



Ethics in Public Health Research

Minding the Gaps: A Reassessment of the Challenges to Safe Motherhood

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Maternal and perinatal mortality reduction has remained a priority on the international health agenda for nearly 2 decades. During this time, strategies for achieving these goals have shifted in emphasis from prevention of pregnancies to provision of care. Robust evidence is limited, particularly regarding what works best in delivering care in specific health system settings and at the population level.

We describe the limited evidence base using a framework that highlights the consequences of the major gaps in measurement, evidence, and action, and we discuss existing opportunities for bridging these gaps at the policy level. Capitalizing on current global policy interests and generating demand-driven evidence is a priority for enabling documentation of progress toward reaching the United Nations Millennium Development Goals for 2015. (*Am J Public Health*. 2007;97:978–983. doi:10.2105/AJPH.2005.073692)

SINCE THE LAUNCH OF THE

international Safe Motherhood Initiative in 1987,¹ widely endorsed initiatives such as the 1994 International Conference

for Population and Development and the 1997 Safe Motherhood Technical Consultation² have emphasized the need for an increased focus on reductions in maternal mortality. Although the priority health outcomes have essentially remained the same—less maternal and perinatal mortality—the intervention strategies have shifted in emphasis over time, from prevention of pregnancies to traditional birth attendant training on safe delivery care or provision of emergency obstetric care in hospitals.^{3,4}

The reasons for such shifts are varied; they include the changing agendas of international organizations, a degree of disillusionment regarding progress, and intensified competition for scarce health resources. As of yet, what has not been available to inform these shifts is what works best for a particular health system at the population level. This lack of knowledge is a reflection of 3 significant, inter-related gaps—in measurement, evidence, and action.

Twenty years would seem like a sufficient time for these gaps to be narrowed and health burdens to be reduced. The reality is that

the gaps still limit both our expectation and demonstration of progress. The United Nations Millennium Development Goals (MDGs), which aim to reduce global poverty and, in particular, seek a three quarter reduction in maternal mortality by 2015, have now brought a new timeline into focus.² What, then, are the prospects for narrowing the gaps during the next decade?

THE MEASUREMENT GAP

—A goal which cannot be monitored cannot be met or missed.

Johansson and Stewart^{5(p2)}

The data currently available on the magnitude, trends, and differentials for maternal and perinatal mortality and morbidity are woefully inadequate in those countries where the need for data is greatest. This data deficiency is not just a consequence of underdevelopment; it is also a contributory factor.⁶ There are many historical examples of how demonstrating improvements in public health can have the power to enhance the supply of and demand for health services. Indeed, it has been argued that providing access to reliable information is

the single most cost-effective achievable strategy for sustainable improvements in health care.⁷ To date, only a few developing countries—Sri Lanka, Thailand, and Honduras, for example—have shown progress in reducing maternal mortality nationally.^{8,9} The reductions have been dramatic in some cases—for example, maternal mortality in Sri Lanka dropped 80% over a 20-year period.⁸ One reason for the success of these countries may have been that they had statistics to parade before policy decisionmakers and the public to break the vicious cycle¹⁰ of poor data, thus low priority, thus limited resources, and so poor data.

Why are the data still so inadequate and why does it matter? These 2 crucial questions are part of the vicious cycle but also part of the solution. Much has been written on the inadequacies,^{11,12} with weak routine information systems often unfairly blamed. This analysis of the problem has led to a lack of data on maternal and perinatal outcomes being considered normal. Continuing to work with dubious data is necessary to avoid a total stalling of commitment.¹³ It should be accompanied by



taking on the grand challenge of making the deaths and disabilities of women and their babies lead to ethical, political, and numerical improvements.¹⁴ Currently, there are still arguments that the magnitude of these deaths and disabilities is unacceptably high—which is undoubtedly true, but how high and for whom? If we do not know the level of the current burden of maternal and perinatal conditions, how can we know whether progress has been made and what made the difference?

