Cost-effectiveness of Maternal and Newborn Health Interventions

and packages in 59 low- and middle-income countries

A Graphical Analysis

MERCK for Mothers

COPENHAGEN CONSENSUS CENTER

WHY IS MATERNAL HEALTH IMPORTANT?

32%
REDUCED INCOME FOLLOWING MATERNAL DEATHS

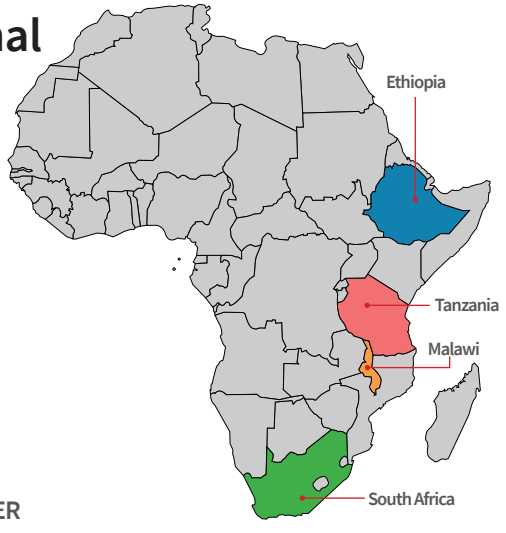
↓32%

↓25%

Households in China usually see a major reduction in both income (**32%**) and expenditure (**25%**) over the year following the maternal death.

Economically, studies in both Africa and Asia have shown that the direct cost of a funeral and medical expenses can reach one third of a family's income.

A qualitative study on the impacts of maternal health in Tanzania, Ethiopia, Malawi, and South Africa showed that the impacts of maternal death can include having to take over the mother's tasks, such as cooking, cleaning/washing and fetching water.



