

# The switch from ROTARIX to ROTAVAC in Ghana: Answers to four key questions

Why did  
Ghana switch  
to a different  
rotavirus  
vaccine?



What did  
Ghana's switch  
to ROTAVAC  
require?



Was the switch  
from ROTARIX  
to ROTAVAC  
cost-saving for  
Ghana?



Did Ghana's  
switch to  
ROTAVAC  
free cold  
chain capacity?



# Why did Ghana switch to a different rotavirus vaccine?

Short answer: **to reduce costs** and **free cold chain space**



In 2020, Ghana switched from using ROTARIX® to ROTAVAC® in its national immunization program. PATH worked with Ghana Health Service and the University of Ghana to analyze the economic implications of this switch. This fact sheet is part of a series on key results of these analyses, collectively providing a case study on Ghana's rotavirus vaccine product switch. *(Manuscript pending submission to a peer-reviewed journal.)*

## Background

Rotavirus is the leading cause of severe diarrheal disease in infants and young children worldwide. Vaccination is the best way to protect children from rotavirus and the deadly, dehydrating diarrhea that it can cause. The World Health Organization (WHO) has recommended universal rotavirus vaccination for infants in all countries since 2009. ROTARIX was WHO-prequalified and became globally available the same year.

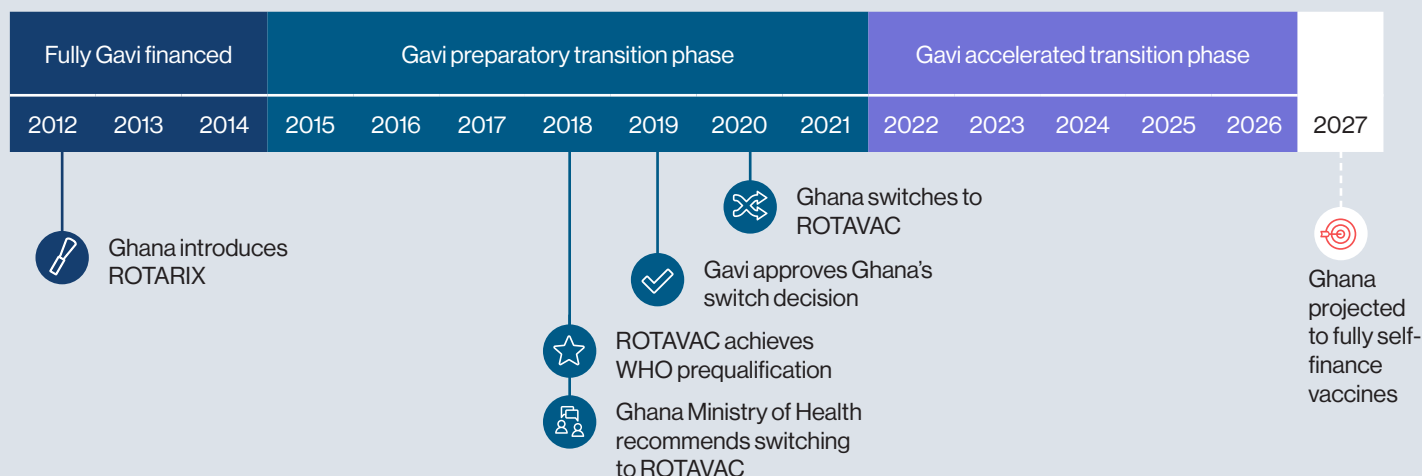
Ghana introduced ROTARIX into its routine immunization program with support from Gavi, the Vaccine Alliance, in 2012. It was one of the first African countries to do so. The rotavirus vaccination program in Ghana has been hugely successful and has maintained high coverage rates, with more than 90 percent coverage since 2014.

In 2018, the rotavirus vaccine market began expanding with new, lower-cost vaccines receiving WHO prequalification. One of these is ROTAVAC, made by Bharat Biotech, India.

## A switch for sustainability

Gavi funding support is designed to be gradually decreased with a corresponding increase in country funding as national income and health system capacity increase and eventually transitioning to the country fully self-financing vaccines. Ghana has been in the Gavi preparatory transition phase since 2015. Since then, Ghana's co-financing contribution for vaccination programs has been increasing by 15 percent every year. In 2022, Ghana entered the accelerated transition phase, which requires the country to quickly ramp up its contributions to fully self-finance all vaccines by 2027.

### Ghana's rotavirus vaccination timeline



In 2018, Ghana's newly-formed National Immunization Technical Advisory Group (NITAG) began discussions with the Ministry of Health about the best evidence-based ways to sustain their successful routine vaccination coverage as the country gradually transitions away from Gavi support. The NITAG identified rotavirus vaccination as one area where they could make a preemptive change to prepare for the future. In 2019, the NITAG supported and endorsed the recommendation by the Ministry of Health to switch to using ROTAVAC in Ghana's immunization program. They had determined that ROTAVAC would better meet the country's needs, partly due to the vaccine's lower price and smaller cold chain volume per dose. Gavi received and approved the switch decision in 2019.

In 2020, health facilities in Ghana began gradually switching to administering ROTAVAC as districts used up their ROTARIX stock. Despite the COVID-19 pandemic, the switch was complete by the end of 2020. While Ghana – along with the rest of the world – faced challenges in maintaining routine infant immunization visits during the pandemic, the health facilities were able to continue administering rotavirus vaccines and successfully switch to ROTAVAC nationwide.

## An educational opportunity for the African region and the world

Ghana was the second country in Africa to introduce ROTAVAC into its national immunization program and the first Gavi country to elect to switch to one of the more recently prequalified rotavirus vaccines. With more rotavirus vaccine options now available, many countries may be considering a switch to a different product that better meets their needs, including financial considerations for vaccine procurement.

