Delivering the Millennium Development Goals To Reduce Maternal and Child Mortality
A Systematic Review of Impact Evaluation Evidence

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Delivering the Millennium Development Goals to Reduce Maternal and Child Mortality

A Systematic Review of Impact Evaluation Evidence

—Overview—
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Cover photo: Nigerian woman and child. Arne Hoel/World Bank.
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The complete evaluation and the Management Response are available on IEG’s website:
https://ieg.worldbankgroup.org/publications/mch

The coded database of the included impact evaluations is also on the IEG website:
https://ieg.worldbankgroup.org/Data/mch/mch_dataset.xlsx
## Abbreviations

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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>IEG</td>
<td>Independent Evaluation Group</td>
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<tr>
<td>IMCI</td>
<td>Integrated Management of Childhood Illness</td>
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<td>MCH</td>
<td>maternal and child health</td>
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<td>MDG</td>
<td>Millennium Development Goal</td>
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<td>SBA</td>
<td>skilled birth attendance</td>
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Acknowledgments

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Overview

Introduction

Improved outcomes for women and children—more education, lower fertility rates, higher nutritional status, and lower incidence of illness, among other outcomes—have broad individual, family, and societal benefits. For nearly 15 years, the targets of the Millennium Development Goals (MDGs) have been a bellwether for progress, particularly for maternal and child health—a two-thirds reduction in under-five mortality in MDG 4 and a three-quarters reduction in the maternal mortality ratio in MDG 5. After more than a decade of effort, these goals have proved difficult to attain and are unlikely to be achieved by 2015.

Interventions that may improve maternal and child health are numerous and spread across many development sectors. Even when such interventions are known to be effective in controlled conditions, however, questions remain about implementation, delivery, and uptake. This review gathers all available impact evaluation evidence of fielded interventions that aim to improve skilled birth attendance and reduce maternal and child mortality rates. To aid policy makers, it reviews effectiveness evidence from multiple sectors on the distal causes of maternal and child mortality, complementing the body of effectiveness evidence from reviews specific to the health sector (such as the *Lancet* series on maternal and child health) that focus on proximate interventions for intermediate outcomes.

This systematic review by the Independent Evaluation Group is a learning exercise that looks beyond the World Bank’s experience. In doing so, it draws on impact evaluations not limited to those conducted by the Bank or on Bank projects. It is intended to be used as a reference for practitioners in the Bank and elsewhere who have an interest in interventions that have demonstrated attributable improvements in skilled birth attendance and reductions in maternal and child mortality. This review also identifies important gaps in the impact evaluation evidence for interventions that may be effective in reducing maternal and child mortality but whose impacts have not yet been tested using robust impact evaluation methods.


Photo: Jonathan Ernst / World Bank, Adwenpaye, Ghana.
Background

Worldwide, maternal deaths have decreased by 47 percent from 1990 to 2010—welcome progress but still far from the 75 percent reduction targeted by MDG 5 (WHO 2012). Maternal mortality rates remain 15 times higher in developing regions than in developed regions, and Sub-Saharan Africa and Southern Asia together account for 85 percent of global maternal deaths. Clinical trials have demonstrated an ability to prevent or manage many of the causes of maternal death through clinical interventions administered by a skilled health care provider with adequate equipment and supplies. For this reason, and because maternal mortality data are problematic, skilled birth attendance (SBA) is included as the main intermediate indicator for MDG 5 in the hope that where SBA is high, reduced maternal mortality will necessarily follow. The proportion of deliveries in developing regions attended by skilled health personnel increased from 53 percent in 1990 to 63 percent in 2008 (United Nations 2012). Despite these gains, progress is still insufficient to achieve MDG 5: Only ten countries have succeeded in meeting MDG 5, and just nine additional countries are on track to achieve it by 2015 (WHO and others 2012).

In comparison to maternal mortality, reducing child deaths has seen greater progress. Globally, the mortality rate for children under five declined by 41 percent from 1990 to 2011 (UNICEF 2012). Neonatal mortality has also decreased during this time, but it has done so more slowly, and the share of under-five mortality continues to grow (IGME 2011). Notwithstanding significant recent progress in improving child health, the majority of child deaths take place in poor, rural, and remote areas affected by severe human resources shortages, minimal infrastructure, and inadequate health service quality (UNICEF 2009).

Causes of maternal, neonatal, infant, and under-five mortality are distinct, although maternal and neonatal mortality may be closely linked, as are infant and under-five mortality. The medical literature indicates hemorrhage, hypertension, and infections to be the major causes of maternal death during pregnancy and childbirth (WHO 2012). Moving along the continuum of care, most newborn deaths are caused by infections such as tetanus, intrapartum complications, and preterm birth (Lawn and others 2006), whereas the causes of death become very different for infant and under-five mortality, where infectious diseases—especially pneumonia, diarrhea, and malaria—are responsible for more than half of deaths (UNICEF 2008; Black, Morris, and Bryce 2003).

Factors influencing maternal and child health are broad and complex, extending beyond the health sector to issues of governance; health utilization by individuals, households, and communities; and services from other sectors as well, including energy, water and sanitation, and education. In figure 1, the report develops a simplified conceptual model based on UNICEF’s framework on the causes of maternal and child deaths (UNICEF 2009) that outlines the causal pathways by which various interventions may affect maternal and child health (MCH) outcomes. It also includes a taxonomy to classify the wide spectrum of potential interventions into three main categories: governance, provision (further subdivided into health—sometimes referred to as supply-side interventions in the health literature—and other sectors), and utilization (sometimes referred to as demand-side health interventions).