COOKING

CLEANING

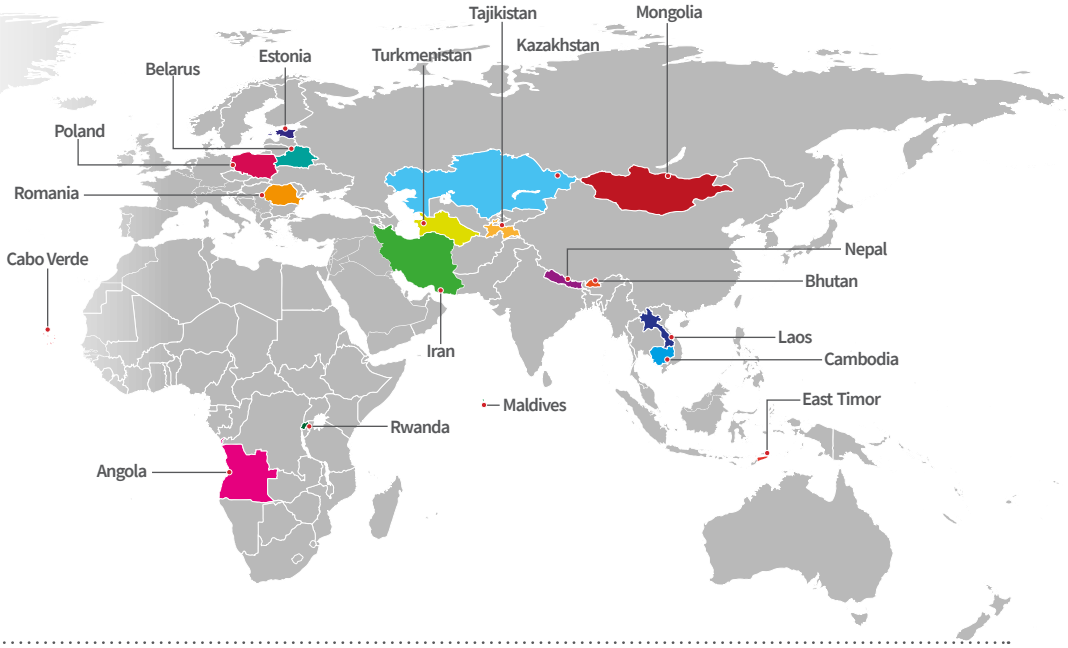
WASHING

FETCHING WATER

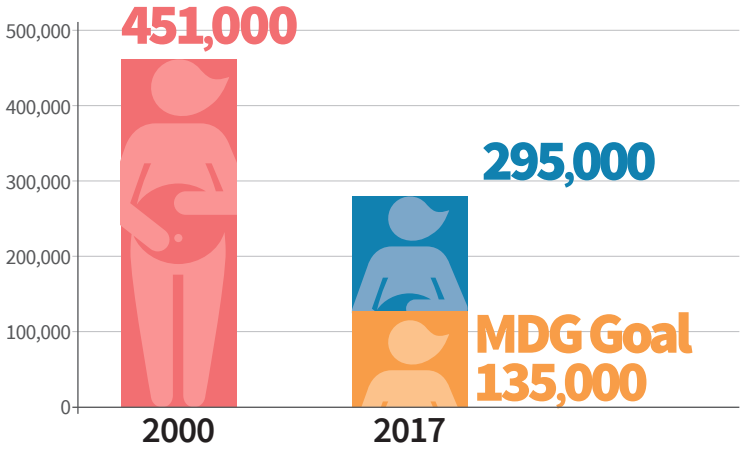
WHERE IS THE GAP?

Globally around **295,000 women die** every year from avoidable complications during pregnancy, birth and post-partum.

Only **18** out of **195** countries achieved MDG maternal mortality target

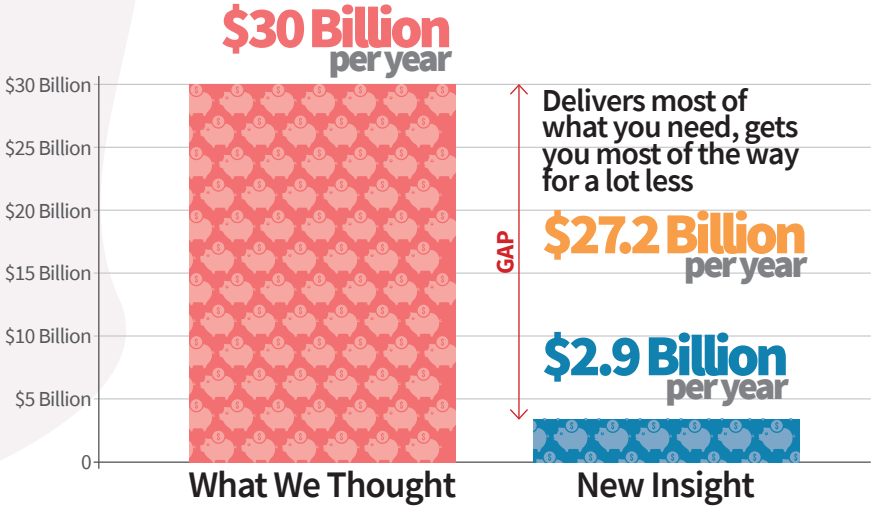


While the approximately **295,000 maternal deaths in 2017** represented a notable decline from **451,000 death toll of 2000**, the 45% decrease fell far short of the MDG5 goal of reducing maternal mortality by three quarters from 1990.



