

# Protecting mother and baby from infectious diseases

PATH's maternal immunization work to enhance the maternal and newborn health toolkit

Mothers and children deserve the chance to reach their full potential, wherever they live. Despite progress toward their survival, too many mothers and newborns still die unnecessarily each year—mostly in low-resource settings. Many deaths could be prevented by increasing access to existing and incoming health solutions—including vaccines.

The first 28 days of life (the newborn period) are a child's most vulnerable. In fact, newborns make up nearly half of all child deaths before five years of age—about 2.9 million deaths each year.<sup>1</sup> Maternal deaths also remain unacceptably high. In 2013 alone, more than 289,000 mothers died during pregnancy, childbirth, or the days following delivery.<sup>2</sup> Along with complications related to prematurity and labor and delivery, infections (sepsis, meningitis, pneumonia, and diarrhea) are among the top causes of newborn deaths. Pregnant women are also at especially high risk for certain diseases, including tetanus and influenza. For these reasons, disease prevention is an important part of a broader suite of interventions to help mothers and babies survive and thrive.

A promising way to prevent disease in these populations is maternal immunization—vaccinating a woman while pregnant to enhance immunity for mother and/or baby. Due to this potential, PATH is advancing maternal immunization strategies against several illnesses that disproportionately threaten newborns and/or pregnant women, including respiratory syncytial virus (RSV), Group B *Streptococcus* (GBS), influenza, and pertussis (whooping cough.)

## MATERNAL IMMUNIZATION—A PROMISING STRATEGY

Direct vaccination, which works for older children, is often not an effective option for newborns. Babies are born with immature immune systems not yet able to adequately respond to infections encountered shortly after birth or to most childhood vaccines. Vaccinating a woman during pregnancy can boost her immunity and transfer antibodies through the placenta to the fetus that protect the baby in the first critical months after birth until its own immune system matures and direct vaccination can be effective.

Maternal immunization has had success globally against maternal and newborn tetanus (MNT), influenza, and



*Immunization during pregnancy can help protect mother and/or baby from certain life-threatening illnesses. Photo: PATH/Heng Chivoan*

pertussis. For example, it has helped dozens of low-resource countries eliminate MNT, a disease often a death sentence for mothers and babies. Globally, partners have committed to eliminating MNT by 2020.<sup>3</sup>

Momentum is accelerating around maternal immunization to address disease prevention gaps. In addition to vaccines already used for maternal immunization, other maternal vaccines are in development against infections like RSV and GBS. As momentum builds, coordination across vaccine and prenatal/postnatal care systems is needed to discern how maternal immunization fits within the broader maternal and newborn health toolkit. We need to overcome remaining scientific, policy, regulatory, and implementation challenges, and leverage existing maternal vaccine delivery programs so that the strategy can reach its full potential.

## RSV PREVENTION IN EARLY LIFE

RSV is a leading cause of newborn and infant respiratory infections and hospitalizations worldwide, and a significant cause of death, mostly between birth and five months of age. RSV causes 34 million new infections, 3.4 million hospitalizations, and up to 199,000 child deaths before five years of age every year.<sup>4</sup> Almost all such deaths are in low-resource settings. Symptoms can be similar to the common cold, but can also lead to serious complications like

pneumonia and bronchiolitis. RSV can also make infants more vulnerable to pneumonia caused by other pathogens and may be linked to long-term effects like asthma.

The lack of a licensed RSV vaccine leaves a significant gap in the newborn survival toolkit. Fortunately, promising RSV interventions are in development and could be ready for introduction in a few years. These include vaccines for maternal immunization and affordable antibodies that can be administered at birth to protect in early life. PATH is collaborating across sectors to ready the enabling environment for incoming RSV interventions so that, when they are available, the global health community is poised to implement them and make them universally accessible.