For most causes of death, clinical recommendations are known and treatments are relatively inexpensive. Yet maternal and child mortality continue to realize the least progress of all the MDGs. Knowing what to do is no longer the problem; knowing how to do it remains a challenge. The central problem is how to induce providers and users to adopt treatments and protocols established in the medical literature. This Independent Evaluation Group (IEG) review, therefore, focuses on field evidence of policy interventions in developing countries.
Objectives of the Review

This report reviews all Bank and non-Bank impact evaluations with estimates of any intervention’s impact on at least one of five MCH outcomes—the incidence of SBA, maternal mortality, and neonatal, infant, and under-five mortality (see box 1). The selected indicators encompass the entire continuum of MCH care and are used to track progress on MDGs 4 and 5. Because it is the main intermediate indicator for MDG 5, the report also examines SBA as an intervention: It looks at the effects of skilled attendance at birth on health outcomes.

To aid policy makers seeking to reduce child or maternal mortality, this review takes an outcome-oriented approach, explicitly recognizing the multisectoral nature of MCH by aiming to collect all impact evaluations that include the above MCH outcomes, regardless of the type or sector of intervention that produced them. This is in contrast to the intervention-oriented approach of most existing systematic reviews, which examine the effects of a single intervention type. Accordingly, this review aims to answer the following questions:

- What do we know about the attributable effects of available interventions on reducing maternal and child mortality and increasing SBA?
- What do we know about the effects of increasing the number of births attended by skilled health personnel, as indicated by MDG 5, at the local or national level?
- What important knowledge gaps remain on interventions to reduce maternal and child mortality?

The purpose of reviewing impact evaluation evidence in this systematic review is not to supplant existing evidence and received wisdom, but rather to understand how impact evaluation evidence compliments, and perhaps challenges, current strategic beliefs regarding the best ways to work to reduce maternal and child mortality.

Methodology and Scope

A comprehensive search for all impact evaluations (including those of the World Bank) on the five target outcomes was conducted using electronic database searches, screening and hand-searches, and literature snowballing, and included both published and unpublished “grey literature” seeking peer review. The inclusion criteria required that studies (i) be experimental or quasi-experimental impact evaluations.

Water and sanitation, education, energy, and governance (representation and accountability) interventions consistently reduced neonatal, infant, and under-five mortality.

Photo: Stephan Bachenheimer / World Bank, Bolivia.
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**Figure 1** Framework of Interventions Reducing Maternal and Child Mortality

**Inputs**

- Governance
  - Strategic planning
  - National guidelines
  - Resource generation
  - Partnerships

**Provision**

- Health sector
- Other sectors

**Utilization**

- Individuals, households, communities

**Intervention areas**

- Health sector
  - Service delivery
    - Delivery modality
  - Service packages
  - Health infrastructure
  - Service management
  - Health financing
  - Health workforce
  - Health information systems
  - Medical products and technology

- Other sectors
  - Water and sanitation
  - Education and training
  - Income generation, labor market, personal or business finance
  - Energy
  - Agriculture and food security
  - Transportation infrastructure

**Seek to affect**

- Availability
- Affordability
- Efficiency
- Equity
- Quality of services
- Behavioral change
- Cultural norms
- Practices

**Outputs**

- Improved access to essential maternal and child care
- Improved access to basic nonhealth services and nutritious food
- Improved healthy practices and lifestyles
- Improved care seeking behavior and utilization

**Outcome**

Reduced maternal and childhood mortality
with a credible counterfactual, (ii) be completed between 1995 and 2012, (iii) evaluate an intervention taking place in a low-income or middle-income country, and (iv) report impacts on at least one of the mortality (or SBA) outcomes of interest.

By limiting the scope of the review to those impact evaluations that report estimates on the “ultimate” outcomes of interest (mortality and SBA), the review is able to report on the evidence for theories of change in interventions. Were the review to include impact evaluations that only reported intermediate outcomes, it would still be reliant on theories rather than causal evidence in some parts of the logic model moving from inputs to outcomes.

In an effort to provide viable large-scale policy options, efficacy studies and evaluations of interventions of a clinical nature were not selected for inclusion, as these tend to be too small and tightly controlled in ideal conditions for practical applicability in the field. Studies not based on a counterfactual—what would have happened in the absence of the program—may be liable to confounding explanations of their results. Experimental and quasi-experimental impact evaluations of field studies, properly executed, can overcome these challenges.

The search exercises produced more than 7,000 studies of potential import, each of which was carefully reviewed according to the above inclusion criteria to yield 95 relevant studies. Of those, 62 studies were rated AAA (high quality) or AA (medium quality) based on the strength of their internal validity (see box 2) and are included in this review. These 62 studies include 68 impact evaluations; some studies included multiple treatment arms, which are counted as separate impact evaluations.

Evaluation quality has implications for findings and policy decisions. Impact evaluations with a AAA rating connote established causality of the impact estimates, whereas those with a AA rating connote that causal claims are likely, though less well established. Evaluations graded A leave doubt to the causal claims of their reported associations, often in spite of the best efforts of the authors given the available data, although these may be more reliable than other types of evaluation (for example, multivariate regression or single differencing). Only the 68 impact evaluations rated AAA and AA were of sufficiently high quality to be included in the analysis of the systematic review.

