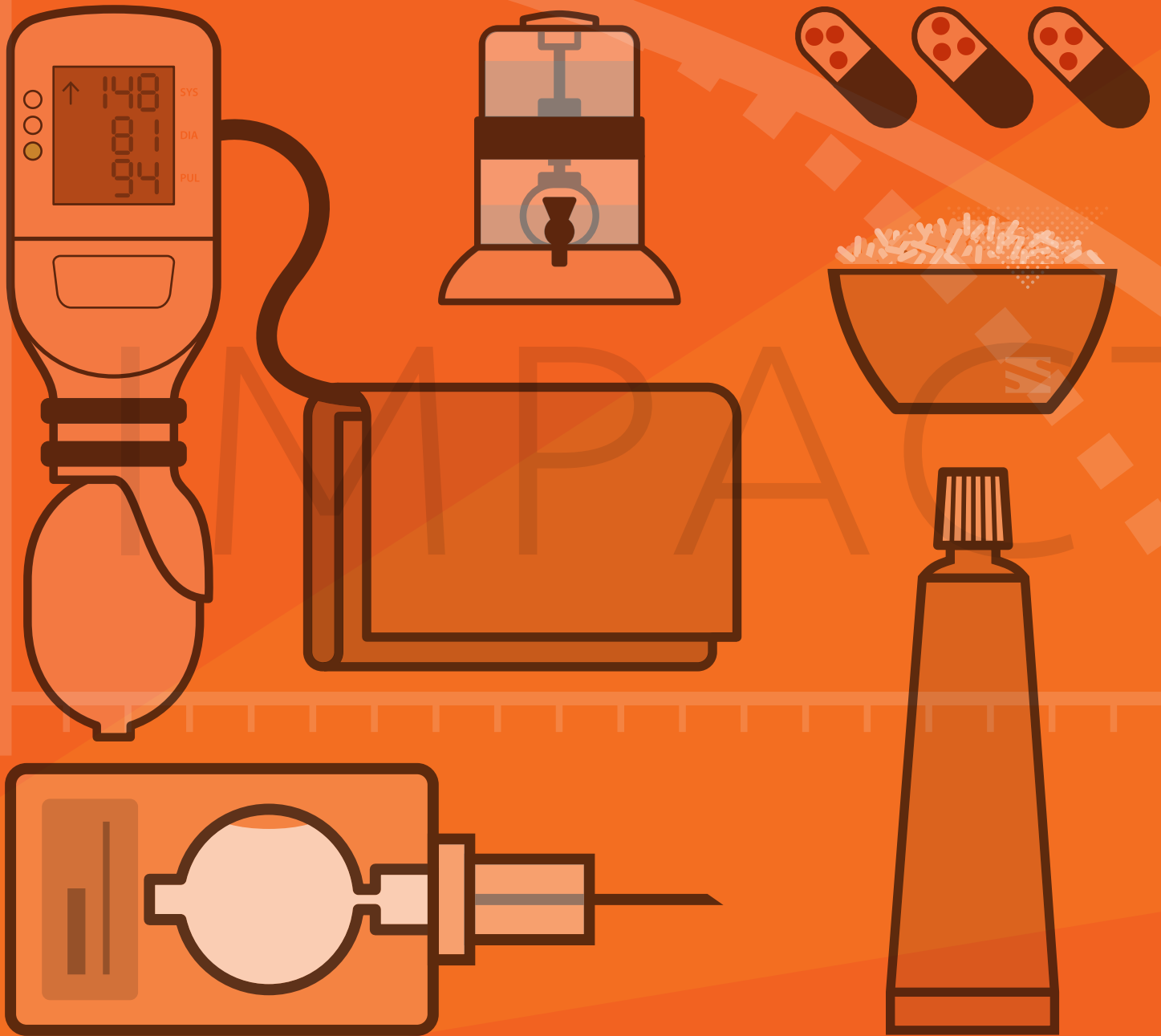


# Harnessing the power of innovation to save mothers and children

How 11 emerging innovations could save more than 6 million lives





## EXECUTIVE SUMMARY

Building on the remarkable successes of the past two decades in reducing child and maternal mortality around the world, global leaders have set an ambitious goal of ending preventable child and maternal deaths altogether. This objective, enshrined in the United Nations Sustainable Development Goals (SDGs), will require scaling up lifesaving interventions and adopting new approaches to eliminate needless deaths.

PATH modeled the impact (in lives saved) of 11 emerging innovations—such as devices, drugs, and systems/services—to illustrate how scaling up coverage can significantly reduce maternal, newborn, and child deaths. In this report, an innovation is defined as an intervention that can change the affordability, accessibility, or effectiveness of practices or tools used for prevention, diagnosis, treatment, and care. The new tools and approaches used in this analysis were previously identified through the Innovation Countdown 2030 project, in which health innovations crowdsourced from around the world were ranked by experts for their lifesaving potential.

The United States Agency for International Development (USAID) has targeted 24 high-priority countries to increase child and maternal survival rates and has modeled the impact of 50-evidence based interventions in these countries. PATH's analysis examined the potential of the 11 emerging innovations to increase intervention coverage, within the context of USAID's model. PATH's analysis showed that more than 6 million maternal, newborn, and child deaths could be prevented from 2016 to 2030. In the final year of this analysis alone, when innovation is scaled up at the highest level, use of these interventions could help to save more than 600,000 lives. This would represent a substantial contribution toward reaching international goals.

Among the innovations modeled, those with the greatest potential for lives saved are new injectable contraceptives that increase access to family planning and new tools for improving diagnosis and treatment of pneumonia among young children. Other innovations with high potential to reduce mortality are “kangaroo mother care,” a method of using skin-to-skin contact in conjunction with breastfeeding to improve survival of low-birthweight or premature infants; use of chlorhexidine, a low-cost antiseptic, to prevent infections of the umbilical cord stump; and new tools for small-scale water treatment to prevent diarrheal disease among young children.

The results suggest that additional investment by governments and global partners in the development, introduction, and scale-up of these 11 innovations, as well as other promising approaches, will be essential to meeting targets for lives saved. Innovation will confront shortcomings in prevention, diagnosis, treatment, and care and help expand coverage of lifesaving interventions. As global leaders examine which investments are necessary to reach the SDGs, priority should be placed on innovation as a critical strategy for increasing survival of women and children around the globe.

## INTRODUCTION

During the past two decades, the rate of maternal, newborn, and child deaths in low- and middle-income countries has fallen precipitously because of strategic investments, focused programming, and scaled-up use of evidence-based interventions. The number of children dying in countries receiving support for health programming annually has decreased from about 12.7 million (1990) to 5.9 million (2015), and the number of annual maternal deaths has declined from 532,000 (1990) to 303,000 (2015).<sup>1,2</sup>

Effective health interventions and behavior-change approaches in global health programming have included the use of skilled birth attendants for labor and delivery, promotion of hand-washing and breastfeeding, and treatments for infections that threaten the lives of children and newborns. In addition, interventions from the last several decades such as oral rehydration solution for children with severe diarrhea, insecticide-treated bed nets to protect against malaria, and antiretroviral drugs to prevent mother-to-child transmission of HIV have played a powerful role in improving health outcomes and preventing deaths. With the right tools, training, and knowledge, global health leaders and practitioners have been able to deliver results.

