Global Issue

Two Decades of the Safe Motherhood Initiative

Time for Another Wooden Spoon Award?

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After two decades of the Safe Motherhood Initiative, meaningful reductions in maternal mortality and disability during pregnancy and childbirth in developing countries have not been realized. Herein, we present an overview of the Initiative and review the reasons for this lack of impact, focusing on the issue of strategic effectiveness. An appraisal of strategies that are currently recommended reveals a lack of strong evidence to support their effectiveness. Drawing from the Initiative's history, we propose that, among essential elements to achieve safe motherhood, recommended public health strategies should be supported by good evidence of effectiveness, through (cluster) randomized trials when feasible, before their widespread implementation.

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See related editorial on page 968.

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This year marks the 20th anniversary of the Safe Motherhood Initiative to redress the neglected and disproportionate problem of preventable maternal mortality in developing countries.[1–2] Strategies originally formulated to achieve the stated goal to reduce maternal mortality by 50% within one decade included the provision of appropriate prepregnancy care, family planning, good prenatal care (including adequate nutrition and detection and referral of high-risk patients), the assistance of a trained attendant at birth, and access to essential obstetric care for women at risk of complications.[3] Government commitment, community mobilization, and ongoing research and program evaluation were also emphasized.

Since the Initiative was launched, interval and current estimates of maternal mortality and other complications of childbirth reveal that the situation for mothers in developing countries is as dire as 20 years ago. Although in many settings, accurate measurement of maternal mortality is difficult to make, owing to incomplete ascertainment of both births and maternal deaths, it is estimated that about 530,000 women continue to die annually as a complication of pregnancy and child birth.[4] About 99% of these deaths are in developing countries. In Sub-Saharan Africa, on average, about one woman dies for every 100 live births compared with 1 out of 5,000 births in the developed countries. The magnitude of this disparity is further amplified by generally higher birth rates in developing countries: a woman's life time risk of maternal death is 1 in 16 in Sub-Saharan Africa versus only 1 in 2,800 in North America and Europe. Even worse is that for each maternal death, thousands of mothers suffer preventable morbidity such as hemorrhage, sepsis, and obstructed labor, which frequently results in long-term disability such as infertility, urinary and/or fecal incontinence, and fistulae. Even in this era of the human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) pandemic, maternal mortality remains the public health indicator with the highest discrepancy, in relative terms, between developing and developed countries. Furthermore, maternal mortality is directly associated with perinatal and early childhood mortality, which are also disproportionately higher in developing countries.

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The balance sheet of the Safe Motherhood Initiative has not been entirely negative. Despite the general lack of improvement in outcomes, it has expanded the understanding of the epidemiology of maternal mortality and focused attention on the five leading (and often overlapping) proximate causes in developing countries: hemorrhage, hypertension in pregnancy, infections, abortions, and obstructed labor. While the key causes in developed countries are similar, hypertensive disorders and thromboembolism are nearly as predominant as hemorrhage, and sepsis and obstructed labor are less common. There is increasing concern that HIV/AIDS might be an important cause in developing settings. Marked heterogeneity in causes between and within regions and countries and a paucity of reliable data in the most affected areas (particularly Africa) have been reported. The Initiative has also raised general awareness about maternal mortality. For example, reducing maternal mortality by 75% by 2015 is one of the eight United Nations Millennium Development Goals, supported by practically all countries and multilateral agencies. However, implicit in this inclusion is also an acknowledgment that the Initiative, so far, has not achieved its primary objective of a sustained reduction in maternal mortality and morbidity. Reported experiences of significant reductions in maternal mortality and improvements in birth outcomes in some countries during the 20th century (albeit mostly before the advent of the Initiative) provide the basis for optimism.[1]

Influential agencies and groups including the World Health Organization (WHO), World Bank, and United Nations Population Fund, sponsors of the initiative's inaugural conference, have proposed priority strategies to reduce maternal death and disability. The importance of funding and political commitment in achieving this goal is frequently emphasized.[1–3] However, other potential contributory factors are insufficiently examined, and such an appraisal should shape ongoing efforts to achieve safe motherhood. Therefore, herein we review factors that may have an impact on the success of the initiative and suggest innovations relevant to resource-constrained settings.

WHY THE STATUS QUO?