Within the 68 impact evaluations included, nearly half reported SBA outcomes, and roughly one-third had neonatal or infant mortality outcomes. Just over a quarter of them reported under-five mortality outcomes. Just over 10 percent give findings on maternal mortality, likely because most studies have a sample size too small to detect changes in such an infrequently occurring outcome as maternal mortality.

<table>
<thead>
<tr>
<th>Impact Evaluation Outcomes and Quality Rating</th>
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<tbody>
<tr>
<td>AAA rating</td>
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<tr>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Skilled birth attendance</td>
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<tr>
<td>Neonatal mortality</td>
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<td>Infant mortality</td>
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<td>Under-five mortality</td>
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<td>Maternal mortality</td>
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Source: IEG.
Impact evaluation strategies are often grouped into two families. *Experimental* includes randomized control trials, and *quasi-experimental* includes differences (second order or higher), regression discontinuity, instrumental variables, or matching techniques.

The search process identified 95 studies that qualified as impact evaluations of field interventions from developing countries with estimates of impacts on SBA or maternal or child mortality. These were subjected to a quality review to assess risk of bias. The process was based largely on strength of the internal validity of the study’s identification strategy, that is, the degree of confidence that the reported impact estimates are unbiased and consistent, such that they establish a credible counterfactual.

The quality review criteria were based on previous impact evaluation work by IEG (IEG 2012) and over the following dimensions of internal validity:

- Establishment of identifying assumptions of the employed estimation strategy
- Alternative methods giving the same result
- Robustness checks to alternative specifications
- Representative sampling strategy
- Freedom from data generating and collection challenges
- Sufficient power and time to detect results.

Elements of construct validity (particularly with respect to mortality measurements) and external validity (for example, having a representative sample of policy interest) were also taken into account. Impact evaluations were rated AAA if all or nearly all of the criteria were met, the critical assumptions of the identification strategy were well-established, and there were few if any remaining threats to internal validity. Evaluations rated were AA if most but not all criteria were met and there were no serious concerns with the identification strategy, although some may remain untested or unclear. Because impact evaluations with an A rating retained major concerns with the validity of the identifying assumptions, they are not used in the analysis of this systematic review.
These evaluations come from both inside and outside the World Bank and cover a wide array of interventions. The World Bank was involved in 18 of the 68 included impact evaluations: 6 AAA and 12 AA. Of these, 9 had a World Bank author or coauthor, and 15 were of World Bank projects or projects supported by Bank financing.

As an analytic approach, the systematic review closely inspected the studies for trends of impacts within types of interventions. Because the coverage of interventions in the data for this review—as with all systematic reviews—is necessarily incomplete, this study focuses on reporting promising interventions that consistently find significant results rather than asserting that some interventions “do not work.” It is worth noting that there are many reasons why a study may yield a null result besides the intervention having no impact, including, among other things, challenges of statistical power, contamination, attrition, uptake, and implementation.

Key findings are given only where established by AAA impact evaluations; AA impact evaluations are used in support of findings established by AAA impact evaluations, to suggest potential trends where no AAA evaluations are available, or to illustrate the importance of considering evaluation quality when drawing conclusions. Counts of the SBA and mortality outcomes reported by the included impact evaluations are given in figure 2, decomposed by quality of study (note that a single impact evaluation can report results for multiple outcomes).

Findings

The systematic review provides findings on what is known about the effects of interventions on SBA, maternal mortality, neonatal mortality, infant mortality, and under-five mortality, as well as the effect of SBA on these and other intermediate maternal and child health outcomes. Finally, the review highlights the main gaps in the body of impact evaluation knowledge for maternal and child mortality.

What Do We Know About Interventions that Reduce Maternal and Child Mortality?

The body of evidence from impact evaluations is still nascent and thin, so it does not cover all project variants in an intervention category or all settings in which that intervention may be applied. Concerns of external validity—how well lessons learned in one context can be applied to another context—are not unique to impact evaluations or systematic reviews; indeed, all evaluations have this challenge when applied beyond the original setting. Although the degree of generalizability is never 100 percent, neither is it zero. Because the number of impact evaluations of any intervention type is insufficient to analyze the factors that may explain variation in success when the impact evaluation evidence is mixed, this review indicates where the existing evidence is consistent, or nearly so, for a type of intervention affecting a given outcome or population. The appropriateness of transference of these lessons must be based on their judicious application by policy makers to the target context.

Using the most reliable evidence available, findings on interventions are presented for which the existing impact evaluations demonstrate a high degree of consistency in attributable reductions of mortality indicators for mothers and children.

Skilled Birth Attendance as an Outcome: Promising Interventions

Because the main indicator for reducing maternal mortality in MDG 5 is “the proportion of births attended by skilled health personnel,” the systematic review begins by investigating impact evaluations of interventions that affect SBA rates at a national or local level.

Demand-side financing interventions in Bangladesh, India, Nepal, Kenya, Rwanda, and El Salvador improved SBA by increasing a household’s ability to pay and by giving health care providers incentives through
conditional cash transfers—targeted primarily at poor households—and voucher programs.\[^{26, 11, 30, 31, 28, 23, 4}\]

Longer exposure to the interventions may be necessary to produce an impact. Indeed, the only demand-side financing intervention that did not produce significant results, Progresa in Mexico, was evaluated after only 18 months, perhaps before the project had time to affect behavior.\[^{35}\]

**SKILLED BIRTH ATTENDANCE AS AN INTERVENTION: PROMISING INTERVENTIONS**

Very few impact evaluations are able to isolate the effects of SBA. Most often, interventions with impact evaluations combine SBA with other components. Although the outcomes below are attributable to the interventions as a whole, it is unclear if the effects are due to the SBA component, to some other component, or to an interaction between them.

