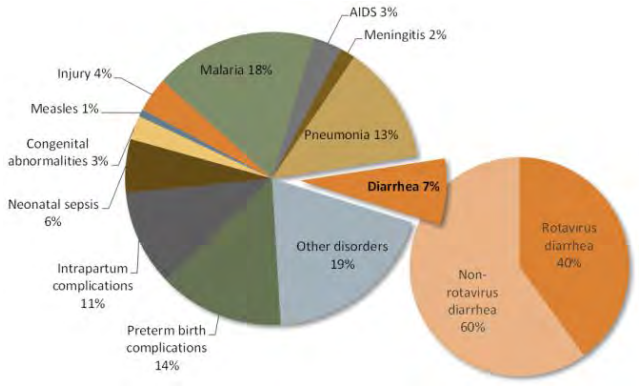
Rotavirus disease and vaccines in Ghana

Diarrhea is one of the leading killers of children in Ghana—causing approximately 10 percent of deaths in children under five years of age.[1] Rotavirus, the most common cause of severe and fatal diarrhea in young children worldwide, takes the lives of 2,090 Ghanaian children under five each year—accounting for 3.6 percent of these deaths.[2] Nearly half the diarrheal disease hospitalizations of Ghanaian children under five are caused by rotavirus.[3] Recent studies in Ghana have shown that rotavirus vaccines are safe and effective against severe rotavirus disease and are a cost-effective intervention.[4,5]

The high burden of rotavirus disease in Ghanaian children, coupled with the power of rotavirus vaccines to prevent childhood deaths and hospitalizations, underscores the incredible potential for Ghana's introduction of rotavirus vaccines to save children's lives.

Causes of death in Ghanaian children under five years of age, 2008[1]



ROTAVIRUS IS THE LEADING CAUSE OF SEVERE AND FATAL DIARRHEA IN AFRICAN CHILDREN <5 YEARS OLD

Rotavirus is a virus that causes gastroenteritis—an inflammation of the stomach and intestines. If left untreated, it can lead to severe dehydration and death. Children six months to two years of age are most vulnerable to infection.

Globally, rotavirus causes more than 450,000 deaths each year in children under five and is responsible for millions of hospitalizations and clinic visits.[6,7] Nearly a quarter of a million African children die from the deadly, dehydrating diarrhea caused by rotavirus infection every year—approximately 50 percent of the worldwide death toll.[6]

Ghana Facts[2,3,8]

Total population: 24,392,000

Population of children >5: 3,533,000

Mortality rate of children >5: 74/1,000 live births

Total number >5 deaths: 57,000

Number of >5 deaths due to diarrhea: 5,193

Number of >5 deaths due to rotavirus: 2,090

ROTAVIRUS TREAMENT AND PREVENTION STRATEGIES

Rotavirus is highly contagious and spreads easily from person-to-person through contaminated hands and objects. It cannot be treated with antibiotics or other drugs. Mild rotavirus infections can be treated effectively in the same manner as other forms of diarrhea, by providing fluids and salts (oral rehydration therapy). However, children with severe rotavirus diarrhea can become dehydrated and need to receive intravenous (IV) fluids or they risk dying. In developing countries, urgent care and IV treatment are often inaccessible or unavailable, making rotavirus prevention through vaccination critical to saving lives.

Vaccination offers the best hope for preventing severe rotavirus disease and the deadly dehydrating diarrhea that it causes. Improvements in water quality, hygiene, and sanitation stop bacteria and parasites that cause other forms of diarrhea, but do not adequately prevent the transmission of rotavirus. Lifesaving rotavirus vaccines should be introduced as part of a comprehensive approach to control diarrheal disease, along with other interventions including oral rehydration therapy, breastfeeding, zinc treatment, and improvements in water and sanitation.

TWO SAFE AND EFFECTIVE ROTAVIRUS VACCINES ARE SAVING LIVES TODAY

There are two orally administered rotavirus vaccines available today: Rotarix®, manufactured by GlaxoSmithKline, and RotaTeq®, manufactured by Merck & Co. Inc. Both vaccines have been shown to be safe and effective in large-scale clinical trials in Africa, Asia, Europe, Latin America, and the US. Clinical trials in Africa (Ghana, Kenya, Malawi, Mali, and South Africa) found that rotavirus vaccines reduced severe rotavirus disease by more

than 60 percent during the first year of life, when children are at greatest risk for severe rotavirus diarrhea.[4,9]

Rotavirus vaccines are saving lives and improving health in countries where children have access to them. Swift and significant declines in hospitalization and deaths due to rotavirus and all-cause diarrhea have been observed in many of the countries that have introduced rotavirus vaccines into their national immunization programs.10 Researchers also have found that use of rotavirus vaccines may protect unvaccinated children and adults by reducing transmission (an effect called herd immunity).[11]

Ghana has identified rotavirus vaccines as an essential and lifesaving intervention in its comprehensive diarrhea control strategy, thereby facilitating achievement of Millennium Development Goal 4—reduction of child mortality.