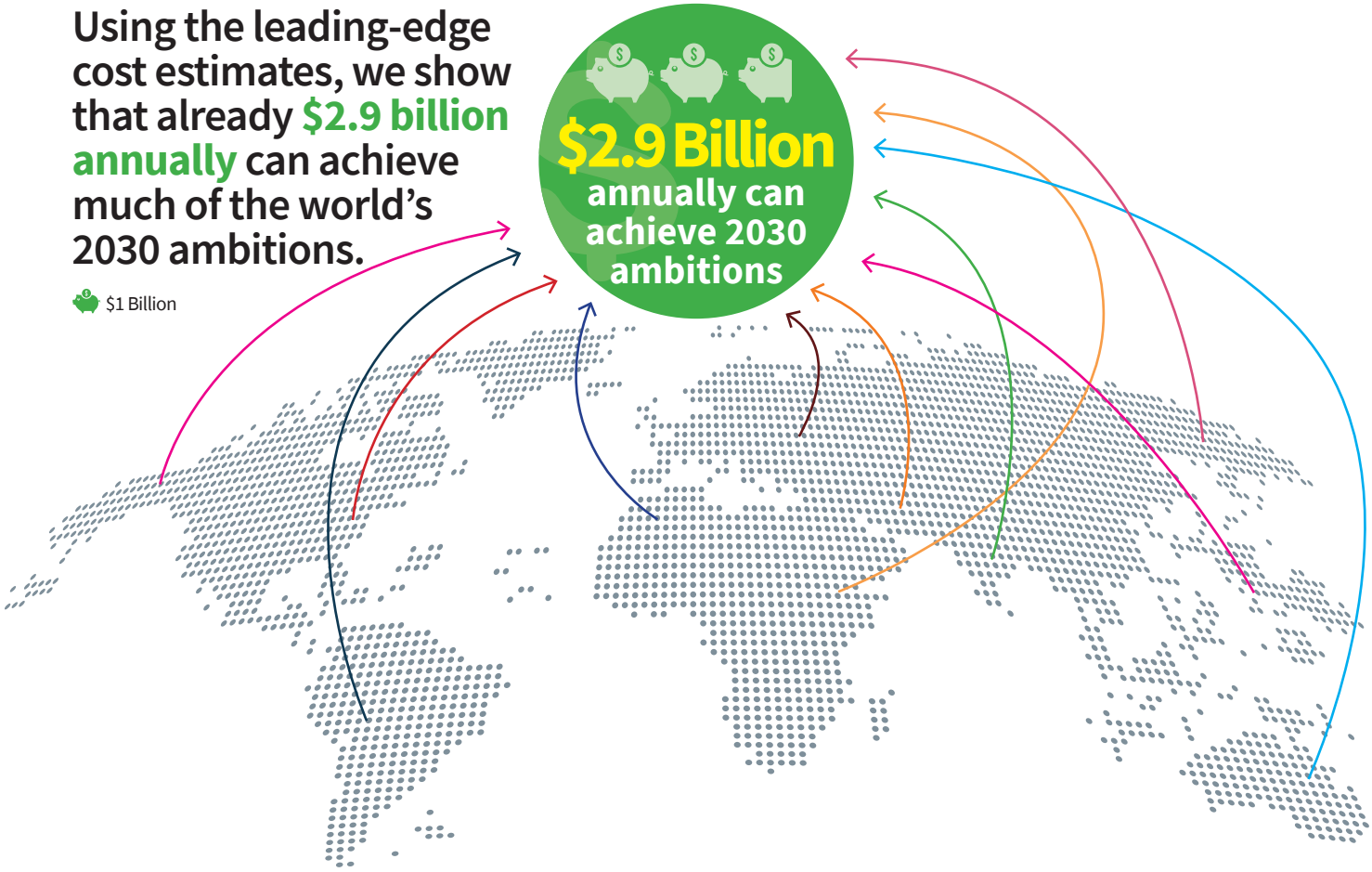
FUNDING IS SHORT, BUT CAN BE USED MORE EFFICIENTLY

In much of the literature, a global budget increase of **$20-30 billion** annually is suggested to tackle the problem.



Using the leading-edge cost estimates, we show that already **$2.9 billion annually** can achieve much of the world's 2030 ambitions.

