

Demonstrating programme impact on maternal mortality

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Reducing maternal mortality is one of the primary goals of safe motherhood programmes in developing countries. Maternal mortality is not, however, a feasible outcome indicator with which to judge the success of these programmes. This is due to an unfortunate combination of obstacles to measurement – some general to assessing the mortality impact of health programmes and some peculiar to estimating maternal mortality. There is a need to promote alternative views and measures of programme success, and alternative uses for information on maternal deaths.

Introduction

Measuring levels of maternal mortality in the community is not easy, particularly in developing countries. Demonstrating the mortality impact of health programmes is not easy. Putting these two together by trying to demonstrate impact using maternal mortality is entering into the realms of the impossible dream. But just like many dreams or goals, practicalities do not prevent their pursuit. This is fine up to a point, but that point has now been reached for the recently prioritized topic of safe motherhood. The resources being devoted to attempting to measure an impact on maternal mortality of safe motherhood programmes would be better spent on more effective implementation. This is not to say that the goal of maternal mortality reduction is neither worthwhile nor achievable. It is simply to disentangle the fundamental distinction between what is desirable to measure and what is measurable. The objective of this paper is to promote greater realism about the measurement-related constraints on safe motherhood.

Impact assessment – a universal challenge

Of course the desire to demonstrate improvement in health outcomes is not peculiar to proponents of safe motherhood. It is universal to providers of care to individuals as well as to entire populations, to in-

itiatives delivering medical care as well as to those affecting the broader determinants of health, and to agencies working with local communities as well as to those operating at the international scale. Similarly, judging improvement in terms of deaths averted or reduction in mortality levels is not unique to safe motherhood and neither are some of the difficulties faced. Rather, if a special case is to be argued it is on the basis of a peculiar synergy between the general constraints of measuring impact and the specific problems of measuring maternal mortality.

Demonstrating impact implies the existence of an objective or target. Targets for programmes, be these of a global, national or sub-national nature, are easy to set but can be difficult to know if met. Meeting a target implies that the programme inputs were delivered effectively. It also implies that the target can be measured, preferably before, during and after these inputs were made. Failing to meet a target can be due to inadequacies in the processes by which inputs are intended to yield outputs, but can also be due to an inability to measure change.¹ If an impact on mortality cannot be demonstrated, is this because an improvement has not occurred, in other words the programme was ineffective, or because it could not be detected?

Disentangling these options is far from straightforward and relates to two key questions: why is it

difficult to show change in the level or pattern of mortality, and why is it difficult to attribute such changes to a specific health programme? The principal explanations are well-known and include, for example, controlling for intervening factors and meeting large sample-size requirements; much has been written about these elsewhere.^{2,3,4} Moving to the specific case of safe motherhood programmes, the difficulties are further compounded by fundamental problems in the measurement of maternal mortality^{5,6} which are discussed below. This unfortunate combination of problems is a barrier to assessing impact, be it in the context of a research study, a comprehensive maternity care programme, or the global Safe Motherhood Initiative (SMI).⁷

Safe motherhood – learning lessons

The history of the global SMI has many parallels with that of the Child Survival Revolution. Both have been driven by an emphasis on mortality reduction and both have stimulated shifts in the delivery of health care from tertiary to primary levels.⁸ It is, therefore, not surprising that following in the footsteps of the target of reducing infant and under-five mortality by one-third by the year 2000,⁹ the goal of the SMI was couched in terms of reducing maternal mortality by an estimated 50% in one decade.⁷ What is surprising is the failure or reluctance of the implementers (and funders) of the SMI to draw on the lessons learnt from over 25 years of attempting to measure impact on infant and child mortality. The lessons are salutary:

- demonstrating mortality reduction owing to comprehensive or selected interventions is methodologically difficult, even in experimental settings such as in Matlab, Bangladesh;¹⁰
- downward trends in infant and child mortality are now detectable in many developing country populations,¹¹ although the relative contributions of the array of factors – social, economic and service provision – are virtually impossible to differentiate.

The ‘M’ and the ‘C’ in Maternal and Child Health do, however, have fundamentally different implications for measurement when it comes to levels and trends in mortality.