Successes in reducing child and maternal mortality have emboldened global leaders to chart a course for ending preventable child and maternal deaths altogether. With critical leadership from the United States—along with the United Nations Children’s Fund and the governments of Ethiopia and India—the Child Survival Call to Action was commissioned in 2012 to establish a global goal to end preventable child deaths by 2035 and to rally the global community around a new, more targeted approach to accelerate progress in the highest-burden countries and communities. Subsequently endorsed by 178 governments worldwide, the Call to Action goals were based on an analysis using the Lives Saved Tool (LiST)<sup>3</sup> to set targets for reducing child mortality from causes that are avoidable.

The United States Agency for International Development (USAID) further built on this work in 2014, publishing *Acting on the Call: Ending Preventable Child and Maternal Deaths*. This report used a “best-performer” scenario<sup>4</sup> to estimate how more lives could be saved if all 24 high-priority countries could expand coverage of interventions for maternal, newborn, child health and family planning at a rate of

progress achieved by the best-performing country among them.<sup>5</sup> *Acting on the Call* is a road map for progress in child and maternal survival and explores how US programs can achieve greater impact more rapidly.<sup>5</sup>

In addition, a report by the Lancet Commission on Investing in Health, titled *Global Health 2035*, concluded in 2013 that investment in health technologies and systems is essential to achieve a “grand convergence,” in which child and maternal deaths would be reduced to low levels in all countries regardless of income level.<sup>6</sup> The Commission researchers first modeled the impact of building robust, health-delivery systems and scaling up use of today’s medicines, vaccines, diagnostics, and other technologies. The results showed that this effort, at best, might help low-income countries reach two-thirds of the way to convergence by 2035. The researchers concluded that the remaining gap could be closed only through the discovery, development, and delivery of new technologies and other innovations. They also estimated that scaling up use of technologies and health services could prevent up to 10 million deaths each year from 2035 onward, with astonishing economic benefits as well as reductions in suffering.

The PATH-led Innovation Countdown 2030 (IC2030) project further expanded upon these findings and created an evidence base for specific innovations under development. IC2030 identified and evaluated emerging innovations with high potential to help meet the United Nations Sustainable Development Goal (SDG) targets for maternal, newborn, and child mortality. This effort crowdsourced health innovations<sup>b</sup> from around the globe and then asked experts to rank them for their lifesaving potential. The project team modeled this select group of maternal, newborn, and child health innovations to quantify potential lives saved through scaled-up use. The results, documented in a 2015 report titled *Reimagining Global Health* (available at [www.ic2030.org](http://www.ic2030.org)), demonstrated that scaled-up use of selected innovations could potentially save several million lives by 2030.

Currently, less than 3 percent of health research and development (R&D) funding is targeted to the five diseases that make up the largest health burden in low- and middle-income countries.<sup>7</sup> However, further R&D investment and subsequent introduction and scale-up of new innovations will be essential to reach the ambitious international health goals, including both USAID’s targets

a. At the time of this analysis, USAID had identified 24 high-priority countries for child and maternal health: Afghanistan, Bangladesh, Democratic Republic of the Congo, Ethiopia, Ghana, Haiti, India, Indonesia, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Nepal, Nigeria, Pakistan, Rwanda, Senegal, South Sudan, Tanzania, Uganda, Yemen, and Zambia. In June 2016, a 25th country—Myanmar—was added to the list.

b. Innovation can be defined in many ways. In the global health space, it is broadly viewed as an intervention that can change the affordability, accessibility, or effectiveness of practices or tools used for prevention, diagnosis, treatment, and care. PATH uses an expansive definition to include both product- or technology-based innovations (e.g., diagnostics, medical devices, vaccines, and medicines) and system-, design-, or process-focused innovations (e.g., digital health). In our view, game-changing health impact can only be achieved through both product and system innovation and related behavioral changes.



and the SDG for child and maternal health.<sup>8</sup> Building on the IC2030 findings, the analysis presented in this document provides further evidence of the importance of investment in R&D and the potential impact of innovation in ending preventable child and maternal deaths.

### **METHODS: MODELING THE IMPACT OF INNOVATION**

Since 2003, LiST has been used to estimate the number of lives that could be saved by scaling up coverage of key interventions in low- and middle-income countries. Ongoing development of the tool is led by the Institute for International Programs at the Johns Hopkins Bloomberg School of Public Health, and technical inputs are provided by a consortium of academic and international organizations. Coverage, defined as the proportion of a population in need of effective health interventions who actually receive them,<sup>9</sup> is the cornerstone of the model, which estimates mortality change as a consequence of changing coverage patterns. The purpose of LiST is to improve the quality of information available to support public health policies and decision-making.

The LiST framework ensures that there is no double counting or overestimation of lives saved when multiple interventions are scaled up simultaneously. To calculate impact, the model assumes that each death is attributable to a single cause and that each death can only be prevented once. Detailed information about the mathematical approach, modeled pathways within LiST, and inherent assumptions have been described elsewhere.<sup>10</sup>

As previously noted, USAID used LiST to model a “best-performer” scenario, which serves as the basis for its ambitious road map for ending preventable child and maternal deaths in collaboration with 24 low- and middle-income country partners. The most recent country-level data were incorporated by USAID into a set of national models to examine the scale-up of proven maternal, newborn, and child health interventions according to best-performer trends that have been described previously.<sup>4</sup> The baseline year for the analysis was 2012, and the best-performer models track coverage of interventions until 2020.

It is important to note that the best-performer scenario is designed to show what could be possible if all countries perform optimally. However, it does not identify barriers to expanding coverage of interventions or prescribe steps that can be taken to reach higher rates of progress. Proposed actions to accelerate progress within USAID's high-priority countries have been described in the *Acting on the Call* report and include improving health delivery through leadership, governance, health workforce management, health information, and financing, to name a few. Additionally, steps to improve USAID's internal arrangements, such as establishing a coordinator for child and maternal survival, were proposed by the Award Cost Efficiency Study Blue Ribbon Panel.<sup>11</sup> One factor that has not been examined for its potential contribution to accelerating the rate of progress in child and maternal survival and achieving the lives-saved calculations defined by the best-performer scenario is innovation, hence the focus of our analysis in this report.