Many district health directors in the poorest countries still have no reliable recent information on the number of maternal deaths, stillbirths, or early neonatal deaths in health institutions, let alone those occurring silently and tragically at home or when mothers are on their way to seek help. Few ministers of health in these countries can confidently state their national maternal mortality ratios or perinatal mortality rates. In Burkina Faso, for example, crude modeled estimates suggest that the number of maternal deaths per 100 000 live births could be 630 or it could be almost 3 times this figure.¹⁵ Major international initiatives such as the Global Burden of Disease (a part of the World Bank's Disease Control Priorities Project) do not include stillbirths, and only deaths and disabilities attributed to direct obstetric complications are captured in the maternal category.¹⁶ Maternal mortality is 1 of 3 MDGs that cannot be monitored directly, the others being poverty and HIV/AIDS.⁵

The omission from the Global Burden of Disease initiative of countries lacking data also removes those facing the greatest challenges, potentially giving an inflated impression of the proportion progressing toward the 2015 targets.

The measurement gap is therefore the difference between measurements that are sufficient for advocacy purposes (i.e., adequate and accurate data) and measurements that can inform actions (i.e., data that can help us to monitor trends). But there are now heightened opportunities for bridging this gap by building upon what may be called “heads of steam” to create momentum. These are highly topical and often sensitive issues currently at the forefront of the attention of national and international players.

The Gender Disparity

The invisibility of maternal death and disability is not just a matter of failing health information systems. It is also a symptom of constraining social environments in which the rights to life, health, and reproductive autonomy are far from reality for most girls and women.¹⁷ The comparative lack of gender-disaggregated data—not just in the health sector but also in employment, education, and wealth indicators, for example—continues to disguise profound gender imbalances.¹⁸ Recognition of the importance of prioritizing gender issues is increasing, however, and the 10th International Conference for Population and Development in 2004 reinforced key messages

on women's empowerment and equality as global goals.

There are also a growing number of countries in which governments have been encouraged to address preventable causes of maternal death that violate women's rights to life and health.¹⁹ The head of steam behind this rights-based approach can provide the momentum needed for generating and meeting heightened demands for data to show the extent and nature of discrimination, including disproportionate burdens on particular socioeconomic groups or regions. One example is Brazil, where there are well-documented inequalities between geographical regions and significant gender discrimination.²⁰

The Poor–Rich Disparity

Equity in health and reduction of poverty are not new objectives, but they are currently dominant among the international rhetoric of development.^{5,6,21} The millennium declaration has given added impetus to defining, measuring, and taking action against poverty. A variety of indicators try to capture the so-called poor–rich gap, both within and across countries. For women's health, most markers reflect health service utilization rather than health outcomes. In a recent analysis of 52 developing countries, for example, there was an average of 4 times the difference in the use of professional assistance during birth between the poorest and richest quintiles of society.²¹

Monitoring poverty-reduction strategies only in terms of coverage statistics does not, however, provide proof of equitable health

gain or indeed equitable survival.²² Increased use of health care by the poorest women is a necessary but insufficient condition for the reduction of maternal and perinatal mortality at the population level, particularly if the quality of care is not also ensured. Maternal death and disability is widely regarded as a sensitive barometer of the functioning of the entire health system,^{6,23–25} and tracking poverty differentials in these outcomes can thus also highlight market and government failures in the system. The head of steam currently behind poverty-relevant indicators, therefore, provides an opportunity to rally concerted popular and political support for better data on maternal and perinatal conditions.

The Tools-and-Technology Disparity

The need for generating reliable information on health outcomes is not unique to safe motherhood, but is part of a “gathering storm” of demands from monitoring initiatives, such as the MDGs and Poverty Reduction Strategy Papers that threatens to disrupt local health information systems by placing different priorities in competition with each other.²⁶ The storm could, however, be harnessed to reform and strengthen these systems, particularly if competition between special programs is managed and transformed into collaboration. This would require effective mechanisms for sharing lessons—such as the Health Metrics Network, which aims to improve country health information



systems²⁷—as well as for placing a premium on methods and tools of wider relevance and application than on single, vertical initiatives. The measurement needed for maternal and perinatal outcomes could act as an entry point for systems-wide improvements in the quality and quantity of health information, both institutional and population based.

