Smartest Investments for maternal and neonatal health

Every two minutes, a woman dies from pregnancy or childbirth complications, and nine babies die. This year, almost 300,000 women will die from pregnancy-related complications, while 2.3 million newborn babies will die within the first month of their lives. Most of these deaths occur in the poorer half of the world—especially in Africa and South Asia—where mothers are 80 times more likely to die from pregnancy-related complications than those living in rich countries. Newborn babies are at ten times greater risk of dying in low-income countries than in rich countries.

These 2.6 million annual deaths are an immeasurable loss for the families and communities in which these mothers and children perish. Across all low- and lower-middle-income countries, these deaths amount to a loss of almost half a trillion dollars each year or 6% of countries' GDPs.

Yet, despite the enormity of this tragedy, much of it is eminently preventable. Many of these women and children do not die because of some complex issue but because of a basic lack of skilled birth attendants and emergency care. Over a third of newborn deaths occur on the day of birth, mostly because the babies are born too early and experience birth complications like asphyxia or die from poor care and infections.

It doesn't have to be this way; $3.7 billion annually[1] can save 161,000 mothers' lives and 1.2 million infants each year.

Global inequality for mothers and infants

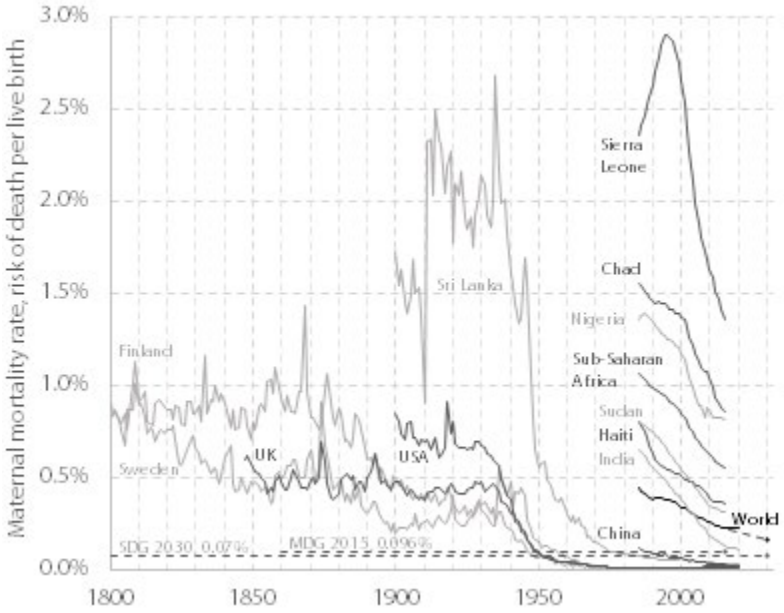
Things used to be far worse worldwide. Through most of the 1800s, the average pregnancy in rich countries[2] had a 0.5 to 1% chance of killing the mother, as can be seen in Figure 6.1. It is likely that deaths were even more frequent in poorer countries, although there is little data.

The global risk of mothers and infants dying dropped markedly in the 1900s as new drugs, better hygiene, and improved access to emergency obstetric care swept across the rich world. The introduction of the first broadly effective antibacterial was also very important because it could treat puerperal fever, which in England and Wales in the early 1930s still caused almost half of all maternal deaths. Just ten years later, it caused less than one in ten.

[1] Since all benefits from maternal and newborn health arrive immediately, the academic analysis compares the cost and benefits of a single year, 2020 (modeled without Covid). The average annual cost over 2023–30 will be higher, because of more births and higher salaries of healthcare workers. Benefits will actually be slightly higher again because of more saved lives and each life is worth more, as incomes have risen. All costs are described in 2023 dollars. The annual policy cost in 2020 is $3.7 billion as described in this chapter, and over 2023–30, $4.9 billion, as described in Table 3.1.

[2] Surprisingly, in rich countries, poverty and malnutrition played less of a role: maternal mortality rates tended to be higher in the upper social classes because mothers experienced more unnecessary interference from physicians, especially with cross-infections in hospitals.

Family planning similarly played a role, as fewer children were born to each mother. Other advancements drove down maternal mortality gradually over time. These included ergometrine (which treats heavy vaginal bleeding), blood transfusions, penicillin, and improved anesthesia. Medical professionals received better training and interfered less in normal labor. The organization of obstetric services was also improved. For most rich countries, the rate of maternal mortality today is about one death for every 10,000 live births or 0.01% per live birth.



Source: Our World In Data, WHO, WHO, Prediction for 2030: BMJ.