Several reasons have been advanced to explain the lack of impact of the Safe Motherhood Initiative on maternal mortality. The broad-based nature of the inaugural initiative and historical lack of strategic focus is one such factor.[5] The recognition of this problem led several stakeholders to propose priority strategies for achieving safe motherhood (see Table 1 and next section). Another factor is the lack of commitment from governments[2,6]: acknowledgment of the need to improve maternal health is not followed by concrete actions such as resource mobilization and relevant organizational changes. Another related and frequently cited factor is inadequate international funding assistance.[6] As already noted, practical government commitment (including local funding) and increased international funding are obviously important. Unfortunately, efforts to improve maternal health pale significantly in comparison to global efforts in the area of HIV/AIDS treatment and prevention, where commitments (sometimes forced upon governments, such as South Africa, by persistent advocacy and international pressure) have been followed by large-scale local and international resource mobilization involving initiatives such as the Global Fund and the $15 billion (U.S.) President's Emergency Plan for AIDS Relief.[7,8] Integrative approaches to the use of such resources might be beneficial to other global priorities, including maternal health. Lack of concerted patronage from obstetric professionals, who should have a vested professional interest in safe motherhood, has also been identified as additional factor that might contribute to the status quo.[9] In that regard, the initiative has been labeled an "orphan."[9] Arguably, obstetricians, especially acting through professional groups, could play a vital role in promoting safe motherhood. Organizations such as the Society for Maternal Fetal Medicine (United States), American College of Obstetricians and Gynecologists, American Gynecological and Obstetrical Society, Royal College of Obstetricians and Gynecologists in the United Kingdom, and Society of Obstetrics and Gynecology of Canada could take up the challenge. Some of these groups, in partnership with the International Society of Gynecologists and Obstetricians, have shown interest, but involvement is relatively minimal.[10] The impact of such involvement, however, remains to be demonstrated and should be monitored.

There remains uncertainty regarding the effectiveness of proposed safe motherhood strategies and a paucity of relevant information.

A major setback to the Safe Motherhood Initiative was the widespread implementation of strategies that did not prove effective in reducing maternal mortality.[1,2] Such strategies

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Table 1. Prioritization of Safe Motherhood Strategies by Influential Organizations/Groups and Quality of Supporting Evidence

	CU (AMDD), 1999[13,14]	Institute of Medicine, 2003[15]	WHO, 2005[16]	World Bank*[17]	UNFPA, 2005[18]	Lancet Group, 2006[19]
Key strategies†						
Skilled birth attendance		1	1	✓	✓	1
Emergency obstetric care	1	✓ (as part of 2)		✓	✓	
Essential obstetric care		2				
Postpartum care		3	✓ (as part of 1)			2
Antenatal care		4		✓		2
Family planning		✓ (as part of 4)		✓	✓	2
Preconceptional care		4				
Abortion care				✓		2
Type of supporting evidence‡						
Experimental (randomized trial)						
Quasi-experimental/nonrandomized	X (?)					
Observational (cohort or case control)	X					
Prospective before/after or time series						
Descriptive studies	X	X	X	X		X
Cost-effectiveness analysis						X
Expert opinion	X	X	X	X		X
Proxy (effective clinical interventions)		X				X

CU (AMDD), Columbia University's Averting Maternal Death & Disability program; WHO, World Health Organization; UNFPA, United Nations Population Fund; Lancet Group, Lancet's Maternal Survival Series Steering Group.

* Position obtained from documents by World Bank staff and published by the bank with disclaimers that these do not necessarily reflect the official position of the bank.

† Numbers indicate level of prioritization beginning with the most important; ✓ indicates no explicit prioritization was provided (or mentioned as part of another strategy).

‡ Descriptive studies include situational or ecologic or historical/retrospective temporal trend analyses. X indicates this type of supporting evidence was used; (?) indicates uncertainty regarding use of this type of evidence. Data from Harris RP, Helfand M, Woolf SH, et al. Methods Work Group, Third US Preventive Services Task Force. Current methods of the U.S. Preventive Services Task Force: a review of the process. Am J Prev Med 2001;20(3 Suppl):21–35; supporting evidence not explicit in UNFPA document.

included identification of at-risk pregnancies and training of traditional birth attendants and were based mainly on the plausibility of their effectiveness, not solid evidence thereof.[11–12] Drawing from this experience, and given the reality of limited resources, the accrual of good evidence of effectiveness before widespread implementation should be a guiding principle for contemporary safe motherhood strategies and programs.

CURRENT SAFE MOTHERHOOD STRATEGIES AND PROGRAMS

There is good evidence and consensus that many individual clinical interventions affecting major causes of maternal morbidity and mortality are available and effective if properly applied. These interventions are appraised in resources such as the WHO Reproductive Health Library and Cochrane Library. Examples include active management of placental delivery with oxytocics, blood transfusion, magnesium sulfate for seizure prophylaxis, antibiotics to prevent and treat maternal infection, and properly timed operative delivery. Effective contraception is the ideal primary preventive intervention given high rates of unplanned and unwanted pregnancy. The Safe Motherhood Initiative has therefore been concerned with identifying the best public health methods (ie, strategies) for optimizing delivery of packages of these individual interventions to large populations. The priority strategies currently recommended by key stakeholders are presented in Table 1:

- Columbia University's AMDD program, funded by the Bill & Melinda Gates Foundation, has, since 1999, advocated emergency obstetric care (basic and comprehensive) as the critical strategy to reduce maternal mortality.[2,13,14]
- In 2003, the Committee on Improving Birth Outcomes of the Institute of Medice (IOM) weighed in with four prioritized recommendations, with skilled attendance at deliveries as the first.[15] Skilled attendance included the ability to arrange essential obstetric care, including emergency care, for home or institutional deliveries.
- The WHO, in the 2005 World Health Report,[16] similar to the IOM, prioritized professional skilled care. Additionally, the

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WHO specifically discouraged an exclusive focus on emergency obstetric care and distinctions between routine and emergency services (since both can be provided at the same facility). The WHO further emphasized the imperative for first-level and referral services to be introduced simultaneously and identified postpartum care as a major component of skilled care.