Aside from the need for a larger array of validated instruments and mechanisms for identifying adverse maternal and perinatal events, there is also a need to bridge the digital- and paper-based technology divide. In 2000, a lack of paper for essential tasks such as printing health records or plotting utilization figures was standard in many poor countries where the printed word is still preferred by health professionals.²⁸ This is despite the fact that 10 years earlier it seemed the world was entering the information age and technology would help overcome major barriers in the capture, management, and dissemination of reliable, relevant health information.²⁹ The head of steam created by the ongoing global review of access to health information in developing countries³⁰ should be a stimulus to developing, testing, and sharing measurement tools and technologies as global public goods. Research will play a crucial role in helping to narrow the so-called 10/90 gap—the term for the fact that only 10% of global expenditure on health research and development is allocated to the poorest 90% of the world's population.²⁹

Bridging the Measurement Gap

The measurement gap can be bridged by using the gender disparity, poor–rich disparity, and tools-and-technology disparity to yield benefits beyond safe motherhood. Enhanced tools for monitoring differentials in the improvement of maternal care (MDG 5), for example, would also aid in tracking progress in poverty reduction (MDG 1) and gender-disparity reduction (MDG 3). Improvements in generic methods, information systems, and technologies to measure mortality would help with reducing child mortality (MDG 4), combating diseases (MDG 5 and MDG 6). Given that in 2004 neonatal deaths represented an estimated 36% of all deaths in children younger than 5 years old,³¹ it is crucial to be able to monitor these events, many of which are associated with maternal complications.

Measurement, however, is not an end in itself but rather a means for informing decisions to achieve a higher-level objective—the reduction of maternal and perinatal mortality and morbidity. The tools and mechanisms currently available are inadequate for generating timely, relevant, and appropriate information on these outcomes and thus for monitoring and attributing progress. Consequently, precious human and financial resources are being allocated to major safe motherhood interventions whose effectiveness in improving maternal and perinatal conditions at the population level is unproven. As the competition for these limited resources continues to

intensify, decisionmakers will need to answer some hard questions about the value of investment posed by political powers and by civil society.

THE RELEVANT EVIDENCE GAP

—We have evidence on how to reduce deaths and improve health.^{32(p1)}

Evidence is currently a much used and abused term in international public health. After being imported from the original domain of medicine into health policy and programs, the term has become ambiguous. In the context of safe motherhood, this ambiguity has led to more ambiguity about claims of “knowing what works.”^{33,34} Regarding the core components of the discrepancies or gaps in our understanding of safe motherhood, 3 important clarifications are needed: the certainty or quality of the “knowing” (advice vs evidence), the level of the “what” (the intervention), and the generalizability of the “works” (how evidence can be applied and reapplied in different contexts and large-scale programs).

The “Level-of-Intervention” Discrepancy

The underlying causes of maternal and perinatal death and disability are multiple, complex, and closely intertwined. The final medical causes, however, are distinct entities and are mostly amenable to specific clinical interventions for preventing death. At this latter level, the focus is on the individual woman or baby, or

both, and avoidance of death implies a secondary prevention model and thus an emphasis on emergency obstetric care. There is a huge knowledge base on best clinical practice, much of it derived from decades of accumulated conventional wisdom and increasingly proven by robust research using gold standard methods such as randomized controlled trials.