Evidence from Ukraine and China indicates that a combination of complementary intervention types—such as strengthening the SBA workforce while improving mothers’ knowledge and information—can effectively reduce maternal mortality.\[^{28, 14}\] However, a similar intervention in India found no such effect.\[^{34}\]

Thin but internally robust evidence indicates that interventions with SBA as a major component reduced under-five mortality in Brazil and Uganda,\[^{32, 9}\] improved breastfeeding in India and Pakistan,\[^{26, 34, 7}\] and improved immunization rates and anthropometrics of children in Uganda.\[^{9}\]

**Box 3**

**Evidence for Large Global Strategies Is Thin and Often Mixed**

**Integrated Management of Childhood Illnesses**

The Integrated Management of Childhood Illnesses (IMCI) Program has been implemented in more than 100 countries, yet impact evaluation evidence of IMCI effects is both thin (only two studies included in the review) and mixed.\[^{1, 6}\] An AAA study on an IMCI program in India found significantly reduced early neonatal mortality and infant mortality in home births but no effect on facility births. No impact was found on under-five mortality from an AA quality study in Bangladesh.

**Safe Motherhood Programs**

Though evaluations of safe motherhood programs consistently demonstrate at least marginally significant positive impacts on increasing the proportion of institutional births, the evidence comes from only three studies in two countries in a single region, despite the program’s worldwide application.\[^{14, 24, 2}\] In China, complementary and reinforcing strategies increased SBA,\[^{14, 24}\] and also caused significant but extremely small reductions in maternal and neonatal mortality (the latter of which was only marginally significant).\[^{14}\] In contrast, large effects were found for some outcomes in an application of the program in Indonesia, which placed strong emphasis on community-based care: a significant one-third decrease in the odds of a child dying within five years, and a marginally significant (though still large) effect on both infant mortality and SBA.

**Demand-Side Financing**

Conditional cash transfers, vouchers, and other financial incentives significantly increased SBA in both low- and middle-income countries.\[^{4, 11, 23, 26, 28, 30, 31, 35}\] Only one AAA study of a conditional cash transfer included infant mortality as an outcome, finding a significant reduction from Mexico’s Progresa.\[^{30}\] No impact evaluations of demand financing interventions demonstrated a significant effect on maternal or neonatal mortality or even included under-five mortality as an outcome.

**Increasing the Proportion of Births Attended**

Although it is the main indicator for MDG 5, there is no impact evaluation evidence that solely “improving the proportion of births attended by skilled health personnel” improves mortality outcomes. Neonatal mortality was not significantly affected in India, as reported by an AAA and AA study.\[^{26, 23}\] The AA study also found no difference for maternal mortality outcomes in its most robust estimation strategy, although statistical power may have been an issue. Still, interventions that combine SBA with quality and access elements can improve mortality outcomes.
interventions that are attributable to integrated MCH interventions promoting SBA through complementary and reinforcing strategies.

Specifically, the successful interventions aimed to promote SBA by bundling training of health workers with increasing knowledge and information, as in Ukraine’s Mother and Infant Health Project[29] and in China’s Safe Motherhood Program by additionally bundling an insurance scheme.[14]

These two successful interventions had both provision and utilization (supply side and demand side) components. Those studies that only had one—provision or utilization—did not demonstrate a detectable reduction in maternal mortality.

**NEONATAL MORTALITY: PROMISING INTERVENTIONS**

AAA-rated studies of interventions in India and Pakistan to improve mothers’ knowledge and information to change home-based care practices, particularly those delivering service packages at the community level, demonstrate significant reductions of neonatal mortality—in the range of 14 percent to 30 percent.[6, 7, 34]

Interventions that provided newborn home visits along with community mobilization, such as women’s group education sessions in India,[6, 22] Bangladesh,[3] and Pakistan,[7] significantly reduced neonatal mortality.

Evidence from Indonesia and Taiwan, China, found that increasing girls’ formal education through improving access to schools can significantly reduce newborn mortality.[13, 12]

One AAA study found that increasing governance and the political agency of women was extremely important to reducing neonatal mortality in India.[5]

**INFANT MORTALITY: PROMISING INTERVENTIONS**

Interventions in nonhealth sectors consistently and substantially lowered infant mortality. A variety of
interventions to reduce pollution, identify sources of water contamination and improve quality, and increase school enrollment rates addressed the largest causes of child death (pneumonia and diarrhea) and lowered infant mortality rates in countries in Latin America and East and South Asia.[16, 33, 10, 13]

Results from health sector provision interventions are limited and complex, although interventions to train health workers to provide family health services across the continuum of care and at the community level were found to have contributed to mortality reductions in Brazil, Indonesia, and India.[25, 32, 2, 6]

Limited but consistent evidence also suggests a link between expanded participation in processes that affect the provision and funding of public health services and reductions in infant mortality.[5, 18, 8, 20]