In the analysis, PATH modeled the contribution that selected emerging innovations could make to reach targets for ending preventable child and maternal deaths in the 24 high-priority countries identified by USAID. The innovations selected had been previously identified in the IC2030 project. Certain IC2030 innovations were excluded or modeled as a bundle to remain consistent with the LiST modeling approach used by USAID. The 11 modeled innovations were:

- New formulations of oxytocin to prevent maternal deaths from postpartum hemorrhage.
- A low-cost uterine balloon tamponade to control postpartum hemorrhage.
- New tools to detect preeclampsia to prevent maternal deaths.
- New neonatal resuscitators to prevent newborn deaths from breathing difficulties.
- Use of chlorhexidine for umbilical cord care to prevent life-threatening neonatal infections.
- “Kangaroo mother care” (KMC)—skin-to-skin contact and breastfeeding—to increase survival in premature or low-birthweight babies.
- Rice fortification to prevent nutritional deficiencies and resulting deaths among young children.
- A chlorinator for small-scale water treatment to prevent diarrheal disease among children.
- Better methods to diagnose pneumonia in children.
- A potent, single-dose antimalarial drug to prevent deaths among young children.



- New products to expand use of injectable contraceptives to reduce maternal, newborn, and child deaths related to unintended pregnancy.

With permission from USAID and in collaboration with researchers at Johns Hopkins University, PATH assessed how these innovations could facilitate the expansion of intervention coverage rates in the modeling that underpins the USAID best-performer scenario. For example, PATH modeled how use of innovative needle-free and heat-stable formulations of the proven intervention oxytocin can increase its availability and use. Without the need for skilled health workers to administer injections and refrigeration to stabilize medication temperatures, it is possible to expand access to this lifesaving drug in health centers within low-resource communities that operate with limited staff and without reliable electricity for refrigeration equipment. PATH estimated the number of lives saved each year in the 24 high-priority countries with scale-up of each innovation between 2016 and 2030 (See Appendix A for a comparison of the various models and approaches mentioned in this report).

PATH developed assumptions for the projected launch year, coverage rate, and effectiveness of each modeled innovation. (See Appendix B for descriptions of all modeled innovations, modeling rationales, and assumptions.) PATH did not adjust the existing USAID assumptions for intervention scale-up rates, but rather considered the proportion of scale-up that

may be attributable to innovation. The most current USAID models for ending preventable child and maternal deaths (updated May 2016) were used for this analysis, and all outputs were produced by LiST version 5.43 beta 19.

## RESULTS: ESTIMATING LIVES SAVED WITH EMERGING INNOVATIONS

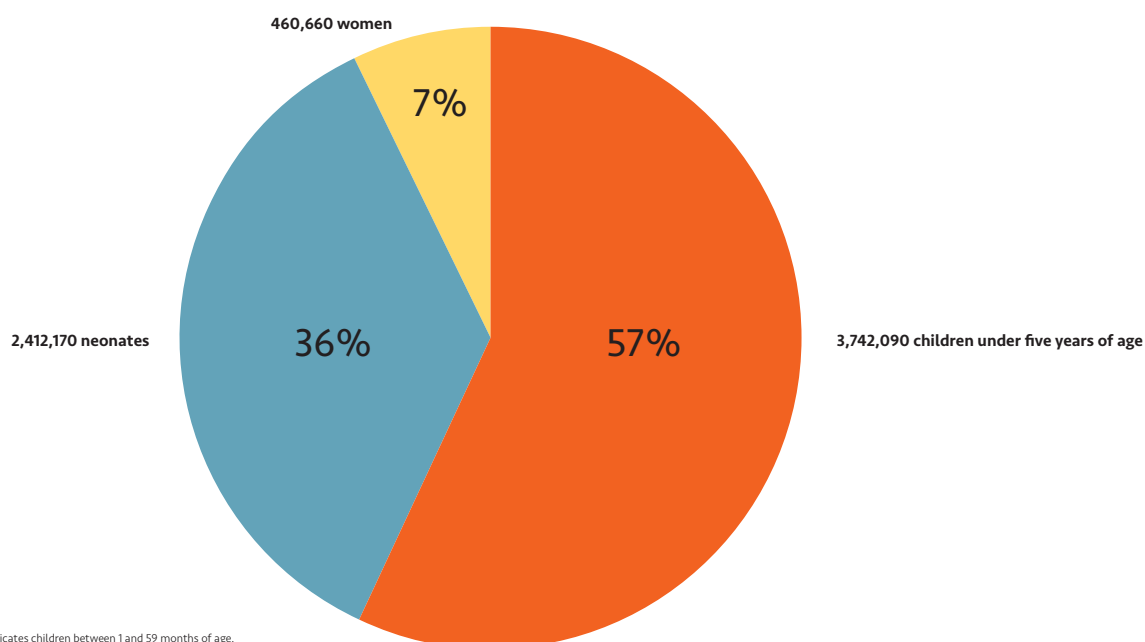
An estimated total of 6.6 million lives—3.7 million children under five years of age, 2.4 million neonates, and nearly 500,000 women—could be saved between today and 2030 if the selected 11 innovations were scaled up in USAID's 24 high-priority countries (Figure 1).

By 2030, the 11 modeled innovations collectively contribute to saving 15 percent of the lives of children under five years of age, 12 percent of the neonatal lives, and 18 percent of the maternal lives projected under the USAID best-performer scenario. Although the absolute number of maternal lives saved is comparatively lower than the number of newborns or young children saved, the impact of innovations on maternal mortality rates is substantial.

### Highest-impact interventions

The innovation with the largest estimated impact is the use of new products to increase coverage of injectable contraceptives (Figure 2). Improving access to effective family planning options can prevent unintended

FIGURE 1. The majority of the estimated lives saved by scaling up use of 11 innovations are in young children (2016–2030).



Note: "Children under five" indicates children between 1 and 59 months of age.

pregnancies and avert deaths among women, newborns, and young children. This is the only modeled innovation that reduces mortality of multiple populations, as evidence shows healthy timing and spacing of pregnancy decreases both maternal and newborn mortality.<sup>12</sup> Further preventing unintended pregnancies could significantly avert child deaths.<sup>13</sup> Innovative methods such as small, lightweight, single-use injection devices will make injectable contraceptives more widely available to women in low-resource settings. This is because injectable contraceptives are easy to transport and use, allowing for administration in remote locations by community health workers or even by women themselves in their own homes.