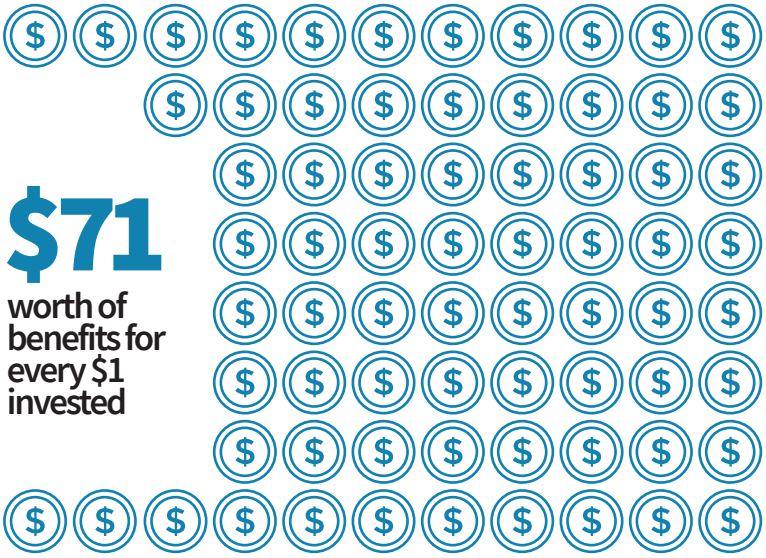
$1 Billion



SMART INVESTMENTS IN MATERNAL HEALTH CAN PAY DIVIDENDS?

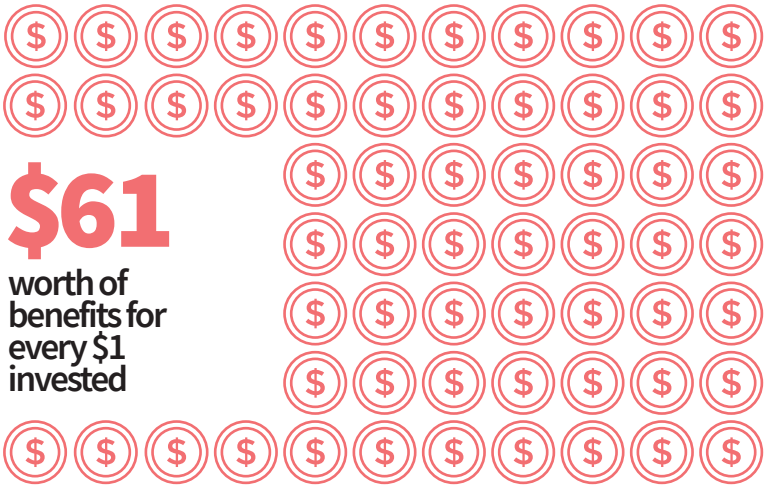
Basic Emergency Obstetric & Newborn Care (BEmONC) with Family Planning

Providing **$71.50 worth of benefits for every $1 dollar spent** by governments and beneficiaries, this package of interventions offers the highest BCR. This would require $2.9bn per year in additional investments, and would avert an expected additional 162,000 maternal deaths, 1.21m newborn deaths and 1.18m stillbirths.



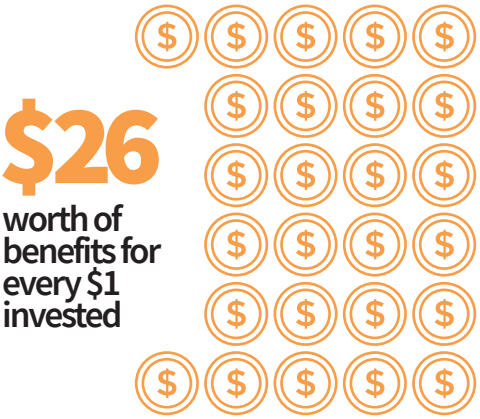
Basic Emergency Obstetric and Newborn Care (BEmONC)

Providing **$61.50 worth of benefits for every $1 dollar spent** by governments and beneficiaries, the package of interventions with the third highest BCR is BEmONC. This would require an $2.2bn per year in additional investments, and would avert an expected additional 93,000 maternal deaths, 0.87m avoided newborn deaths and 0.81m avoided stillbirths.