ROTAVIRUS VACCINES ARE COST-EFFECTIVE AND A WISE INVESTMENT

Rotavirus vaccines are cost-effective, and in GAVI-eligible countries, where 95 percent of deaths due to rotavirus occur, more than 2.4 million child deaths can be prevented by 2030 by accelerating access to lifesaving rotavirus vaccines.[5] Each year, in GAVI-eligible countries, an estimated 180,000 deaths could be prevented and 6 million clinical and hospital visits averted, thereby saving US$68 million annually in treatment costs.[12]

In Ghana, a recent study found that rotavirus vaccination for children under five would be a highly cost-effective public health intervention.[5] Treating rotavirus diarrhea among children in Ghana costs an estimated $3,248,976 per year. The study predicted that with the introduction of rotavirus vaccines, Ghana would save $1,731,085 (53.3 percent) in treatment costs and save 1,554 children's lives per year.[5]

In June 2009, based in part on the clinical trials in Ghana that demonstrated vaccine efficacy in impoverished, high-mortality settings, the World Health Organization's Strategic Advisory Group of Experts recommended that rotavirus vaccines be included in all countries' national immunization programs.[13] As of March 2012, 30 countries have introduced rotavirus vaccines in their national immunization programs, including the African countries of Morocco, South Africa, and Sudan.

Demand for rotavirus vaccines by many GAVI-eligible countries is high. GAVI plans to vaccinate more than 70 million children in 40 of the world's poorest countries by 2016 and recently approved an additional 16 countries—12 in Africa—for rotavirus vaccine support. Accelerating access to rotavirus vaccines by GAVI and its partners will not only save the lives of Ghanaians but also lessen the tremendous economic and health burden of rotavirus disease, thereby contributing to poverty reduction and a growing economy.

For more information on rotavirus disease and vaccines please email rotavirusvaccine@path.org.

[1]Black RE, Cousens S, Johnson HL, et al. Global, regional, and national causes of child mortality in 2008: a systematic analysis. *The Lancet*. 2010;375(9730):1969–1987).

[2]WHO. 2008 rotavirus deaths, under 5 years of age, as of 31 January 2012. Available at: www.who.int/entity/immunization_monitoring/burden/ChildRota2008.xls. Accessed January 31, 2012.

[3]WHO. *Global Rotavirus Information and Surveillance Bulletin*. 2011;4. Available at: www.who.int/nuvi/surveillance/Final_RV_bulletin_Jan_Dec_2010_Data.pdf. Accessed April 3, 2012.

[4]Armah GE, Sow SO, Breiman RF, et al. Efficacy of pentavalent rotavirus vaccine against severe rotavirus gastroenteritis in infants in developing countries in sub-Saharan Africa: a randomised, double-blind, placebo-controlled trial. *The Lancet*. 2010;376(9741):606–614.

[5]Abbott C, Tiede B, Armah G, Mahmoud A. Evaluation of cost-effectiveness of live oral pentavalent reassortant rotavirus vaccine introduction in Ghana. *Vaccine*. 2012;30(15):2582–2587.

[6]Tate JE, Burton AH, Boschi-Pinto C, et. al. 2008 estimate of worldwide rotavirus-associated mortality in children younger than 5 years before the introduction of universal rotavirus vaccination programmes: a systematic review and meta-analysis. *The Lancet Infectious Diseases*. 2012;12(2):136–141.

[7]Parashar UD, Hummelman EG, Bresee JS, Miller MA, Glass RI. Global illness and deaths caused by rotavirus disease in children. *Emerging Infectious Diseases*. 2003;9:565–572.

[8]UNICEF At a glance: Ghana page. Available at: www.unicef.org/infobycountry/ghana_statistics.html. Accessed April 5, 2012.

[9]Madhi SA, Cunliffe NA, Steele D, et al. Effect of human rotavirus vaccine on severe diarrhoea in African infants. *New England Journal of Medicine*. 2010;362(4):289–298.

[10]Patel M, Steele AD, Gentsch JR, Wecker J, Glass RI, Parashar UD. Real-world impact of rotavirus vaccination. *Pediatric Infectious Disease Journal*. 2011;30(1 Suppl):S1–S34.

[11]Lopman BA, Curns AT, Yen C, Parashar UD. Infant rotavirus vaccination may provide indirect protection to older children and adults in the United States. *Journal of Infectious Diseases*. 2011;204:980–986.

[12]Atherly DE., Lewis KDC, Tate J, Parashar UD, Rheingans, RD. Projected health and economic impact of rotavirus vaccination in GAVI-eligible countries: 2011-2030. *Vaccine*. In press.

[13]World Health ORganization. Meeting of the immunization Strategic Advisory Group of Experts, April 2009—conclusions and recommendations. *Weekly Epidemiological Record*. 2009;84(23):220–236.

PATH is an international nonprofit organization that transforms global health through innovation. We take an entrepreneurial approach to developing and delivering high-impact, low-cost solutions, from lifesaving vaccines and devices to collaborative programs with communities. Through our work in more than 70 countries, PATH and our partners empower people to achieve their full potential.

455 Massachusetts Ave NW, Suite 1000
Washington, DC 20001

info@path.org
www.path.org