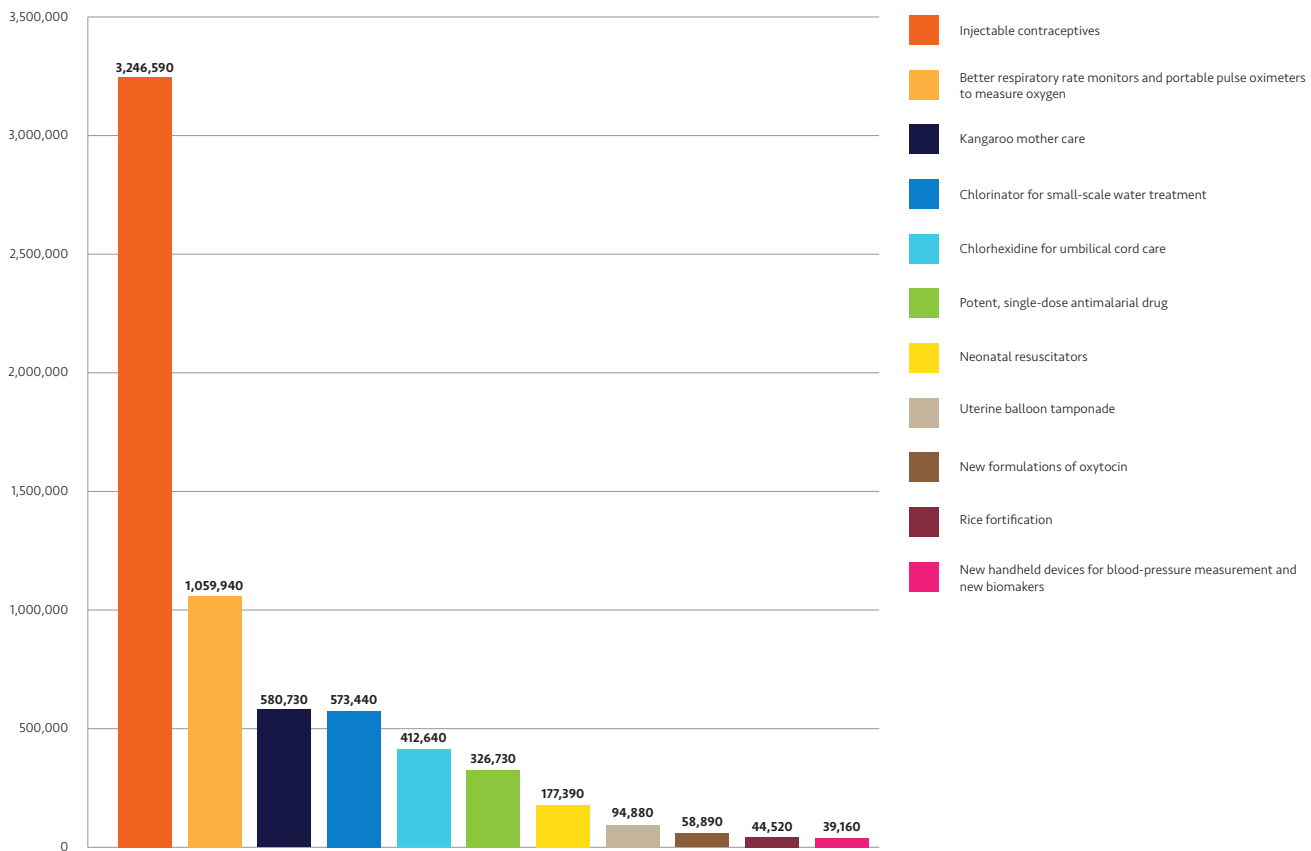
Better respiratory rate monitors and portable pulse oximeters to improve timely detection and treatment of pneumonia among children under five years of age have the second-highest impact. Difficulties in diagnosing pneumonia among young children in low-resource settings often lead to unnecessary treatment delays and increase the risk of death. Innovations in diagnostic technologies can have a significant impact when better monitoring leads to expanded coverage of lifesaving treatments resulting in

fewer child deaths from pneumonia. Innovative devices for pneumonia are more reliable and easier to use than existing tools, and some models can transmit data to nearby devices.

KMC has the third-highest impact. This innovation involves skin-to-skin contact and breastfeeding to improve survival of low-birthweight or premature newborns. Based on hospital-based studies comparing incubator care with KMC, the World Health Organization has recommended widespread use of KMC, especially in countries with high neonatal mortality rates, and KMC is now being scaled up in 23 of USAID's high-priority countries. The use of KMC is a low-cost, innovative approach for newborn survival in low-resource settings without sophisticated equipment.

Innovations that prevent disease also have substantial projected impact. For example, the application of chlorhexidine, a low-cost antiseptic, to the umbilical cord stump can prevent deadly infections among vulnerable newborns, especially for those born in an unsanitary environment. Chlorhexidine was a proven intervention adapted into a new formulation for umbilical cord use. The application of chlorhexidine is a low-cost, easy-to-use product that significantly reduces newborn mortality.

**FIGURE 2. Injectable contraceptives have the largest number of estimated lives saved (2016–2030).**



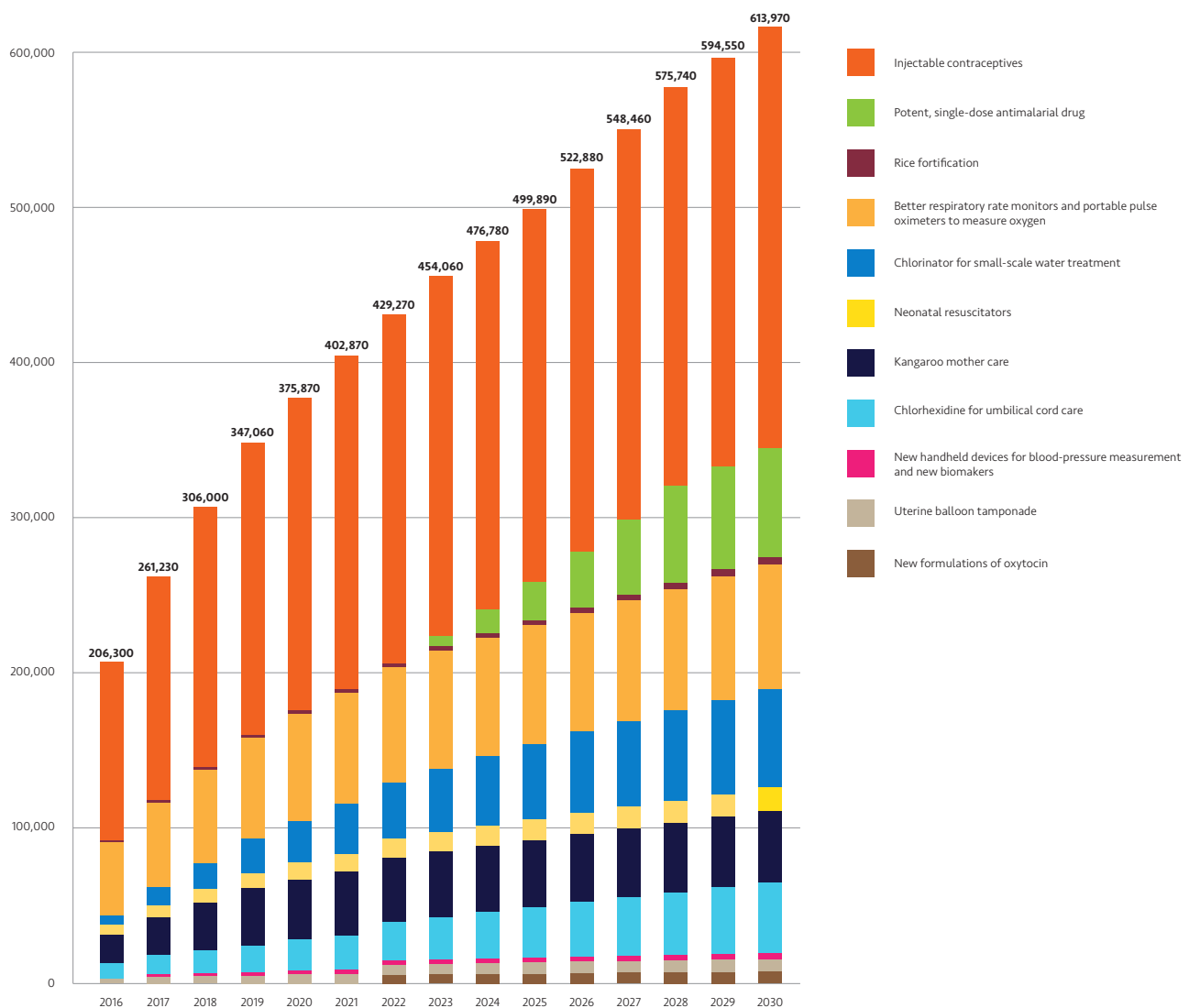
Similarly, new approaches for small-scale water treatment offer promising alternatives for the prevention of life-threatening diarrheal disease. For example, chlorinators currently in development can be fitted to latch onto existing water sources, providing safe water for community use. Chlorinators are innovative devices making small-scale, clean community water sources both feasible and economical.