Safe & Inclusive Family Planning

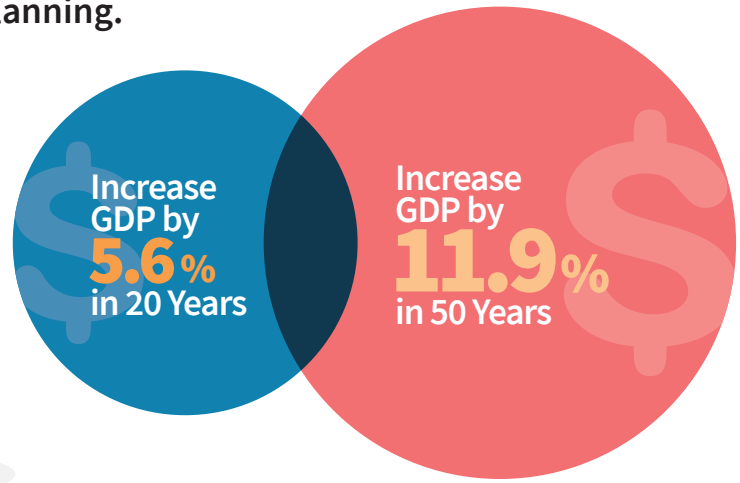
Providing **$26.80 worth of benefits for every $1 dollar spent** by governments and beneficiaries, this is the sole intervention (as opposed to a package) with the greatest absolute impact on maternal deaths. Scaling up this intervention to meet 90% of unmet need in the 59 countries with the highest maternal and newborn mortality rates would require an additional $1.2bn per year in investments, and would avert an expected additional 87,000 maternal deaths.



WHY FAMILY PLANNING?

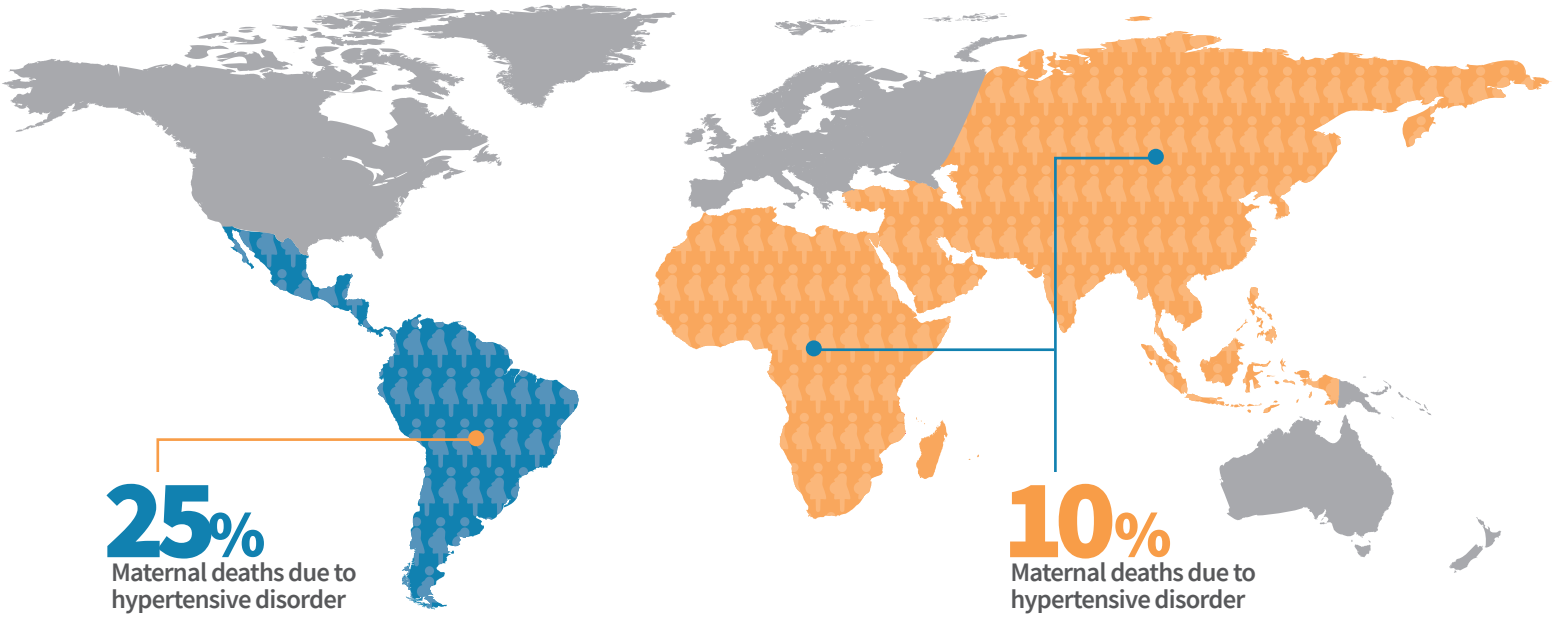
Family planning not only provides greater choice for women, its provision generates a large economic impact in the long run (demographic dividend).

