the nearest unit) to compare with neighbouring countries or to compare their policies with those of the previous government. Is it necessary to measure ratios in order to be successful? Not necessarily. Proxy indicators exist. The main thing is what we do with the information, starting with the data recorded in the maternal death records: what is the local analysis? Does it answer the question? What is the analysis at regional level? And on a national level? What are the solutions proposed? Few countries have managed to orchestrate the analysis at all levels and set up a response, a system that tackles the systemic (and not

[6] WHO. Time to respond: a report on the global implementation of maternal death surveillance and response. Geneva: World Health Organization, 2016.
[7] C. Deneux-Tharaux, C. Berg, M. H. Bouvier-Colle, M. Gissler, M. Harper, A. Nannini, S. Alexander, K. Wildman, G. Breart, and P. Buekens. Underreporting of Pregnancy-Related Mortality in the United States and Europe. *Obstet Gynecol* 106 (4):684-692, 2005.

only medical) causes of maternal deaths that include scrutiny at the local and regional level.

THE COMPLEXITY OF THE RESPONSE

Is such a strategy realistic? High income countries like the United Kingdom or France have organised it; low income countries like Rwanda (or middle income countries like South Africa) are on the way to achieving it, but with a rather modest impact on maternal mortality. The response requires motivated health workers to analyse and define 'medical' strategies (we know the difficulty for healthcare professionals to adopt evidence-based clinical standards) and systemic strategies (including the reference system between villages, maternity wards and the hospital). However, having motivated healthcare professionals is not enough if all the stakeholders in the health system do not get involved. For example, the referral system may be optimal, but if essential medicines are missing, the patient may die. These essential medicines may be missing because of someone in the supply chain was not doing his job or perhaps giving the medicine is not a priority. The problem may be due to lack of maintenance of equipment or lack of basic equipment. This can be even more complex when everyone's behaviour in the community is critical. This seems obvious for reducing incidence of HIV (an indirect medical cause of maternal death in Southern Africa). When it comes to maternal health, one wonders whether the relatively low interest is due to the place of women in society, especially if they are poor. Even in countries where the caesarean section is heavily subsidized or free, those who are wealthiest have benefited the most.

Reducing maternal mortality requires a complex response to the organisation of health services but also to changes in the behaviour of a large number of stakeholders both inside and outside the health system[8]. The impetus for this complex response can only become effective if there are voices in society demanding that the problem be put on the political agenda.

[8] S. Kuruvilla, J. Schweitzer, D. Bishai, S. Chowdhury, D. Caramani, L. Frost, R. Cortez, B. Daelmans, Francisco A. de, T. Adam, R. Cohen, Y. N. Alfonso, J. Franz-Vasdeki, S. Saadat, B. A. Pratt, B. Eugster, S. Bandali, P. Venkatachalam, R. Hinton, J. Murray, S. Arscott-Mills, H. Axelson, B. Maliqi, I. Sarker, R. Lakshminarayanan, T. Jacobs, S. Jack, E. Mason, A. Ghaffar, N. Mays, C. Presern, and F. Bustreo. Success factors for reducing maternal and child mortality. *Bull.World Health Organ* 92 (7):533-44B, 2014.

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