Figure 3 shows how the estimated total number of lives saved each year grows from about 200,000 in 2016 to more than 600,000 in 2030 with expanded use of innovations. Scaled-up use of injectable contraceptives is responsible for about half of the total lives saved, though the proportion declines slightly over time as more innovations are launched in the model.

### Limitations of the analysis

Several limitations of the analysis need to be considered when interpreting the results. Because this analysis is based on USAID's projected trends for coverage change, the impact of these technologies can only be estimated in the context of the current national-level models and assumptions about progress achieved to reach coverage targets. The innovation coverage targets or proportional contributions of innovations to the modeled coverage increases were based on the value propositions of each product and evidence from studies, where available. In addition, many of the modeled innovations are currently undergoing R&D and specific modeled parameters may not have been known or examined at the time this analysis was undertaken. For this exercise, we assumed that each innovation would reach relevant technical and regulatory milestones and launch

FIGURE 3. Estimated number of lives saved grows with increased use of innovations (all populations).







at an estimated date. However, a variety of factors influence whether these innovations will actually become available and widely implemented in USAID's 24 high-priority countries.

Although the IC2030 project sought to create the broadest possible list of high-impact health innovations, there are many promising technologies and products in development that were not among the submissions received and, therefore, were not considered for this analysis. Additional innovations that may effectively reduce maternal, newborn, or child mortality in these settings may augment the projected health impact.

### **THE NEED TO INVEST IN INNOVATION TO REACH GLOBAL HEALTH GOALS**

This study highlights that further innovation is crucial for reaching the goal of ending preventable child and maternal deaths. An estimated 6.6 million maternal, newborn, and child lives could be saved between now and 2030 if 11 innovations highlighted by experts for their lifesaving potential are advanced.

Alongside efforts to improve service delivery performance and expand coverage of known best practices and interventions, mechanisms to identify, develop, and scale innovations deserve greater focus. USAID in particular, in order to meet the goals set within *Acting on the Call*, will require a deliberate approach to prioritizing the devices, drugs, and systems/services that will have the greatest impact on saving lives. USAID has already established programs to advance innovation for child and maternal survival. For example, the Saving Lives at Birth Grand Challenge—a collaboration between USAID's Center for Accelerating Innovation and Impact and the US Global Development Lab—aims to bring about innovations in

technology and service delivery to achieve better maternal and newborn health outcomes. Although these efforts are commendable, progress will be limited without a focused strategy and further commitment to expanding these programs. Other governments and global development partners must similarly prioritize investment in innovation to increase child and maternal survival rates within their global health strategies and programs.

In addition to public financing, nontraditional actors will play crucial roles in advancing innovation for child and maternal health. The expertise of the private sector in developing new technologies is unparalleled and underleveraged for global health. Furthermore, as the IC2030 project demonstrated, innovators are emerging in new and unexpected places. In-country innovators, in particular, have demonstrated an incredible capacity to address their own health challenges, and are the best source for frugal innovations—cost-effective, fit-for-purpose solutions to address the needs of populations who suffer the greatest health burdens worldwide. However, country innovators often lack the resources to overcome roadblocks to development, introduction, and widespread scale-up of innovations. Investments—especially from low- and middle-income countries themselves—in regulatory systems, research infrastructure, and human-resource capacity, will unlock the potential for promising innovations to be used in local settings and around the globe.

The task ahead for governments and development partners is to focus on the most promising innovations to save the lives of vulnerable women, newborns, and children and to ensure local and global stakeholders can sustainably implement these solutions. Whether the focus is on the 11 innovations highlighted in this report or an alternative set, this analysis emphasizes that the international development community has an opportunity to take advantage of a rich set of emerging tools that can enable dramatic change. To reach the goal of ending preventable child and maternal deaths, global leaders will need to act purposefully to encourage the development of innovations that will have the greatest impact on saving lives, inform decision-making and investment, and ultimately enhance the process of scale-up, transforming ideas into impact.

Authored by: Tara Herrick, Elana Banin, Heather Ignatius, John Ballenot, and Victoria B. Chou