One study on Nigeria suggests providing FP services can **increase GDP by 5.6% in 20 years** and **11.9% after 50 years** relative to no family planning.



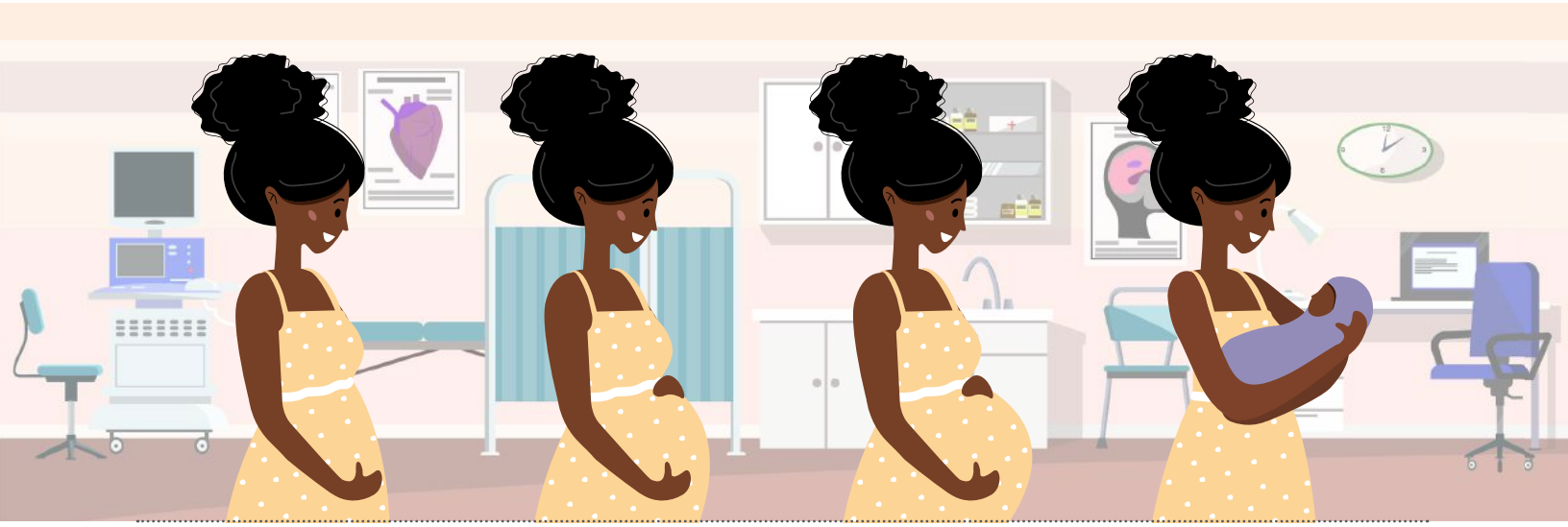
COUNTRY-BASED CAVEATS

While these issues are prevalent across the globe, naturally, the maternal health context of each region will play a strong role in determining the value of each package. For example, hypertensive disorders are associated with approximately **10% of maternal deaths in Africa and Asia**, while in **Latin America** that **figure rises to nearly 25%**, making the value of interventions like $MgSO_4$ that much stronger.



WHY ARE PACKAGES A GOOD IDEA?

Each of these interventions have a much **stronger impact** when embedded within a broader package of interventions that is able to respond to **multiple interdependent challenges**. Working together, these interventions offer **compounded health benefits** for each woman, lowering the number of complications throughout **all stages of a pregnancy**, and lowering the need for intensive healthcare procedures.