Figure 6.1 Maternal deaths in percent of all live births, 1800–2020 for selected countries, world, and likely global trend to 2030, along with global promises for 2015 and 2030.

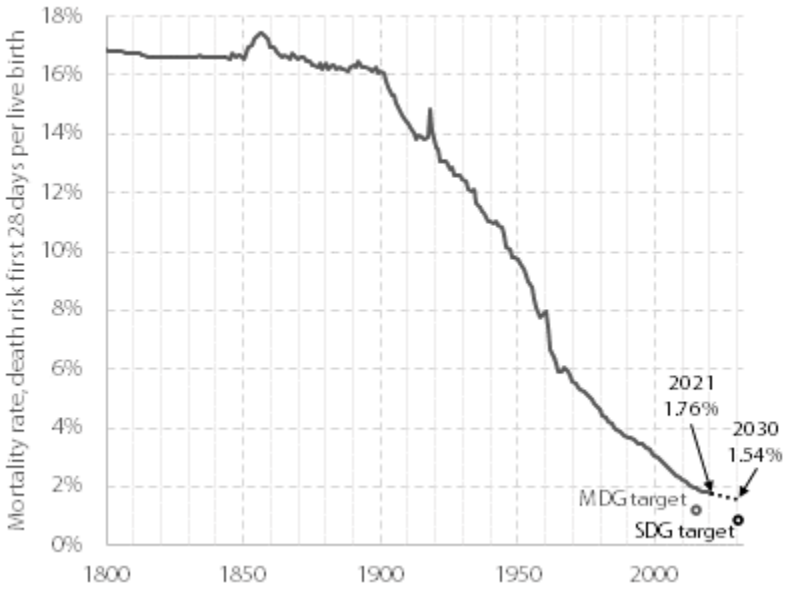
Unfortunately, many of these advancements have not permeated the poorer half of the world to the same degree. In 1990, low-income countries still lost one mother for every 100 pregnancies.

Increasingly, maternal deaths have become concentrated in sub-Saharan Africa even as they've fallen globally. While the region accounted for a third of the almost 600,000 maternal deaths worldwide in 1985, it accounted for two-thirds of the 300,000 mortalities in 2015.

In total, it is estimated that the lifetime risk of maternal death, i.e., the probability that a 15-year-old girl will eventually die from a maternal cause, is 1-in-38 in sub-Saharan Africa. This means that 263 of every 10,000 women will die from pregnancy-related complications compared to about two in 10,000 in rich countries.

The risk to newborns has also fallen remarkably worldwide, although the progress has again been slower in developing nations. As Figure 6.2 shows, it used to be that one-sixth of all newborns would die within 28 days of being born. About a quarter of all children in the 1800s would die within their first year, and more than 40% would die before their fifth birthday.

Neonatal mortality has drastically declined since 1900 due in large part to higher standards of living, improved medical care, antibiotics, and better nutrition, along with more consistent supervision by medical personnel. Cultural factors have also driven the death rate down, such as changes in the care shown toward infants and extended breastfeeding. Since the late 1800s, there has been a movement away from a fatalistic acceptance that many babies would inevitably die toward a realization that lives could actually be saved by doctors, better nutrition and hygiene.



Source: Gapminder, assuming constant relation between under-five and neonatal mortality, UNICEF, and 2030 estimate from Lancet.

Figure 6.2 Estimated global newborn deaths (first 28 days) in percent of all live births from 1800–2021 with a likely trend for 2030, along with global promises for 2015 and 2030.

That progress continues. In high-income countries, infant mortality has more than halved since 1990 to 0.3% in 2021, and for sub-Saharan Africa, it has been reduced by more than one-third from 4.5% in 1990 to 2.7% in 2021.

The MDG targets made a difference

The tragedy of pregnant women and their children dying has long been on the global health community's radar. Two decades ago, the United Nations promised to address the issue with the Millennium Development Goals. Two of the eight global goals specifically targeted maternal and child deaths, and they accelerated the decline in mortalities.

Between 1990 and the MDG's 2015 deadline, coverage of reproductive health services globally increased significantly, including for the poor and vulnerable., and development assistance spending increased dramatically. Development spending across maternal health and family planning more than doubled from $2.1 billion annually to $5.8 billion.[i]

Similarly, development assistance spending on newborn and child health increased tenfold from less than 1 billion annually in 1990 to almost $10 billion in 2015. However, most of the spending

went towards nutrition and immunization, which—while very useful—does little for neonatal mortality.