## REFERENCES

- 1 United Nations Children's Fund (UNICEF). *Committing to Child Survival: A Promise Renewed Progress Report 2015*. New York: UNICEF; 2015.
- 2 World Health Organization (WHO), UNICEF, United Nations Population Fund (UNFPA), World Bank Group, and the United Nations Population Division. *Trends in Maternal Mortality: 1990 to 2015*. Geneva: WHO; 2015.
- 3 Lives Saved Tool website. Available at: <http://livessavedtool.org>. Accessed July 14, 2016.
- 4 Walker N, Yenokyan G, Friberg IK, Bryce J. Patterns in coverage of maternal, newborn, and child health interventions: projections of neonatal and under-5 mortality to 2035. *Lancet*. 2013;382:1029–1038.
- 5 United States Agency for International Development (USAID). *Acting on the Call: Ending Preventable Child and Maternal Deaths*. Washington, DC: USAID; 2015. Available at: <https://www.usaid.gov/sites/default/files/documents/1864/USAID-2015-Acting-on-the-Call.pdf>.
- 6 Lancet Commission on Investing in Health. Global health 2035: a world converging within a generation. *Lancet*. 2013;382:1898–1955.
- 7 Yamey G, Morel C. Investing in health innovation: a cornerstone to achieving global health convergence. *PLoS Biology*. 2016;14(3):e1002389. doi: 10.1371/journal.pbio.1002389.
- 8 Engmann CM, Khan S, Moyer CA, Coffey PS, Bhutta ZA. Transformative innovations in reproductive, maternal, newborn, and child health over the next 20 years. *PLoS Medicine*. 2016;13(3):e1001969. doi: 10.1371/journal.pmed.1001969.
- 9 Bryce J, Arnold F, Blanc A, et al. Measuring coverage in MNCH: new findings, new strategies, and recommendations for action. *PLoS Medicine*. 2013;10(5):e1001423. doi:10.1371/journal.pmed.1001423.
- 10 Walker N, Tam Y, Friberg IK. Overview of the Lives Saved Tool (LiST). *BMC Public Health*. 2013;13(suppl 3):S1. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3847271/>.
- 11 Chambers R. *Doing Things Differently at USAID: Recommendations for Improved Effectiveness and Efficiency to Accelerate Action and Save Additional Lives*. Washington, DC: USAID; 2014. Available at: <https://www.usaid.gov/sites/default/files/documents/1868/blue-ribbon-advisoy-panel.pdf>.
- 12 USAID. *Ending Preventable Maternal Mortality: USAID Maternal Health Vision for Action Evidence for Strategic Approaches*. Washington, DC: USAID; 2015. Available at: [https://www.usaid.gov/sites/default/files/documents/1864/MH%20Strategy\\_web\\_red.pdf](https://www.usaid.gov/sites/default/files/documents/1864/MH%20Strategy_web_red.pdf).
- 13 Stenberg K, Axelson H, Sheehan P, et al. Advancing social and economic development by investing in women's and children's health: a new Global Investment Framework. *Lancet*. 2014;383(9925):1333–1354.




APPENDIX A. Approaches for estimating the health impact of interventions and innovations.




APPROACH	DEVELOPER	OBJECTIVE
<p>Lives Saved Tool (LiST)  <a href="http://livessavedtool.org/">http://livessavedtool.org/</a></p>	<p>The Institute for International Programs at the Johns Hopkins Bloomberg School of Public Health</p>	<p>Computer-based tool that can be used to compare multiple scenarios of estimated impact regarding different intervention packages and coverage levels. These scenarios combine the best scientific information about effectiveness of interventions for maternal, neonatal, and child health with information about cause of death and current coverage of interventions.</p>
<p><i>Acting on the Call: Ending Preventable Child and Maternal Deaths</i> report  <a href="https://www.usaid.gov/actingonthecall">https://www.usaid.gov/actingonthecall</a></p>	<p>US Agency for International Development (USAID)</p>	<p>Formulated a plan for scaling up high-impact interventions to reduce child and maternal deaths in 24 high-priority countries. This report utilized LiST to apply the "best-performer scenario," which changes coverage for each intervention based on the rate of progress achieved by the best-performing country (within categories). Expected impact is shaped by current coverage rates under optimal conditions.</p>
<p>Innovation Countdown 2030 (IC2030)  <a href="http://ic2030.org/">http://ic2030.org/</a></p>	<p>PATH</p>	<p>Identified, evaluated, and showcased game-changing health technologies and innovations with great promise to save lives. PATH sought ideas from experts, innovators, and developers worldwide, crowdsourcing health solutions that can accelerate the world's progress toward the proposed 2030 health targets in the United Nations Sustainable Development Goals.</p>
<p>IC2030: Harnessing the power of innovation to save mothers and children</p>	<p>PATH</p>	<p>PATH estimated the contribution that innovation could have in reaching USAID's targets for ending preventable child and maternal deaths in 24 high-priority countries. With permission from USAID and in collaboration with Johns Hopkins University, PATH specified how 11 selected innovations could facilitate the expansion of USAID's intervention coverage rates from LiST. The innovations selected for the analysis had been identified in the PATH-led IC2030 project.</p>

## APPENDIX B. Innovations modeled for contributions to ending preventable child and maternal deaths in 24 high-priority countries.

	INNOVATION	MODELING RATIONALE AND ASSUMPTIONS
 <p>PATH/Patrick McKern</p>	<p><b>New formulations of oxytocin</b></p> <p>Severe bleeding after childbirth kills hundreds of thousands of women each year in low-resource settings. Although oxytocin can effectively control postpartum hemorrhage, this drug is not available to many women, especially in remote areas. It currently comes only in liquid form and needs to be injected by trained health professionals. It also must be transported and stored under refrigeration.</p> <p>Alternative formulations are needed to improve access to oxytocin. Products under development include a fast-dissolving tablet placed under the tongue and a dry powder that can be administered with a simple, disposable inhaler. Unlike conventional oxytocin, these formulations do not require refrigeration during transport and storage or require injection, making them especially suitable for use in outlying areas by lower-level health workers.</p>	<p><b>Rationale</b></p> <p>The availability of heat-stable, needle-free formulations of oxytocin will expand access to this lifesaving drug, especially in areas without reliable supplies of grid electricity to operate refrigeration equipment at health centers. The percentage of intervention scale-up targets attributable to the innovation was adjusted by country based on national electrification rates.<sup>1</sup></p> <p><b>Predicted launch date</b></p> <p>2022</p> <p><b>Estimated peak percentage of US Agency for International Development (USAID) intervention coverage target attributable to innovation</b></p> <p>Ranges from 20% to 60% (country-level electrification data used to determine values)</p>
 <p>PATH/Patrick McKern</p>	<p><b>Low-cost uterine balloon tamponade</b></p> <p>When first-line treatments for postpartum hemorrhage fail to control bleeding, one option is to insert a balloon tamponade in the uterus. Health care professionals in wealthy countries have used uterine balloon tamponades for years, but costs and lack of access to equipment and training have limited their use in low-resource settings.</p> <p>A simple, low-cost kit to create a uterine balloon tamponade consists of a condom that is tied to a Foley catheter and then inflated with clean water through a syringe and one-way valve. Using readily available materials, it is especially suitable for use in remote low-resource settings. PATH and Sinapi Biomedical, a South African manufacturer, are also currently developing a promising, low-cost uterine balloon tamponade device.<sup>2,3</sup></p>	<p><b>Rationale</b></p> <p>The uterine balloon tamponade can be made available to all women who give birth in facilities and who fail drug therapy. Based on previous studies, modeling assumes the device will have 85% effectiveness.<sup>4</sup></p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>N/A (not in USAID best-performer model; impact of the low-cost uterine balloon tamponade is additive to the best performer data)</p>
 <p>Dawid De Greeff and King's College London</p>	<p><b>New tools to detect preeclampsia</b></p> <p>Preeclampsia is a condition that affects more than one in 20 pregnant women and is associated with dangerously high blood pressure. Some women have few symptoms until it is too late. Undetected and untreated, preeclampsia can lead to eclampsia, or seizures. Together, these hypertensive disorders are a leading cause of maternal death, especially in settings with inadequate prenatal care.</p> <p>Better methods to detect preeclampsia are needed. This may include introduction of new, easy-to-use, low-cost handheld devices for measuring blood pressure and use of new tests for biomarkers that provide an early warning of preeclampsia.</p>	<p><b>Rationale</b></p> <p>Studies have shown that many women are not screened for preeclampsia during antenatal care in low- and middle-income countries.<sup>5</sup> New, effective diagnostic tools will help to identify women with preeclampsia and improve coverage of low-cost treatment with magnesium sulfate.</p> <p><b>Predicted launch date</b></p> <p>2017</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>30%</p>