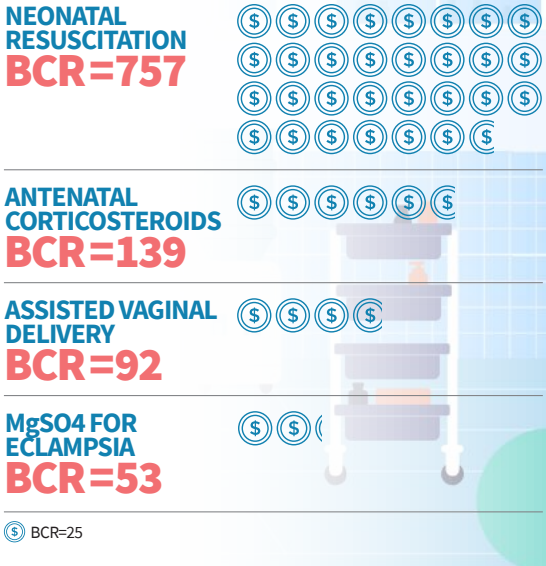


MOST HELPFUL INTERVENTIONS WITHOUT PACKAGE

When taking into account life-saving impacts on both mothers and their newborns, the most cost-effective individual intervention was neonatal resuscitation, an intervention requiring only an inexpensive, reusable hand- operated resuscitator and a health care provider. The second and third most effective interventions were antenatal corticosteroids and assisted vaginal delivery. Similarly, this finding reflects a reduction in asphyxia, and to a lesser extent deaths due to prematurity or sepsis, which are among the most common causes of death in the 59 countries analyzed.

Most helpful interventions without package

The best individual investments globally (for maternal and newborn health) include Neonatal Resuscitation (BCR = 757), Antenatal Corticosteroids for pre-term labor (BCR=139), Assisted Vaginal Delivery (BCR = 92) and Magnesium Sulfate for Eclampsia (BCR = 53).



SUMMARY OF KEY IMPACTS

MAJOR THEMES	SUMMARY OF IMPACTS BY THEME
Caretaking by default after a maternal death 	• Female relatives from the maternal side were routinely called upon to care for orphaned children, often without having a choice in the matter. • Maternal death often exacerbated tensions between caregivers and extended family members who did not offer support for orphaned children. • Men frequently remarried before the mourning period ended, cutting ties with the maternal family.
Barriers to accessing high quality care 	• The physical and economic challenges of accessing health centers played a role both in maternal death, and the provision of follow-up care to orphaned children. • Staffing shortages diminished the quality of care received by individuals who were able to access health centers. • Infants faced acute needs following maternal health. While health facilities provide free milk substitute for the first six months of life, these services were inconsistently available and difficult to access. • Older children faced health and nutritional risks related to protein deficiencies and low caloric intake.
Financial hardships for caretakers and impacts on children 	• Caretakers faced economic hardship, stretching limited resources to support orphaned children. • Integrating orphaned children into a family often acted as a source of tension between spouses. • Families often turned to short-term, informal labor, to absorb the immediate impacts of caring for orphaned children, which can limit a family's opportunities for financial stability and independence. • Orphaned children were often called upon to take on additional household responsibilities, with preference showed towards biological children in allocation of expenses related to school and nutrition.
Loss of childhood for orphans, especially female orphans 	• Orphaned children faced disadvantages related to educational opportunity, when families could not afford school fees and supplies. • Girl children were often expected to take on caretaking and household responsibilities, and faced pressures to find a partner at an early age in order to alleviate financial pressures on the family. • Losing a mother also had informational, emotional, and social costs for girl children.
Government assistance and other support programs 	• Many participants did not know about support available through government institutions and NGOs. • Those who did seek support, often felt it was ineffective, non-transparent or difficult to access.