**Under-Five Mortality: Promising Interventions**

Impact evaluations of interventions in nonhealth sectors consistently found large and significant effects in under-five mortality. These interventions included water and sanitation programs in Argentina, Bangladesh, Colombia, and Bolivia as well as a monitoring and evaluation project in Uganda and an education initiative in Indonesia. In some cases the reductions increased among younger mothers (Indonesia) and the poor (Argentina).[12, 9, 17, 15, 19, 27]

Evidence from Brazil, Bolivia, and Uganda suggests that public participation in government budgets and in decisions on which health projects to implement and how to monitor health workers’ compliance reduces under-five mortality because the public is more likely to both demand adequate health financing and use health services that they trust.[27, 18, 9]

Health sector interventions, such as *Programa Saúde da Família* in Brazil, affected only moderate reductions in under-five mortality compared to projects outside of the health sector.[32] In Bangladesh and Indonesia, service packages that combine interventions across the continuum of care also produced significant reductions in child mortality.[21, 2] An AA impact evaluation of a similar intervention in Bangladesh was not significant, although this may be due to statistical power issues.[1]
DISTRIBUTIONAL IMPACTS

In 2004, views in the World Bank on rising to the challenges of MDGs 4 and 5 focused on the fact that the poorest countries—and within those countries the poorest households—had the worst maternal and child health and were less likely to use effective interventions (World Bank 2004).

The findings of this review are consistent with those views. Though utilization among the poor remains a challenge, the impact evaluations reviewed found particularly beneficial outcomes among participants with poorer socioeconomic status. Although less than 30 percent of those evaluations reported heterogeneous effects of any type, those that differentiated results by socioeconomic status consistently reported larger impacts among the poor. Countries with a heavier child mortality burden at baseline or fewer births attended by skilled health personnel are more likely to see an impact on those outcomes.

QUALITY OF EVIDENCE

When considering evidence, decision makers should take the quality of that evidence into account—even for impact evaluations. For example, in infant mortality, all three AAA impact evaluations of health services found attributable reductions in infant mortality. Yet health services had mixed results if no discernment of evaluation quality were made and AA and AAA studies were grouped together, as only two of four AA studies of similar interventions reported significant effects. This observation also underscores the need for more high-quality evidence.

EXTERNAL VALIDITY

Interventions affecting child mortality are multi-dimensional and causally complex. Interventions affecting maternal mortality and SBA are causally simpler but require better-functioning health systems on both the provision and utilization sides. Contextual and environmental factors likely influence both sets of outcomes. See box 3.

The particular contextual dimensions affecting interventions’ external validity—or generalizability from one setting to another—are unknown and likely vast. With the limited set of impact evaluations available, tests of these associations are also limited. Still, this review does explore how literacy, income, and baseline maternal and child mortality and SBA are associated with the likelihood that an intervention will produce a statistically significant impact.

The evidence indicates diminishing marginal likelihood of a significant improvement to baseline levels of SBA and neonatal, infant, and child mortality. Interventions in more challenging areas are more likely to have an effect on SBA or child mortality.

However, the trends diverge by outcome for both income and literacy. Interventions in less literate and poorer areas were more likely to affect SBA and neonatal mortality than interventions in better-off and more literate contexts. The opposite is true for infant mortality. This suggests an interaction between environment and intervention, which may be an illustration of causal complexity. For a child exposed to risks for a longer period, environment may play a larger factor, but for SBA and neonatal outcomes, which have a shorter exposure period, focused interventions may have a better chance of working.

Knowledge Gaps: What Do We Still Need To Know?

This review also identifies areas where there is a critical lack of evidence, not just in the World Bank, but across all development institutions. Although addressing these gaps through more impact evaluations will not in itself solve the challenge of MDGs 4 and 5, expanding evidence in these areas can enable better decision making for investments to reduce deaths of mothers and children.

GAPs IN INTERVENTION COVERAGE BY Outcome

Although additional impact evaluation evidence would be welcome across all interventions, several gaps are particularly important, and quality evaluations are still spread thinly. IEG found no more than four AAA impact evaluations of a given mortality outcome for any one type of intervention—too few to reliably compare
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effectiveness of intervention classes across such very different contexts of application. Far more high-quality evaluations are needed to be able to make comparisons between interventions.

For SBA as an outcome, there are very few studies on the effect of health infrastructure and none on nonhealth infrastructure.

Among studies that examine SBA as an intervention, no high-quality evidence isolates its effect on maternal mortality. Given its prominence as a key indicator for MDG 5, more rigorous studies on the isolated effect of increasing SBA are clearly needed. The robust estimation strategies in two studies that can isolate the effect of increasing the proportion of attended births indicate that there are no neonatal mortality differences at the district level between SBA and non-SBA births after more than two years of implementation of a large conditional cash transfer scheme in India, even for areas with higher quality of care.[26, 23]

Although increasing the proportion of births attended promises to reduce mortality outcomes, there is currently no robust, rigorous field evidence that this is the case. As noted, that promise is more likely to be realized when SBA interventions are combined with improvements in the health workforce and knowledge and information for mothers. Indeed, for India, the challenge seems not to be inducing mothers to deliver at clinics, but the level of care and referral system they actually receive once there.

Additionally, more high-quality studies are needed on SBA interventions that include components of health infrastructure, health information, equipment and supplies, communication, and transport, as well as interventions in nonhealth sectors, such as road infrastructure improvements.