Naturally, there is still room for the improvement of specific technologies,³⁵ but it is also reasonable to claim that “we know what works” at the patient level and for many conditions. Proof of a single intervention's efficacy or effectiveness at preventing individual-level death or disability, however, is not proof of benefit for an entire population, because interventions still need to be supplied through a functioning health system and on a scale that meets demand. These systems comprise many other interventions—of known or unknown benefit—and operate in the real world in which there are a host of other influences on the death, disability, and health of mothers and babies.

At the population level, it is therefore less helpful to discuss single interventions—there are no “magic bullets” or quick fixes.³⁶ Rather, the debate needs to encompass whole composites of interventions—here called intervention strategies—that imply not only content (the components) and implementation (the delivery of components) but also context—the settings in which strategies become implemented as programs. Categorizing or



typifying intervention strategies highlights differences in emphasis in what might be called the underlying model of intent or belief. At the extreme ends, for example, are the strategies based on a philosophy or belief that emphasizes secondary prevention (emergency obstetric care) versus those prioritizing primary prevention (family planning). In practice, many developing countries have multiple and overlapping programs being implemented. Differentiating them on the basis of underlying models enables major units of resource expenditure to be isolated and valid questions to be answered on the cost-effectiveness at the population level.

The Advice-Versus-Evidence Discrepancy

Acknowledging the difference between knowing what works for individual case management versus entire societies requires political champions, at the national and international levels, who can turn to advantage the inevitable uncertainties in programming priorities that this acknowledgment will generate. These uncertainties can create a head of steam for robust evaluation and so help bridge the gap in safe motherhood between opinion and evidence.¹¹ There are areas of clinical practice whose efficacy, effectiveness, and sometimes cost-effectiveness have been rigorously assessed. Most of these areas were selected for assessment on the basis of expected health gain or cost minimization. Conversely, there is a notable dearth of robust evaluations of

major health policies or programs in safe motherhood, even though one might expect improvements in health or resource use from such evaluations.

Why is this? A multitude of explanations could be given; for example, the argument that scarce resources should be used for implementation rather than evaluation. Another set of reasons relates to the challenges regarding measurement that evaluations of intervention strategies present.³⁷ These challenges are undoubtedly significant and fall within the domain of scientific research, which must drive the search for solutions. Not only are realistic and appropriate measurement tools needed to track changes in key health outcome and process indicators, but also innovative thinking is needed to grapple with the complexities of content, implementation, and context that are characteristic of intervention strategies. Measurement and evidence gaps need to be addressed together. These major evaluations require the capture and management of a wide range of types of information, both primary (new) and secondary (existing), which can be assessed from a variety of perspectives, including the use of conventional grades of evidence related to, for example, randomized trials or observational studies.

Modeling techniques can be used on secondary data to predict potentially cost-effective intervention strategies,¹⁶ and opportunities to test these techniques may arise where enhancements to ongoing programs are possible. Technological innovation is needed in

knowledge management, both on the input side and on the user interface, and this innovation can have major spin-offs into other health service areas in which, ironically, information dearth is replaced by information overload.²⁶ The units of evidence need to be pieced together to create a coherent story of the cost-effectiveness of alternative intervention strategies in reducing maternal and perinatal death and disability and of the pathways or mechanisms by which these benefits are achieved. The novel concept of causal networks, which are complex explanatory models of cause and effect,³⁷ holds promise as a “story-telling device” and has particular relevance to the generalizability of findings through control for key contextual factors. Moreover, when fundamental questions regarding which intervention strategies achieve greatest health gain are investigated, a causal network approach would require that a host of additional subquestions be answered along the causal pathway, through primary or secondary research, thereby increasing the overall evidence base for safe motherhood. The continuous process of improving the quality and scope of evidence must, of course, happen alongside promoting use of the “best” evidence available at the time to inform policy and program decisionmaking.