### A VACCINE SOLUTION TO PREVENT NEWBORN GBS

GBS is a leading cause of sepsis and meningitis in young infants worldwide, and may also play a role in miscarriage and stillbirth. Infants less than three months of age are at highest risk of severe complications and death. Those that survive are often left with lifelong disabilities. Screening pregnant women and antibiotic treatment during labor of those that carry GBS can drastically reduce the chance of GBS passing to the newborn and causing early-onset disease; however, this strategy is neither feasible nor available in most low-resource countries. A GBS vaccine could save countless lives in these underserved settings; yet no such vaccine exists. To fill this gap, PATH is supporting the development of a potentially groundbreaking maternal vaccine designed to provide early newborn protection against the most common kinds (or serotypes) of GBS.

### MATERNAL INFLUENZA IMMUNIZATION FEASIBILITY

Influenza is a common respiratory infection that causes up to 5 million severe illness cases and up to 500,000 deaths each year.<sup>5</sup> Deaths could surge into the millions if a highly virulent pandemic strain emerges. Anyone can get infected, but newborns, infants, and pregnant women are particularly susceptible. Consequently, the World Health Organization (WHO) identifies pregnant women as a high priority group for influenza vaccination to protect both mother and baby.

A number of countries have maternal influenza immunization strategies, but more information is needed about what it will take to broaden use in low- and middle-income countries. Therefore, PATH is conducting formative research in Malawi and El Salvador on the knowledge and

acceptability of maternal influenza immunization among pregnant women and policymakers, as well as on implementation feasibility in these settings. The aim is to provide generalizable information from places that differ in familiarity with maternal immunization, which can then be more broadly applied to other countries.

### AFFORDABLE PERTUSSIS PROTECTION FOR NEWBORNS

Pertussis is a highly contagious respiratory infection that starts as a mild cough and can progress to severe coughing fits and difficulty breathing. In serious cases, pertussis can cause pneumonia, seizures, brain damage, and death. An estimated 16 million cases of pertussis occur worldwide each year, mostly in low-resource countries, and about 195,000 children are estimated to die from the disease.<sup>6</sup> Infants in the first months of life are the most vulnerable.

Routine childhood vaccination programs worldwide include combination vaccines that protect against pertussis, but newborns are too young for these vaccines to be effective. Maternal immunization could reduce their susceptibility by providing immunity until successful active vaccination can take place. This strategy is supported by WHO and used in a number of industrialized countries, but the pertussis vaccines currently available for pregnant women are not affordable for all countries. To close this gap, PATH is exploring affordable maternal vaccine solutions to protect young babies from pertussis in low-resource settings.

### REFERENCES

1. WHO. Every Newborn: an action plan to end preventable deaths. Geneva: WHO; 2014. Available at: [https://www.everynewborn.org/Documents/Every\\_Newborn\\_Action\\_Plan-ENGLISH\\_updated\\_July2014.pdf](https://www.everynewborn.org/Documents/Every_Newborn_Action_Plan-ENGLISH_updated_July2014.pdf). Accessed January 11, 2017.
2. United Nations. The Millennium Development Goals report: 2015. New York: UN; 2015. Available at: [http://www.un.org/millenniumgoals/2015\\_MDG\\_Report/pdf/MDG%202015%20rev%20\(July%2015\).pdf](http://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%2015).pdf). Accessed January 11, 2017.
3. Kiwanis/UNICEF. Eliminate maternal/neonatal tetanus. About the map. Kiwanis/UNICEF. 2016. Available at: <http://sites.kiwanis.org/Kiwanis/en/theELIMINATEproject/Progress/Aboutthemap.aspx>. Accessed January 11, 2017.
4. Nair H, Nokes DJ, Gessner BD, et al. Global burden of acute lower respiratory infections due to respiratory syncytial virus in young children: a systematic review and meta-analysis. *Lancet*. 2010;375(9725):1545-1555.
5. WHO. Influenza (seasonal) [fact sheet no.211]. WHO; April 2009. Available at: <http://www.who.int/mediacentre/factsheets/fs211/en/>. Accessed January 11, 2017.
6. WHO. Pertussis. WHO; June 2011. Available at: <http://www.who.int/immunization/topics/pertussis/en/>. Accessed January 11, 2017.



[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).

**STREET ADDRESS**  
2201 Westlake Avenue  
Suite 200  
Seattle, WA 98121 USA

**MAILING ADDRESS**  
PO Box 900922  
Seattle, WA 98109 USA