As the body of impact evaluations reporting maternal mortality effects is exceptionally sparse, additional research is needed for nearly all interventions. Specifically, more high-quality evidence is needed to identify effective interventions associated with family planning programs, universal health schemes, women’s schooling, referral systems, transportation, and infrastructure of health facilities.

To improve the evidence base for neonatal mortality, more high-quality evidence is needed to identify effective interventions associated with referral systems and transportation and infrastructure improvement that affect the quality and availability of health care facilities for essential or emergency newborn care. Furthermore, additional information is needed on health financing interventions (for example, performance-based financing, contracting, or incentives for improving the quality of postnatal care). Evaluations addressing the utilization of health services, such as community health insurance and prepayment schemes, loan schemes and revolving funds, and other innovative financial mechanisms, are notably missing for neonatal mortality and most other mortality outcomes. To the degree that the World Bank’s current program of impact evaluations on results-based financing can address the question of its effects on maternal and child mortality, the Bank can help reduce this gap.

The number of evaluations estimating effects on infant mortality rates was relatively high, but more high-

Father and son wait at a health clinic in Afghanistan. The Sub-Saharan Africa and Middle East and North Africa Regions have perhaps the greatest need for impact evaluations on maternal and child mortality. Photo: Graham Crouch / World Bank.
quality evaluations are needed in several sectors: health, governance, labor market, agriculture and nutrition, and transportation. More information is also needed on the effects of standardized programs on all child mortality indicators. Although it has been used in more than 80 countries (Bryce and others 2004), the IMCI service package and the equally widespread Safe Motherhood programs have few rigorous impact evaluations measuring their effects on child mortality. What evidence does exist most commonly reports a null effect of IMCI but weak or marginally significant impacts of Safe Motherhood.

No high-quality evaluations of under-five mortality focused exclusively on either governance or utilization. There is a surprising lack of field-based impact evaluations reporting the mortality effects of interventions targeted at the three deadliest diseases for children under five: malaria, diarrhea, and pneumonia.

**Gaps by Evaluation Components**

Impact evaluations can better inform policy decisions by including estimates of distributional impacts over population subgroups (heterogeneous effects) and integrating mixed methods to help unpack causal pathways and provide details to aid in appropriate application to other contexts, give estimates over time to inform temporal trajectories and sustainability of interventions, and report rigorous efficiency (cost-benefit) analysis.

**Gaps in Regional Coverage**

Future efforts to curb the stubbornly high rates of maternal and child mortality should consider the interventions found effective in this report. Although there are insufficient data to parse out the share of the variation in impact evaluation results that stems from the range of potentially important dimensions of context, it is reasonable to believe that inter-regional variation accounts

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**Figure 3** Impact Evaluation Coverage by Outcome and Region

Source: IEG.

Note: World Bank regions have been used for convenience. IE = impact evaluation; SBA = skilled birth attendance; MM = maternal mortality; NM = neonatal mortality; IM = infant mortality; U5 = under-five mortality.
for a large share of those differences. To the extent that results from one context are informative in design policies for another context, impact evaluations are a regional—if not global—public good with potentially large returns. Investments of knowledge should be made for regions and countries with the highest mortality rates and for the most vulnerable populations.

As figure 3 shows, there are large regional disparities in the availability of evidence (for convenience, IEG uses World Bank regions). There is only one impact evaluation with SBA or maternal or child mortality outcomes from Europe and Central Asia, and none from the Middle East and North Africa, even though it is frequently ranked as the region with the third most severe challenges in SBA or mortality (see figure 4). Given its population size and diversity of contexts, the East Asia and Pacific Region is also underrepresented.

**Gaps by Severity of the MDG Shortfall**

Regional gaps are heightened when considering the relative difficulty of the challenges of prevailing SBA and maternal and child rates and levels. Figure 4 shows the number of AAA and AA impact evaluations by SBA and mortality rate over the six regions, along with indicators of the severity of the problem in each region. Results are similar for comparisons by the number of deaths by region, although South Asia becomes the worst for SBA and neonatal mortality. Regions that are suffering the worst are precisely the areas that have the least impact evaluation evidence, leaving policy makers with the greatest need the least information for policy making. The result is similar when using the regions’ share of global mothers not attended or maternal or child deaths.

Areas with the greatest need for solid evidence of impact evaluations have the shortest supply. In particular, South Asia and Sub-Saharan Africa consistently have the lowest SBA and highest maternal and child mortality, whether measured as rate of births or as global share of deaths. South Asia has several impact evaluations of interventions affecting SBA (for which the region has the worst levels) and neonatal mortality (for which the region has the second highest rates). However, the area with the largest global need for additional impact evaluation evidence is Sub-Saharan Africa, where there is a critical lack of evidence on maternal, infant, and under-five mortality even as the region has the highest levels of these outcomes.

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**Figure 4 Regional Gaps Between Mortality Rate and Impact Evaluation**

![Regional Gaps Between Mortality Rate and Impact Evaluation](image)

**Source:** World Development Indicators.

**Note:** Numbers in [brackets] represent the actual, unindexed, percent of births attended by skilled health staff or standard mortality ratios measured per 100,000 live births in the case of maternal mortality and per 1,000 live births for the neonatal, infant, and under-five mortality; most recent years available. World Bank regions have been used for convenience. ECA = Europe and Central Asia; EAP = East Asia and Pacific; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SA = South Asia; and SSA = Sub-Saharan Africa.
The lack of progress in these areas is likely not because of the lack of impact evaluations (there are potentially many reasons for that, including lack of investments or poorly functioning institutions). However, where methodologically feasible, impact evaluations can indicate the attributable impacts of interventions, including those aimed at improving institutional quality, and thereby steer investment to more productive use. Without high-quality, regionally relevant impact evaluations, countries in these areas are left to make critical decisions with correlational evidence.