All this extra spending significantly accelerated the decline in both maternal and child mortality. As can be seen in Figure 6.1, this resulted in about a 40% reduction in maternal death risk. This didn't fulfill the MDGs' target of a 75% reduction in maternal mortality from 1990–2015, but it was still an immense accomplishment. Likewise, the MDGs had promised to cut child mortality by two-thirds. It was measured as mortality of under-five-year-olds but roughly tracks infant and newborn mortality. As Figure 6.2 shows, for newborns, the rate was approximately halved.[ii]

SDG promises won't be met

The SDGs make strong promises to reduce both maternal and child death rates. Unfortunately, they have done little to accelerate the decline.

Maternal mortality gets top billing as the very first SDG health target. Unlike many other targets that have had the numerical promises filled in later by technical consultations, this target explicitly promises to reduce maternal mortality to 0.07% worldwide by 2030.

It means the SDGs promise to reduce maternal mortality by more than two-thirds from 0.227% in 2015. That's a wildly ambitious goal that would require mortality rates to fall almost four times faster than they did during the MDG period. That's a sustained rate of reduction that only 11 countries have ever achieved.

In terms of annual maternal deaths, reaching the SDG promise would see a reduction from about 300,000 now to just below 100,000 in 2030, as global births will likely remain almost constant for the rest of this decade.

In reality, the first six years of the SDGs have seen maternal mortality rates stall almost completely. You can see it in Figure 6.1, where the global rate is near flatlining after 2015. On current trends from 2015–20, we'll reach the SDG promise more than four centuries later, by 2450. The move towards lower maternal mortality rates is made harder because births in high-income countries are slightly declining while they are slightly increasing in the poorer half, meaning even more global births occur in countries with high maternal death rates.

Just a few years ago, it was expected that without more policies, we would miss our maternal mortality target and end up at about twice what we had promised (the dashed line in Figure 6.1). Now, this is even seen as optimistic. We will likely see more than 200,000 mothers die each year, even in 2030.

Newborn mortality is the second health target for the SDGs, and it is similarly unachievable: By 2030, *all* countries are promised newborn mortality rates below 1.2%. Given that many countries already have rates below 1.2%, it means achieving an average global neonatal death rate slightly under 0.9%, or more than halving the 2015 newborn mortality rate worldwide, as Figure 6.2 shows. Compared to today, achieving the SDG promise would save an additional 1.1 million newborn deaths a year.

We are nowhere close to hitting the newborn target. On the current trajectory, we will see a much more muted reduction, with the annual loss of newborn lives in 2030 still beyond 2 million. We will reach the newborn SDG promise only in 2060.

It would have been hard to achieve the SDG promises under the best of circumstances, but the fact that the SDGs offer no focus does not help. Instead, the ambitious maternal and child death targets come alongside a very long list of health promises. Some of the most notable include ending the AIDS epidemics, tuberculosis, malaria, and neglected tropical diseases; combatting hepatitis and waterborne diseases; reducing chronic disease, traffic deaths, drug and alcohol addiction, tobacco use, and environmental deaths from air, water, and soil pollution; achieving universal health coverage; and expanding family planning.

Moreover, funding has barely budged since the MDGs. From 2015 to 2021, inflation-adjusted development spending on newborn and child health increased by less than 2% per year, compared to more than a 10% increase per year during the MDGs. Development spending on maternal health increased at just 0.3%, compared to more than 4% during the MDGs.

If we want to see more than a minimal improvement in maternal and newborn health over the coming years, it must get more attention and more resources. Fortunately, it turns out that there is a relatively simple policy that could make this an extraordinarily good investment for the world.

A simple and phenomenally efficient solution

To reduce maternal and newborn deaths, governments can choose from a vast plethora of policies: Among many others, they can get more pregnant women in for pregnancy check-ups, prescribe more iron supplements, have more and better birth facilities or more health worker visits to counsel the mother and child after birth. But with limited resources, governments have to focus.

To find out what policies are the best investments to prevent maternal and neonatal deaths, the researchers for this chapter's paper employed a tool called the Lives Saved Tool or LiST. Developed by the Institute for International Programs at the Johns Hopkins Bloomberg School of Public Health, LiST contains detailed data on impacts across many nations over a wide range of policy choices across all stages of pregnancy.

They used LiST to investigate 42 separate interventions in different phases of pregnancy, ranging from the distribution of condoms, giving iron supplementation to women during periconception, antenatal care visits, and diabetes case management during pregnancy to assisted vaginal delivery during birth.