a. PATH analysis on the latest available Demographic Health Survey using the STATcompiler. PATH reviewed data for the percentage of women who receive antenatal care who receive a blood-pressure measurement and the percentage of women who receive antenatal care who get urine collected.

 <p>Laerdal Global Health</p>	<p><b>New neonatal resuscitators</b></p> <p>As many as one in ten newborns need help breathing at birth, and many of these babies will die without proper care. In low-resource settings, health centers and birth attendants often lack the resuscitation equipment needed to help babies breathe. Challenges faced by health workers include limited access to devices suitable for use in low-resource settings, costs, and lack of training.</p> <p>New, low-cost, reusable, and easy-to-use resuscitators can help to prevent deaths among newborns in low-resource settings. One new product is especially designed to improve the mask-mouth seal and features easy assembly and cleaning.</p>	<p><b>Rationale</b></p> <p>New, low-cost resuscitators will make it easier to seal the nose and mouth, have fewer parts, and be easier to clean. These design improvements will lead to a modest expansion in intervention coverage.</p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>15%</p>
 <p>CNCP/JSI Research and Training Institute, Inc</p>	<p><b>Use of chlorhexidine for umbilical cord care</b></p> <p>Hundreds of thousands of newborns in low-resource settings die each year from infections. Unsanitary conditions during childbirth and a lack of antiseptics in the first week of life increase the risk of life-threatening disease, including serious infections. Affordable, feasible, and efficacious interventions to reduce neonatal infections are needed.</p> <p>Chlorhexidine liquid or gel substantially reduces the risk of infection when applied to the umbilical cord stump soon after birth. It delivers chlorhexidine at a safe and effective 7.1% concentration, appropriate for use at home by low-level health workers or family members.</p>	<p><b>Rationale</b></p> <p>Use of this low-cost, easy-to-use product is currently being scaled up across a number of countries and promises to prevent many life-threatening infections among newborns. Expert evaluators defined chlorhexidine as an innovation and ranked it highly in the Innovation Countdown 2030 project.</p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>100%</p>
 <p>Jonathan Torgovnik/Getty Images Reportage</p>	<p><b>Kangaroo mother care</b></p> <p>"Kangaroo mother care" involves prolonged skin-to-skin contact (chest-to-chest) between the newborn and mother immediately after birth. Studies have found that this intimate physical contact improves thermal regulation of newborns and promotes exclusive breastfeeding, which is especially important for survival in low-resource settings. It also creates a strong psychological bond between the newborn and parent.</p> <p>Kangaroo mother care was originally developed to improve newborn survival for low-birthweight or preterm babies in areas where incubators are either unavailable or unreliable. Based on the observed benefits and simplicity, it has been recommended for widespread use, especially in developing countries with high newborn death rates.</p>	<p><b>Rationale</b></p> <p>This innovation is currently being used in some countries, and evidence supporting expanded use is strong.<sup>6</sup> Expert evaluators defined kangaroo mother care as an innovation and ranked it highly in the Innovation Countdown 2030 project.</p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>100%</p>

 <p>PATH/Glenn Austin</p>	<p><b>Rice fortification</b></p> <p>Micronutrient deficiencies threaten the health and development of millions of children. Key problems include deficiencies in iron, which can reduce cognitive function, and vitamin A and zinc, which can reduce immune function, leaving children more vulnerable to disease. Enriching the foods children regularly eat with needed vitamins and minerals can help to avoid these problems.</p> <p>For children who live in areas where rice is a staple food, rice fortification is a cost-effective, wide-reaching, and sustainable way to boost nutrition. Expanding use of this innovation may improve child nutrition in many countries.</p>	<p><b>Rationale</b></p> <p>With newer methods, rice fortification can be tailored to meet the specific needs of local populations for micronutrients such as iron, thiamin, zinc, vitamin A, folic acid, and other B vitamins. The resulting rice is nearly identical to unfortified rice in aroma, taste, and texture. Rice fortification will complement other micronutrient supplementation products and lead to a modest expansion in coverage.</p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>15% (micronutrient supplementation)</p>
 <p>Zimba</p>	<p><b>Chlorinator for small-scale water treatment</b></p> <p>Many households in developing countries lack access to clean water. Large-scale public water systems are often inadequate, and households may lack the resources to buy treated water. Use of contaminated water at home can cause severe diarrheal disease, a leading cause of death among young children.</p> <p>New technologies are making the use of chlorine for disinfecting water at small-scale community water sources both feasible and economical. One promising chlorinator, for example, is fitted directly to a hand pump or community tap and automatically chlorinates water to a safe concentration without electricity or moving parts. It treats up to 8,000 liters of water between refills of the chlorine dispenser.</p>	<p><b>Rationale</b></p> <p>Sixty-five percent of low- and middle-income populations obtain water through a community source.<sup>b,7</sup> Based on pilot studies of home water treatment products, 23% of the population that obtains water through community sources will use the chlorinator.<sup>8</sup> Efficacy for reducing the incidence of diarrhea is estimated to be 84% based on available information.<sup>9</sup></p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>Varies by country (assume that a maximum of 18 percentage points of the growth in coverage is due to innovation)</p>
 <p>Lionsgate Technologies</p>	<p><b>Better methods to diagnose pneumonia in children</b></p> <p>Pneumonia is the leading cause of death among children under five years of age. Because pneumonia can be difficult to diagnose, treatment is frequently delayed, increasing the risk of death. Often, health workers in low-resource settings visually count the number of breaths each minute to help determine diagnosis and treatment—a crude method prone to error.</p> <p>New respiratory rate monitoring tools will improve the diagnosis and timely treatment of infants and children with pneumonia. One novel, low-cost sensor, for example, monitors body temperature as well as respiratory rate, is more reliable and easier to use than existing tools, and transmits data to nearby devices. Other new automated monitors use smart sensing technology.</p> <p>New tools to measure blood-oxygen levels will also help detect pneumonia. These include small devices that are typically placed on fingertips to measure light transmission through the body to determine the blood-oxygen level. A new type uses a mobile phone attachment to accurately measure oxygen levels without touching the body.</p>	<p><b>Rationale</b></p> <p>New methods to detect pneumonia in children are critical to the scale-up of effective antibiotic treatments.<sup>10</sup> The United Nations Children's Fund has recently held design challenges to improve respiratory rate monitors to expand access to accurate devices.<sup>11</sup></p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>50%</p>

b. PATH analysis using data from the World Health Organization/United Nations Children's Fund Joint Monitoring Programme for Water Supply and Sanitation.