Although impact evaluations often gather their own data through household surveys, impact evaluations of maternal and child mortality frequently rely, at least in part, on available administrative data. A correlation between areas with worse MCH outcomes and more difficult data environments may explain part of the gap in impact evaluation evidence for those areas. If so, greater investment in improving vital statistics data may be as important as impact evaluations research, and may even promote such evaluations by bringing down the cost of impact evaluation–specific data collection.

**GAPS FOR THE STRATEGY OF THE WORLD BANK**

The World Bank written strategy for addressing these two MDGs can be grouped into this report’s taxonomical intervention categories of governance, service delivery, health workforce, health financing, and household ability to pay.

The de facto strategy for maternal and child mortality can be proxied by the Bank’s funding portfolio. Disaggregating the Bank’s portfolio by the top-level intervention groups of this report’s typology,

<table>
<thead>
<tr>
<th>Table 1</th>
<th>All Impact Evaluations and World Bank Projects by Intervention Type, FY03–12</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention type</strong></td>
<td><strong>All impact evaluations (N = 68)</strong></td>
</tr>
<tr>
<td>Governance</td>
<td>9</td>
</tr>
<tr>
<td>Donor support</td>
<td>0</td>
</tr>
<tr>
<td>Provision: Health sector</td>
<td>41</td>
</tr>
<tr>
<td>Provision: Nonhealth</td>
<td>14</td>
</tr>
<tr>
<td>Utilization</td>
<td>34</td>
</tr>
</tbody>
</table>

*Source: IEG.*

There is a shortage of impact evaluations on maternal mortality, particularly in Africa. Moreover, there are zero AAA studies of Bank impacts on maternal mortality. Photo: Arne Hoel, Mukono, Uganda.

Table 1 displays the volume of evidence against the volume of World Bank activities. The projects came from a portfolio check of the Health, Nutrition and Population; Social Protection; and Poverty Reduction and Economic Management sector boards as well as projects from the Bank’s Sustainable Development Network’s water, energy and mining, and social development sectors that were coded with health sector or theme codes. Together, these sectors cover the vast majority of those covered by the available impact evaluations. Inclusion of a Bank project was based on explicit mention of MCH objectives in the Project Appraisal Document.

The World Bank would benefit from greater sectoral and geographical diversity in the projects evaluated. Currently, there are gaps between the body of global impact evaluation evidence and the portfolio of Bank projects with maternal and child health objectives, especially in governance, health infrastructure, health information systems, and medical projects and technologies. Evaluations in key nonhealth sectors are also sparse: As a multisectoral leader, the World Bank has an advantage facilitating knowledge of health impacts of nonhealth projects and is encouraged to
invest in impact evaluations measuring the potential maternal and child mortality-reducing effects of sectors such as energy, agriculture, and transportation. There are no impact evaluations of donor support activities (donor coordination, budgetary support, sectorwide approaches), although these may be inherently less evaluable by impact evaluation methods. While World Bank funding decisions should consider the full breadth of available evidence, these gaps signal an unmet need for more impact evaluations in these areas to strengthen the full body of evidence.

Only 15 of the 68 reviewed impact evaluations were of World Bank projects or Bank-financed interventions. As a group, these evaluated Bank interventions were effective in improving SBA and reducing under-five mortality, but showed very small or no detectable impacts on maternal mortality, neonatal mortality, or infant mortality. Moreover, of those 15 impact evaluations, 11 were of projects from just three countries: Indonesia (5), Brazil (4), and India (2); such concentration is not in harmony with the global reach of the Bank’s mission. This representation is also incongruous with the level of burden faced by the regions. Evaluations with estimates of SBA and infant mortality impacts are concentrated in the regions with the second-lowest burden for these outcomes, rather than in the areas where the most work is needed.

To the degree that the future work of the Bank’s several impact evaluation bodies (Development Impact Evaluation Initiative, Health Results Innovation Trust Fund, and Strategic Impact Evaluation Fund) and hubs (such as the Development Impact Evaluation Initiative’s program with the Ministry of Health of Nigeria) is able to estimate mortality impacts of these various intervention types across different regions, these gaps may be filled. Other units looking to conduct impact evaluations to address these gaps may wish to consult the Health, Nutrition and Populations Sector’s excellent Impact Evaluation Toolkit.

Conclusions

Although progress of MDGs 4 and 5 lags, this review gives reason for hope that advances can still be made. Countries where mortality rates are highest and SBA
rates are lowest are more likely to observe an impact of appropriately designed interventions. Furthermore, where reported, existing impact evaluations indicated that lower socioeconomic status households realized larger benefits from these interventions.

Given the success of reducing child and maternal mortality illustrated by the impact evaluations reviewed, the World Bank and other development agencies should consider supporting:

- Bundled health interventions affecting both provision (supply side) and utilization (demand side) for both maternal and child mortality
- Formal education and community-based delivery of service packages with interventions affecting mothers’ knowledge and information for neonatal mortality
- Energy and air pollution, water and sanitation, education, and governance interventions affecting strategy and planning to affect child mortality, especially infant and under-five mortality
- Conditional cash transfer or voucher interventions that affect mothers’ ability to pay to improve SBA rates
- Health worker training in conjunction with the provision of family services and increasing household health knowledge to improve infant mortality
- Interventions with longer periods of exposure, which are more likely to report significant effects.