To assess the overall costs of these interventions, the researchers first calculate the cost of providing the interventions for the health sector. This includes the costs of drugs, supplies, and medical staff time, based on international database estimates from the World Health Organization and UNICEF, adding overhead and supervision costs. But it also includes direct costs for the women treated. For example, a mother spends money on a bus ticket to travel to a medical center and perhaps forgoes wages to take the time to travel and wait there. Although

these costs are often not considered because they don't come out of the public purse, they are still real costs of a policy.

Instead of looking at the costs and benefits of individual interventions, the paper examines *packages* of interventions. This is more reflective of how actual health services are delivered, with all tests for a pregnancy check-up performed at one go and not one for each visit. It also lowers costs for mothers who only have to attend a few times and for providers because doctors and nurses do everything in one go.

While there are many policies that the researchers find return quite respectable benefits per dollar, the most effective, substantial package consists of two interventions that can deliver an astounding $87 of social benefits back on every dollar spent. The package would go to the 55 low- and lower-middle-income countries that account for around 90% of maternal and neonatal deaths worldwide, and it consists of two programs:

- Increase coverage of Basic Emergency Obstetric and Newborn Care to 90%
- Increase unmet need for Family Planning services to 90%

Fundamentally, Basic Emergency Obstetric and Newborn Care (or BEmONC) is a package of staff, knowledge, and resources offered at healthcare facilities that make it possible to treat some of the most typical complications around birth. This can ensure a higher chance for both mom and newborn to survive.

It first requires women to give birth in a health facility, and this by itself has substantial health costs for providers and time costs for the women. But beyond that, the facility also has to offer a whole list of basic BEmONC services, as defined by the WHO:

- Clean birth environment
- Immediate drying and additional stimulation
- Thermal protection
- Clean cord care
- Uterotonics
- Controlled cord traction/removal of placenta
- Parenteral administration of anti-convulsants
- Antibiotics for preterm or prolonged premature rupture of membranes
- Parenteral administration of antibiotics
- Assisted vaginal delivery
- Neonatal resuscitation
- Removal of retained products of conception
- Induction of labor for pregnancies lasting 41+ weeks
- Antenatal corticosteroids for preterm labor

Today, about 63% of all women in these 55 countries give birth in a health facility. To get to 90%, that opportunity needs to go to almost 19 million more women each year, at the cost of $550 million annually. However, the reality is that even when she is at the facility, many of the services are missing.

It may seem reasonable to expect that all institutional births would have a clean birth environment, but one survey shows that a third of these institutions lack water and soap for healthcare providers and patients to wash their hands, and one-fifth have inadequate sanitation. Many lack disinfectant to wash down surfaces, common areas, bathrooms, and toilets. It turns out that more money for cleaners and staff is needed to make a clean birth environment available for an additional 27 million women each year.

Of all the BEmONC services, neonatal resuscitation is the most surprising and simple. Of the world's 2.3 million newborn deaths, more than a third are due to birth asphyxia—basically, the baby fails to start or keep breathing. About 5% of all babies need ventilation, even in high-income countries.

The low-cost and efficient solution is a resuscitator, a mask with a hand pump that can push air through the infant's mouth and into its lungs. The cost is just $75. If used 25 times a year, the cost per use is $3. Adding health worker time, the total provider cost per child is in the order of $6. This year, 3.5 million children in these 55 nations will need resuscitation, but only a third will be at a facility with access to one. Making sure 90% have access would give an additional two million newborns a chance at life, costing just $10 million more per year.

The BEmONC package is relatively inexpensive, both because it only covers basic services and because many of its services can be delivered by nurses and midwives, as opposed to more costly doctors.

The family planning part of the package is also important. Within the 55 most affected countries, the researchers estimate that 83% of all women who want to avoid pregnancy have access to safe and effective family planning methods. We can do better. Getting to 90% would give access to another 69 million women. It would mean that fewer women would become pregnant every year, and 87,000 fewer mothers would die.

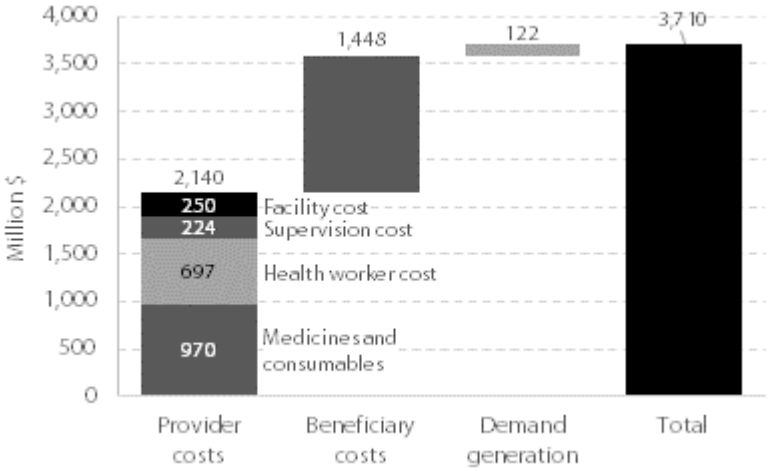


Figure 6.3 Annual costs of full scaling up of BEmONC and family planning to 90% coverage in 55 countries.