1. *Rarity*: Over a short period of observation (say, 2–3 years), maternal deaths are rare events relative to infant and child deaths. Some decision-makers have interpreted this to mean that maternal mortality is not

as great a resource priority, but human rights issues apart, it is important to recognize the basic flaw in such a comparison related to the period of exposure.¹² Women face the risk of maternal death over a period of about 35 years and, in high fertility populations, may endure this risk on 10–12 occasions. The lifetime risk of maternal death is about 1 in 10 000 in northern Europe compared with about 1 in 19 in parts of West Africa.⁶ The key issue here, however, is not one of relative merit, since clearly it is ludicrous to put maternal and child health as competitors rather than allies in the race for resources, but of relative ‘measurability’. To establish a reliable baseline level of maternal mortality, let alone to demonstrate change, requires huge sample sizes or extensive continuous surveillance. For example, to obtain current estimates of maternal and child mortality, of the same relative precision from a single-round cross-sectional survey at expected levels of, say, 500 maternal deaths per 100 000 live births and 200 under-five deaths per 1000 live births, would require sample sizes of, respectively, 324 800 and 6400 households.

2. *Ascertainment*: Both maternal and child deaths similarly suffer from under-reporting owing to the sensitivity of the event and possible feelings of culpability. For a death to be labelled a ‘child’ or an ‘infant’ death depends on knowledge of age. Although accurate age-reporting is often difficult to achieve for populations where calendar dates are not of great significance, the underestimation of levels of infant or child mortality owing just to dating inaccuracies is often minimal and can be adjusted for. For maternal deaths, ascertainment depends on knowledge that the woman was pregnant or recently delivered. The likelihood of underestimation is high in the case of those deaths occurring very early in pregnancy and those where the woman chooses to disguise the pregnancy or its termination, as for example with induced abortions.

3. *Cause-specific data*: There is now considerable evidence for the concurrence of life-threatening diseases in children and this reduces the requirement for extensive information on cause-specific mortality.³ Programme managers and funders have thus started to appreciate impact assessment in terms of all-causes data. This has not, however, denied the existence of specific disease entities but is a pragmatic response to measurement constraints, and there are now efforts to develop verbal autopsy techniques to improve the cause-specific information base for infant and child mortality.^{13,14}

The situation is different for maternal mortality. Reliable community-based data disaggregated by medical cause, and indeed by other key factors such as age and parity, are scarce and the tendency is to group diverse 'maternal conditions' under one heading. Although there is some sense of the major medical causes of maternal deaths – with the 'big five' of haemorrhage, sepsis, hypertensive disorders of pregnancy (HPD), obstructed labour and complications of induced abortion – it is not at all clear if this pattern is real or an artefact of the sources of information, particularly vis-a-vis the contribution of indirect causes. The implications of this uncertainty for both the design and evaluation of safe motherhood programmes are self-evident.

4. *Inadequate existing information:* There are still huge gaps in the data on maternal mortality, and serious doubts surrounding the figures which are available, both from routine and survey sources.¹⁵ This is not generally the case for infant or child mortality, either now or going back 10–15 years, owing primarily to the efforts of large-scale household survey programmes, such as the World Fertility Survey¹⁶ and the Demographic and Health Surveys.¹⁷ Many countries do, however, lack both national and sub-national maternal mortality figures, and for specific programmes it is rarely feasible to obtain an estimate of the current level. If the starting point is unknown, how can change be demonstrated?

5. *Demographic estimation techniques:* It is well-recognized that the development of demographic techniques called indirect estimation has been one of the major contributors to the dramatic improvement in the availability of data on both levels and trends in fertility and in child and adult mortality for the developing world.¹⁸ Many of these techniques have been available for over 25 years. The only comparable indirect technique for providing community-based estimates of maternal mortality is the sisterhood method.¹⁹ This was first tested in 1987 and in the last 7 years has proven to be the only feasible means for estimating maternal mortality – and often for the first time – in many different developing country settings.^{20,21} There are several advantages to the sisterhood method in terms of data and sample size requirements as well as analytical simplicity. However, a disadvantage, which is common to indirect estimation overall, is that it yields a retrospective rather than current estimate and this limits the suitability of the sisterhood method for demonstrating programme impact.²²

It is thus not a coincidence that there are few reliable demonstrations of programme impact on maternal mortality,^{23,24,25} and few reliable time-series on maternal mortality in developing countries.⁵