Although most interventions in the report’s taxonomy already had “proof of concept” efficacy trials, the above interventions are those that have demonstrated effectiveness in the field. Many other interventions “made sense” in theory or concept but did not demonstrate attributable impacts on maternal or child mortality. Still, as the body of impact evaluation evidence is still relatively nascent, this list may change.

Unfortunately, without high-quality cost-benefit analysis, suggesting which among these effective interventions is most efficient is not possible. For the Bank, this underscores the importance of strengthening cost-effectiveness analysis in project preparation, as highlighted in the IEG report Cost-Benefit Analysis in World Bank Projects (IEG 2010).

Considerable gaps in the impact evaluation evidence remain. Further impact evaluations should include policy-relevant evaluation components. Efforts for MCH-related impact evaluations should be prioritized within each mortality outcome for—

- Underrepresented interventions (either as a function of the Bank’s portfolio or as a whole)
- Under-represented regions (either to reach some minimum representation level, or by severity of the MCH problem), especially Sub-Saharan Africa.

Though improved impact evaluation coverage will not solve the challenges of MDGs 4 and 5, addressing knowledge gaps with further impact evaluation evidence from all corners—within and beyond the Bank—can help to influence evidence-based decision making and steer scarce resources toward more productive use.

Finally, the findings in this systematic review do not, in themselves, constitute a strategy for reducing maternal and child mortality. Rather, this review is intended to be a key input to inform such a strategy. Practitioners are encouraged to use these findings as a starting point in exploring appropriate strategies. Decisions to adopt a given recommendation should be done with careful examination of contextual similarities of the target area to those impact evaluations reported here, to encourage solutions that are technically correct, politically supportable, and administratively feasible.

**General References**


Numbered References

Note: Numbered references correspond with bracketed superscripts and indicate the studies that were rated AAA quality or AA quality based on the strength of their internal validity.


Chairperson’s Summary: Committee on Development Effectiveness


The Sub-Committee welcomed IEG’s review and management’s response. Members saw the review as a valuable building block to shape policy discussions and analysis to improve maternal and child health (MCH) outcomes. Members observed that the review of robust impact evaluations identified interventions that cause attributable reductions to maternal and child mortality. They appreciated that the review provided new and useful insights that challenged conventional wisdom—an important step in the movement towards a solutions Bank and with respect to the increasing focus on evidence-based decision making.

The Sub-Committee noted the effectiveness of multisector and bundled approaches to improved MCH outcomes, adding that the review could have benefited from including further discussion on the evidence and gaps for food security and nutrition interventions. Members observed that the evaluation could positively impact the Bank’s work in MCH. They appreciated that it could contribute to a better understanding of the knowledge gaps in MCH and strengthen the Bank’s strategic approach to impact evaluations. Citing the value of the review’s findings, several members inquired about the next steps and urged IEG and management to use the review as a learning tool to inform Bank operations.

Noting the limited number of impact evaluation results available to serve as evidence for this review, members underscored the need to continue with these analyses but also for prioritizing quality improvement of impact evaluations. In this regard they were encouraged to learn that management has scaled up the number and rigor of impact evaluations, particularly in the North Africa and Middle East and Africa Regions. Members stressed the need to invest in national data and information management systems in order to increase national capacity to generate valid data. Members supported IEG’s future plans to conduct assessments of selected evaluations to determine how they have changed the World Bank Group’s programming and behavior. Furthermore, members recognized the importance of this evaluation tool and suggested that in the future the methodology could allow for more flexibility in including other methods.

Juan José Bravo, Chairperson
ABBREVIATIONS

ACKNOWLEDGMENTS

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NOTES
The World Bank Group

**WORKING FOR A WORLD FREE OF POVERTY**

The World Bank Group consists of five institutions – the International Bank for Reconstruction and Development (IBRD), the International Finance Corporation (IFC), the International Development Association (IDA), the Multilateral Investment Guarantee Agency (MIGA), and the International Centre for the Settlement of Investment Disputes (ICSID). Its mission is to fight poverty for lasting results and to help people help themselves and their environment by providing resources, sharing knowledge, building capacity, and forging partnerships in the public and private sectors.

The Independent Evaluation Group

**IMPROVING THE WORLD BANK GROUP’S DEVELOPMENT RESULTS THROUGH EXCELLENCE IN EVALUATION**

The Independent Evaluation Group (IEG) is an independent unit within the World Bank Group. It reports directly to the Board of Executive Directors, which oversees IEG’s work through its Committee on Development Effectiveness. IEG is charged with evaluating the activities of the World Bank (the International Bank for Reconstruction and Development and the International Development Association), the work of the International Finance Corporation in private sector development, and the guarantee projects and services of the Multilateral Investment Guarantee Agency.

The goals of evaluation are to learn from experience, to provide an objective basis for assessing the results of the Bank Group’s work, and to provide accountability in the achievement of its objectives. It also improves Bank Group work by identifying and disseminating the lessons learned from experience and by framing recommendations drawn from evaluation findings.
Delivering the Millennium Development Goals To Reduce Maternal and Child Mortality
A Systematic Review of Impact Evaluation Evidence