The total costs of the BEmONC and family planning scale-up are depicted in Figure 6.3. They include both the actual costs of drugs and replacement over time of equipment like resuscitators

(included on the graph under medicines and consumables), but also the cost of people delivering these services (noted as health worker costs), along with costs for buildings (facility costs) and management (supervision costs).

In addition, there is the cost to the women for their time, transport, and loss of income, marked as beneficiary costs. Finally, there is a smaller cost in the form of subsidies (demand generation) that can be used by governments to help encourage more women to go to get treated at facilities. The total cost to the public purse is about $2.3 billion, with the women themselves paying an additional $1.4 billion.

Adding all these costs up, we get $3.7 billion, a relatively modest investment relative to the deaths that would be averted across 55 countries—161,000 maternal deaths, more than 1.2 million newborn deaths, and almost as many stillbirths.

On top of avoiding millions of tragedies, saving all these lives would also lead to a potentially significant increase in income per capita—what's known as the 'demographic dividend.' A decrease in births can generate numerous benefits throughout a country and into the future. Modeled here, when fertility rates decline, children make up a lower share of the total population. This means that there are more resources available for each child, thus improving each child's educational outcomes and increasing her productivity as an adult.

With fewer dependents, a higher proportion of the total population will be in the workforce, also leading to higher productivity. Having fewer children lowers the amount of time women spend on child rearing, freeing time to participate in the labor market. In total, the reduction in fertility is estimated to yield a demographic dividend benefit equivalent to $28 billion annually.

Table 6.1 Annual costs and benefits in millions of dollars and benefit-cost ratio.

Costs		
	Provider costs	2,140
	Beneficiary costs	1,448
	Demand generation	122
	Total costs per year	3,710
Benefits		
	Newborn lives saved	272,708
	Maternal lives saved	18,230
	Demographic dividend	28,376
	Other benefits	2,675
	Total benefits per year	321,989
Benefit-cost ratio		87

In Table 6.1, you can see all the costs and all the benefits added up. The total annual benefits are a spectacular $322 billion. This is mostly from newborn lives saved, both because there are many more newborns saved, and each newborn saves about twice as many life years. Maternal lives contribute another $18 billion in benefits, and the demographic dividend an additional $28 billion.

All this benefit comes for a cost of only $3.7 billion, resulting in a remarkable benefit-cost ratio of 87: Each dollar spent will generate social benefits worth $87.

Saving the SDGs and more

Investing in this package would mean that we would get close to achieving the SDG promise on maternal mortality. It would mean that we could definitely achieve the promise of newborn mortality.

But more importantly, implementing such a relatively cheap and incredibly effective policy is both smart and morally compelling. Saving 1.4 million lives for $4.9 billion with this BEmONC and family planning package is simply one of the best policies available today.

The academic paper is entitled "Achieving maternal and neonatal mortality development goals effectively: A cost-benefit analysis." It is authored by

Nyovani Madise, African Institute for Development Policy
Arindam Nandi, Researcher at the Population Council, visiting fellow at the One Health Trust
Brad Wong, Copenhagen Consensus Center
Saleema Razvi, Copenhagen Consensus Center

Reviewers and advisors include

Carol Levin, University of Washington

Eva Weissman, School of International and Public Affairs, Columbia University

Ingrid Friberg, Tacoma-Pierce County Health Department

The paper is published in Cambridge University Press' *Journal of Benefit-Cost Analysis*, vol. 13, S1, 2023. You can access it here: https://copenhagenconsensus.com/halftime

[i] $1.9bn in 1990, $5.2bn in 2015, both in 2021$, so in 2023$ is $2.1 to 5.8bn, https://vizhub.healthdata.org/fgh/
[ii] Under-5 cut from 1990 to 2015 by 54%, https://data.worldbank.org/indicator/SH.DYN.MORT, infant mortality rate by 51%, neonatal by 46% https://data.worldbank.org/indicator/SH.DYN.NMRT.