Bazile J, Rigodon J, Berman L, Boulanger VM, Maistrellis E, Kausiwa P, Yamin AE. Intergenerational impacts of maternal mortality: Qualitative findings from rural Malawi 2015 Repro Health 12:S1

Introduction

Maternal health has long been a stated priority in a variety of global goals and strategies: the Millennium Development Goals, the Sustainable Development Goals, FP2020, and the Global Strategy for Women's Children's and Adolescents' Health. However, many of the goals have not actually been achieved, specifically those around reducing the number of maternal deaths – the deaths of women during pregnancy, childbirth and up to 42 days post-partum. While the approximately 295,000 maternal deaths in 2017 represented a notable decline from the 2000 death toll of 451,000, the 45% decrease fell far short of the MDG5 goal of reducing maternal mortality by three quarters from 1990. The United Nations (UN) estimated that only 9 countries, out of the 95 being monitored, had reached their individual maternal mortality reduction goals by 2015. Since then, it is estimated that only 9 more countries have achieved their individual goals, although this is uncertain given the lack of an updated 1990 estimate from 2015.

This report attempts to add novel presentations of cost efficiency and impact to the discourse on maternal and child health. It situates this discourse within the context of limited budgets and finite resources; a reality for the vast majority of countries which struggle to end preventable maternal deaths. While similar costing exercises have been conducted, the findings and funding demands have placed the achievement of strong maternal health beyond the reach of many low- and middle-income countries. Moreover, there remains an unclear understanding of how the indirect costs, opportunity costs, and outcomes, between various Maternal and Newborn Health (MNH) packages of services compare. This article seeks to bridge that knowledge gap, providing a direct head-to-head comparison between multiple MNH interventions and packages, while also focusing on a subset of countries with the heaviest burden and highest investment need.

Highlights

Individual interventions are not typically offered in isolation. Health services typically deliver interventions, as packages which are delivered either at a single visit, such as antenatal care, or at single time point, such as childbirth. Grouping interventions together into combined packages compounds the benefits to each recipient, lowering time costs of the women receiving treatment as well as the salaried time costs of the person administering the treatment.

The key findings of this report are based on a foundational understanding that there is no magic bullet to reducing maternal mortality. A genuine commitment to MNH demands a healthcare system which has the capacity to respond to MNH needs across the spectrum, at all stages. In order to know where and how to best invest strengthening MNH health systems in low and middle income countries, knowing which of those options which are most cost efficient helps those with limited budgets narrow the focus of their efforts – placing resources and energy in the areas where they stand to make the greatest impact. The analysis undertaken shows that the strongest investments in maternal and newborn health within low- and middle-income countries are in the following areas.

1. *Basic Emergency Obstetric and Newborn Care* (BEmONC)

Providing $61.50 worth of benefits for every $1 dollar spent by governments and beneficiaries, the package of interventions with the third highest BCR is BEmONC. This would require an additional $2.2bn per year in investments, and would lead to an expected additional 93,000 avoided maternal deaths, 0.87m avoided newborn deaths and 0.81m avoided stillbirths.

2. Safe & Inclusive Family Planning

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3. *Basic Emergency Obstetric and Newborn Care* (BEmONC) in combination with Family Planning

Providing $71.50 worth of benefits for every $1 dollar spent by governments and beneficiaries, the package of interventions with the highest BCR is BEmONC combined with Family Planning. This would require an additional $2.9bn per year in investments, and would lead to an expected additional 162,000 avoided maternal deaths, 1.21m avoided newborn deaths and 1.18m avoided stillbirths.

4. Among individual interventions, the strongest performing interventions in MNH

The most cost-effective individual interventions when it comes to saving mothers' lives are the management of eclampsia and pre-eclampsia with magnesium sulfate, which produced the strongest benefit-cost ratios, at 53.0 and 20.7, respectively. This is due to the extremely high fatality rates of these conditions if left untreated and the low cost and high efficacy of the magnesium-sulfate used for their treatment. Removal of retained products of conception left behind in the uterus after childbirth, a condition that if untreated can lead to hemorrhage, sepsis and death, also presented a remarkably high cost benefit ratio of 17.1.

When taking into account lifesaving impacts on both mothers and their newborns, the most cost-effective individual intervention was neonatal resuscitation, an intervention requiring only an inexpensive, reusable hand operated resuscitator and a health care provider. The second and third most effective interventions were antenatal corticosteroids and assisted vaginal delivery. Similarly, this finding reflects a reduction in asphyxia, and to a lesser extent deaths due to prematurity or sepsis, which are among the most common causes of death in the 59 countries analyzed.

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