 <p>PATH/Laura Newman</p>	<p><b>Potent, single-dose antimalarial drug</b></p> <p>The primary objective of malaria treatment is to rapidly and completely eliminate the <i>Plasmodium</i> parasite from the patient's blood to prevent the progression of uncomplicated malaria to severe disease or death and to prevent chronic infection that leads to serious anemia. Artemisinin is a key ingredient of the gold-standard treatment for uncomplicated malaria caused by the <i>P. falciparum</i> parasite. In some regions, however, the parasite is developing resistance to artemisinin-based combination therapies.</p> <p>This innovation is a potent, synthetic antimalarial drug candidate that may be effective against artemisinin-resistant strains of malaria. A complete cure for malaria could be completed with a single oral dose. This drug may also be useful for prevention of malaria.</p>	<p><b>Rationale</b></p> <p>The emergence of <i>P. falciparum</i> resistance to artemisinin is an urgent public health concern, threatening the sustainability of the global effort to reduce the malaria burden. Although precise timing of the development of resistance is unclear, we assume that 40% of cases will require use of new treatments by 2030. Scale-up rates are based on the rapid rollout of artemisinin-based therapies.</p> <p><b>Predicted launch date</b></p> <p>2022</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>40% (antimalarials are only scaled up in a subset of the 24 countries)</p>
 <p>PATH/Will Boase</p>	<p><b>New products to expand use of injectable contraceptive</b></p> <p>Injectable contraceptives are among the world's most popular methods for preventing pregnancy. They offer women safe and effective long-term protection, convenience, and privacy. Until now, however, they have not been widely available outside of clinic settings.</p> <p>Sayana® Press is one product that may make injectable contraception more widely available to women in low-resource settings, especially in remote areas. This is a lower-dose formulation of a widely used contraceptive that is packaged in a single-use injection system. Use of this small, lightweight, and easy-to-use product requires minimal training.</p>	<p><b>Rationale</b></p> <p>Scale-up projections are based on the proportion of women who currently use injectable contraceptives.<sup>12</sup> Growth in new users of injectables is assumed to maintain the current proportion of injectables in the contraceptive market. Use of products such as Sayana® Press that require minimal training will help to expand women's access to contraception.</p> <p><b>Predicted launch date</b></p> <p>2016</p> <p><b>Estimated peak percentage of USAID intervention coverage target attributable to innovation</b></p> <p>Varies by country (based on country-level data for women currently using injectables)</p>

## NOTES

- 1 Access to electricity (% of population) page. The World Bank website. Available at: <http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>. Accessed July 21, 2016.
- 2 Reed L. A balloon to save moms' lives [blog post]. PATH Blog. September 22, 2015. Available at: [http://blog.path.org/2015/09/uterine-balloon-saves-lives/?utm\\_referrer=https%3A%2F%2Fwww.google.com%2F](http://blog.path.org/2015/09/uterine-balloon-saves-lives/?utm_referrer=https%3A%2F%2Fwww.google.com%2F).
- 3 Quintanar Solares M, Mazia G. A novel, affordable, safe, and easy-to-use uterine balloon tamponade for management of severe postpartum hemorrhage. Presented at: Global Maternal Newborn Health Conference, October 20, 2015; Mexico City.
- 4 Doumouchtsis SK, Papageorgiou AT, Arulkumaran S. Systematic review of conservative management of post-partum hemorrhage: what to do when medical treatment fails. *Obstetrical & Gynecological Survey*. 2007;62(8):540-547.
- 5 STATcompiler: The DHS Program website. Available at: <http://statcompiler.com/>. Accessed July 21, 2016.
- 6 Lawn JE, Mwansa-Kambafwile J, Horta BL, et al. 'Kangaroo mother care' to prevent deaths due to preterm birth complications. *International Journal of Epidemiology*. 2010;39(Suppl 1):i44-i54. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/20348117>.
- 7 Tables page. World Health Organization/United Nations Children's Fund Joint Monitoring Programme for Water Supply and Sanitation website. Available at: <http://www.wssinfo.org/data-estimates/tables/>. Accessed July 21, 2016.
- 8 PATH. *Perspectives: Commercial Approaches to Delivering Household Water Treatment and Safe Storage Products and Solutions to Low-Income Households*. Seattle: PATH; 2012. Available at: [http://www.path.org/publications/files/TS\\_swp\\_perspectives\\_rpt.pdf](http://www.path.org/publications/files/TS_swp_perspectives_rpt.pdf).
- 9 US Centers for Disease Control and Prevention (CDC). *Household Water Treatment: Chlorination—The Safe Water System*. Atlanta: CDC; 2014. Available at: <http://www.cdc.gov/safewater/chlorination.html>.
- 10 Izadnegahdar R, Cohen AL, Klugman KP, Qazi SA. Childhood pneumonia in developing countries. *The Lancet: Respiratory Medicine*. 2013;1(7):574-584.
- 11 Pneumonia 2: How can we improve the Acute Respiratory Infection (ARI) Timer to effectively diagnose pneumonia? page. Global Design for UNICEF Challenge website. Available at: <http://unicefchallenge.com/pneumonia-2-2/>. Accessed July 21, 2016.
- 12 *FP2020 Commitment to Action: Measurement Annex 2015*. Washington, DC: Family Planning 2020; 2015. Available at: [http://progress.familyplanning2020.org/uploads/15/03/FP2020\\_MeasurementAnnex\\_2015\\_Spreads.pdf](http://progress.familyplanning2020.org/uploads/15/03/FP2020_MeasurementAnnex_2015_Spreads.pdf).



[www.path.org](http://www.path.org)

PATH is the leader in global health innovation. An international nonprofit organization, we save lives and improve health, especially among women and children. We accelerate innovation across five platforms—vaccines, drugs, diagnostics, devices, and system and service innovations—that harness our entrepreneurial insight, scientific and public health expertise, and passion for health equity. By mobilizing partners around the world, we take innovation to scale, working alongside countries primarily in Africa and Asia to tackle their greatest health needs. Together, we deliver measurable results that disrupt the cycle of poor health. Learn more at [www.path.org](http://www.path.org).

455 Massachusetts Ave  
NW, Suite 1000  
Washington, DC 20001