Conclusion

Reducing maternal mortality should clearly continue to be a goal of the SMI. Maternal mortality is not, however, a feasible outcome with which to measure programme impact. Whether a programme has 'worked' should be broadly interpreted to encompass both operational success or performance (the process) as well as improvements in other health outcomes, such as mild or severe complications, along the causal pathway to maternal death.²⁶ The challenge to develop feasible morbidity indicators for impact assessment is considerable. Some progress has recently been made through the development both of survey-based approaches to measuring maternal morbidity in the community^{27,28,29} and of indicators of 'near miss' episodes.³⁰ However, these innovations have only recently been applied to assess the impact of health interventions,^{31,32} and key questions remain about the validity of the measures as well as the appropriate study designs for demonstrating change. Similarly, advocating the use of perinatal mortality as a proxy indicator for maternal health needs further review since reliably measuring perinatal outcomes in the community is also problematic.

Studying maternal mortality should not, however, be abandoned since this has other benefits to safe motherhood programmes. Given the difficulties of gathering adequate data on sizeable numbers of deaths, the benefits lie not in its statistical role for impact assessment but more in the use of maternal mortality as an awareness-creating tool and as a performance indicator, particularly of quality of care. There are now numerous examples of the value of indepth studies of small numbers of maternal deaths for identifying circumstances and avoidable factors. This approach is not new and has been the basis for the Confidential Enquiries into Maternal Deaths which have taken place in the United Kingdom since the early 1950s.³³ There are, however, extremely few developing countries where such a system operates, either through special studies³⁴ or routinely, even for a subset of maternal deaths.

Just as there are other benefits to monitoring maternal mortality besides impact assessment, so there are

other benefits from the SMI besides mortality reduction. Deaths averted do not translate directly into improved maternal health. Women who survive a life-threatening episode are, by definition, cases of severe morbidity, and mortality reduction is thus likely to be manifest in an increase in recorded morbidity, at least in the short-term. Safe motherhood needs to encompass the continuum from negative to positive health, and address the four other 'D's' as well as death – maternal disease, maternal disability, maternal discomfort and maternal dissatisfaction.

When resources are scarce they clearly should be directed towards activities with maximum benefit. Whilst there are some components of maternal health services for which the scientific evidence on effectiveness is extremely limited, such as whether early detection of HPD prevents disease progression,³⁵ there is little doubt that the availability of good quality essential obstetric services can prevent many deaths once maternal health complications have arisen. These services, combined with antenatal and postnatal preventive and promotional health care for women, have the potential to avert an estimated two-thirds of maternal deaths³⁶ and up to half of perinatal deaths.³⁷ Improvements in the availability and uptake of contraception and changes in the status of women are two further important ingredients in reducing the level of maternal mortality. There is high expectation that all these components, when delivered as intended, will avert maternal deaths – the limiting factors on whether a reduction *is* achieved are essentially related to the process or operational performance. The monitoring of such process indicators is valid both in its own right and as a prerequisite to any attempts to measure health outcomes.³⁸

All these messages need to be disseminated and taken on-board both by those implementing safe motherhood programmes on the ground and by the funders who continue to dream of impact assessment. Measuring maternal mortality *is* useful for meeting certain information needs. But impact assessment is not one of them.

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Véronique Filippi, DDG, DISP, is a medical demographer. Since 1989 she has been working within the research programme Methodologies for Measuring Maternal Health in Developing Countries at the London School of Hygiene and Tropical Medicine. She has recently been involved in a study measuring the contribution of reproductive morbidity to contraceptive uptake and continuation in Turkey and on the development of indicators for monitoring progress in maternal health. She is now undertaking fieldwork in Benin on developing and evaluating 'near-miss' morbidity indicators for providing information on maternal health outcomes for impact assessment. She has both research and technical assistance experience in Bangladesh, Benin, Ghana, Egypt and Nigeria, and has provided consultancy services to the ODA (UK), Mothercare (USAID) and WHO.

Carine Ronsmans, MD DPH, has worked as a resident public health physician in Chad and Bangladesh and has recently completed a PhD dissertation on the relationship between fertility and child survival in rural Senegalese families. Her particular areas of interest include the relationship between child mortality and fertility, medical causes of maternal morbidity and mortality, and the effectiveness of health interventions to improve maternal health. She is currently examining the effectiveness of antenatal care in preventing severe maternal morbidity in rural Bangladesh, and is involved in the monitoring and evaluation of a Safe Motherhood intervention in South Kalimantan, Indonesia.

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