The Going-to-Scale Discrepancy

There is much current debate about identifying and reducing crucial bottlenecks in the scaling-up of health services,

particularly in resource-poor countries. The nature of these bottlenecks varies, and thus there is concern about applying lessons learned in 1 country to another country or applying lessons learned in pilot or demonstration projects to another situation. In safe motherhood, there is a presumption that increased investments of human and financial resources should be channeled to doing more of the same but on a bigger scale. Increasing the dimension or coverage of care, however, can adversely affect the supply side of the health system, such as, quality assurance and the role of the private sector. Alternative service arrangements are relevant to different points in the continuum of care, from home-based self-care to emergency clinical care, and these will have different implications for scaling-up health services. Enhancing supply arrangements may, however, upset the equilibrium between supply and demand in the health system.³⁸

There is limited evidence on which intervention strategies effectively correct the underutilization of health care,¹⁷ but there is a strong sense that effectiveness will be context specific, particularly in the case of social or community mobilization initiatives. If this assumption is true, generalizability between countries and from specific evaluations is dependent on the availability and use of sensitive tools to describe the context or setting. Evaluations to identify cost-effective intervention strategies, whether comparing differences in scale



alone or also in content, are thus needed. These contextual factors are also crucial to other bases on which to judge what works at a population level—namely, equity and sustainability.

THE ACTION GAP

—*The “know–do” gap is at least as great in developing as in developed countries.*

Godlee et al.^{29(p298)}

There is a large and growing literature indicating that generating evidence on “what works best” does not guarantee its use.^{39,40} There are 2 interrelated aspects to this “know–do gap”⁴¹—accepting or taking up the knowledge and putting it into action. Developing the tools necessary to create knowledge or evidence does not ensure its application. Behavior change among the intended beneficiaries of evidence and tools is poorly understood in general and certainly no clearer in the area of safe motherhood.⁴² Bridging the measurement and evidence gap is thus a necessary but insufficient condition for reducing maternal and perinatal mortality and disability. Rapid action based on evidence also is required.

A relevant lesson that has both historical and contemporary resonance is the importance of creating demand. The recent work of Godlee et al.²⁹ on health information systems has many parallels here; they noted the continuing tendency to supply information to potential users rather than responding to and

strengthening the demand of the information needs of those users. In safe motherhood, there is now a critical mass of demand for evidence and thus tools, not the least of which is the desire to achieve the MDGs as well as the implementation of Poverty Reduction Strategy Papers. At a country level, this desire necessitates a particular type of listening partnership that identifies, fosters, and delivers on the demand for evidence by decisionmakers.

To strengthen the demand for evidence on the cost-effectiveness of safe motherhood intervention strategies, the capability of both institutions and of decisionmakers within countries must be increased. Explicitly fostering this demand fundamentally involves understanding and acknowledging the priority questions as identified by decisionmakers in the context of their own settings. Satisfying these demands will require research methods and partnerships that draw upon collaborative networks and dissemination technologies that encourage demand rather than supply. Researchers must therefore be responsive to the ultimate users of research products, seeking their perspectives on tools and evidence from the outset and identifying early applications to policy and practice. For example, methods developed to describe the health systems context of safe motherhood programs clearly have broader relevance to the health sector as a whole, and the architects can facilitate wider demand by partnering with international agencies, such as the World

Health Organization, that have broader mandates.

The researcher–user interface is crucial not only in regard to the demand for or acceptance of evidence but also for taking action for safe motherhood at a variety of levels.^{37,39,40,43} This fact highlights the importance of having a broad constituency of partners, of using interdisciplinary approaches, of positioning research in a broad international context, and of grounding the lessons in practical program implementation. Developing methods and using them to evaluate the cost-effectiveness of specific intervention strategies may be described simply as an “along-side initiative,” but the politics of such partnerships are far from simple, and time is needed to build mutual confidence and understanding. Generating and sharing demand-driven evidence and ensuring its use cannot be achieved overnight, but there are now brighter prospects for minding the gaps in safe motherhood. ■

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Contributors

W.J. Graham originated the study and led the writing. J. Hussein assisted with the writing and drafting of the article. Both authors originated the ideas and reviewed drafts of the article.

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