- The World Bank did not explicitly prioritize, although skilled attendance and emergency obstetric care were among recommended strategies in published documents.[17] The Bank envisioned the attendant to operate within a well-functioning health system (with adequate supplies and infrastructure) and with community participation.
- The United Nations Population Fund promotes a three-pronged approach consistent with strategic recommendations from the other organizations but without explicit prioritization.[18] Family planning is considered the starting point.
- The Lancet's Maternal Survival Steering Group (a gathering of experts), like the IOM and WHO, prioritized professional birth attendance, but further specified that attendance should preferably occur at a health facility, not at home.[19] This "professional intrapartum care" presupposes coverage of the first 24 postpartum hours and provision of emergency services, such as operative interventions and transfusion.

These advocated strategies are composed of elements from the initiative's inception that have been modified to various degrees. An emerging consensus in favor of prioritizing skilled birth attendance is apparent. Nevertheless, flexibility is probably necessary. For example, some (including a committee member dissenting from the IOM position regarding skilled attendance) have argued that training of traditional birth attendants may be a viable or interim solution where the health system is under-developed and most births take place at home.[16] Moreover, although traditional birth attendant training has not been shown to improve maternal outcomes, it may improve other outcomes such as perinatal mortality.[20]

Although these currently proposed strategies are reasonable (and draw from past experience to exclude some strategies) it is apparent that they are not backed by strong quality evidence (Table 1). In fact, the IOM and the Lancet group explicitly acknowledge this lack of rigorous data.[15,19] In general, recommendations are based on a combination of expert opinion, historical correlations, ecologic studies and situational analyses of underlying causes.[14–16,19] For example, evidence presented in favor of skilled attendance included reductions in maternal mortality in Sweden coincident with the introduction of skilled midwifery care, and a correlation between countries with high levels of skilled attendance and low maternal mortality. One nonrandomized trial from Bangladesh was used to support the emergency obstetric care strategy,[14] even though this was not the explicit strategy studied, and reported benefits were not directly attributable to it. Two cost-effectiveness analyses with data source limitations were also cited concerning the health center care strategy of the Lancet group.[19] Therefore, while these strategies may appear promising, whether they will yield measurable improvements remains to be seen.

SAFE MOTHERHOOD: ANOTHER WOODEN SPOON?

Pertinently, the Safe Motherhood Initiative coincided with the proliferation and use of evidence from randomized controlled trials (RCTs) in obstetric practice.[21] Archie Cochrane contributed to this growth by emphasizing careful evaluation of health care interventions, especially in the form of RCTs, famously according the Wooden Spoon Award to Obstetrics as the specialty that least used evidence from randomized trials to inform practice. Unfortunately, the use of such evidence-based obstetric interventions, including some that are effective against causes of maternal mortality, lags in developing countries.[22] Therefore, a key challenge to the Safe Motherhood Initiative is to find effective public health strategies to optimally deliver and maximize the impact of effective clinical interventions, within complex health systems with multiple competing priorities and resource constraints.

The multiplicity of strategies reflects both this complexity and uncertainty about strategic effectiveness.[12] As demonstrated, these strategies are premised on situational analyses of underlying barriers and causes, retrospective scrutiny of ecologic and temporal trends, and expert opinion suggesting effectiveness. There remains uncertainty regarding the effectiveness of proposed safe motherhood strategies and a paucity of relevant information. We propose that an essential step should involve demonstrating effectiveness before universal implementation of the proposed strategies. Analogous to the RCT for clinical interventions, cluster randomized trials represent the gold-standard design for evaluating the effectiveness of these pub-

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lic health strategies, which transcend individual patients or clinical interventions, incorporate wider health system considerations, and target relatively large populations. Cluster randomized trials minimize the contamination that would occur with individual randomization. When cluster randomized trials are used, methodological tools, such as appropriate unit of inference, matching or stratification, and accounting for clustering in sample size estimations and analyses, should be applied to obtain valid estimates of effect.[23] Indeed, a recent review of strategies to reduce maternal mortality,[19] identified just four randomized trials with maternal mortality as outcomes, only two of which evaluated specific public health strategies (as opposed to clinical interventions). These strategies were an educational intervention involving women's groups in Nepal and training of traditional birth attendants in Pakistan.[20] We acknowledge that cluster randomized trials are not always feasible. Therefore, at a minimum, demonstration projects or monitoring that incorporates other good designs including nonrandomized trials, controlled before-and-after studies, or other prospective and analytic designs should be used to evaluate innovative strategies. Perhaps another Wooden Spoon Award, might provide the needed impetus?

In conclusion, increased consensus regarding promising public health strategies for achieving safe motherhood should be accompanied by sustained practical commitment from governments, adequate national and international funding, accurate monitoring of maternal mortality and related outcomes, individualization by setting, and continued advocacy. Optimal participation of obstetric professional groups might enhance the mobilization of material and technical resources. Importantly, experience from the past 20 years dictates that sensible assumptions of strategic effectiveness should be proved correct through well-designed studies before widespread policy implementation.

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