Ghana's switch provided an opportunity to inform other countries in the region and globally about the economic implications of switching to a new rotavirus vaccine. Such information adds to a growing body of evidence on the cost and cost-effectiveness of rotavirus vaccine switches.

Learn more about Ghana's rotavirus vaccine product switch with the three other fact sheets in this series:



What did Ghana's switch to ROTAVAC require?



Was the switch from ROTARIX to ROTAVAC cost-saving for Ghana?



Did Ghana's switch to ROTAVAC free cold chain capacity?



UNIVERSITY OF GHANA



May 2022

# What did Ghana's switch to ROTAVAC require?

Short answer:  
**approximately US\$453,000 in expenditures**



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When a country decides to switch from one vaccine product to another, it triggers a range of activities to make the switch a reality. This may include planning and training, social mobilization, and procurement of refrigerators and other logistics, as needed. As part of an economic analysis of Ghana's rotavirus vaccine product switch, PATH, Ghana Health Service, and the University of Ghana conducted key informant interviews at the district and regional levels in six regions and 12 districts of the country as well as the central-level offices responsible for overall immunization program management. Through these interviews, the team estimated Ghana's total **financial** and **economic costs** for the activities and investments required for the switch.

## Financial costs =

**actual expenditure** on goods and services purchased by the government at the time of the switch.

## Economic costs =

**financial costs + the value of in-kind resources used** (e.g., salaries of existing healthcare staff, donated supplies, etc.)

## Map of study sites



## Switch activities

### Planning and training

While ROTARIX and ROTAVAC are both live, oral rotavirus vaccines, they differ in important ways:

- » ROTARIX requires two doses while ROTAVAC requires three.
- » ROTARIX comes in single-dose containers while ROTAVAC comes in multidose vials.
- » ROTARIX is stored at 2 to 8°C while ROTAVAC must be kept frozen at the central level.

The vaccine change therefore required substantial planning and training across the Ghanaian health system, including the central, regional, district, and health facility levels. Planning and coordination committees held several meetings and Ghana Health Service conducted stakeholder engagement workshops. There were also minimal costs for monitoring and evaluation, which were included in this category.

Social mobilization

Another critical activity for the switch was to conduct social mobilization and information, education, and communication (IEC) activities to inform local stakeholders and community members about the switch. Parents in Ghana needed to understand why their infants would now receive three doses of rotavirus vaccine, especially if an older child had received two when ROTARIX was still in use.

Procurement of refrigerators and other logistics

ROTAVAC has a smaller cold chain volume per course than ROTARIX and hence could be accommodated into the existing cold chain without the need for new cold chain procurement. Only one district out of the twelve sampled in the study reported that one refrigerator was provided because of ROTAVAC introduction. Otherwise, for all other facilities in the study, there were no additional refrigerators or other purchases associated with the switch. Additionally, rotavirus vaccines were already part of the routine immunization schedule and are co-administered with existing vaccines. Therefore, no incremental financial costs were incurred for vaccine storage, transport, or service provision because of the switch to ROTAVAC.

The cost of switching

Financial costs associated with the rotavirus vaccine switch were estimated to be **US\$453,070** and economic costs were estimated to be **US\$883,626**.

- » The biggest cost driver for the switch was training, contributing to 77.6 percent of the financial costs and 65.2 percent of the economic costs.
- » Social mobilization and IEC activities were the second most significant financial cost driver (15.7 percent) but were the lowest cost driver for economic costs (9.5 percent).
- » Planning and coordination committees and stakeholder engagement workshops had the least impact on financial costs and had slightly higher economic costs than social mobilization and IEC.



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Was the switch from ROTARIX to ROTAVAC cost-saving for Ghana?

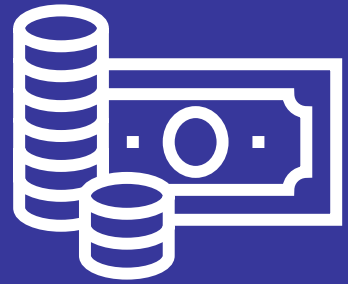


Did Ghana's switch to ROTAVAC free cold chain capacity?



# Was the switch from ROTARIX to ROTAVAC cost-saving for Ghana?

Short answer: **yes**



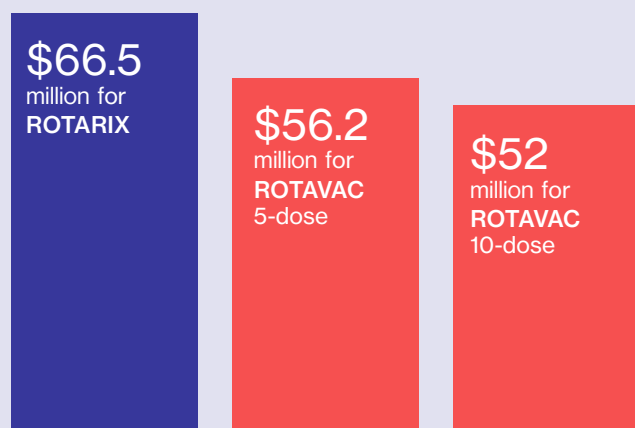
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The Ghana Ministry of Health's decision to switch from ROTARIX to ROTAVAC was primarily driven by a desire for increased affordability and sustainability of their rotavirus vaccination program when support from Gavi, the Vaccine Alliance, ends. A cost-effectiveness analysis conducted by PATH, Ghana Health Service, and the University of Ghana helped validate this decision after the switch occurred.

## A cost-saving solution

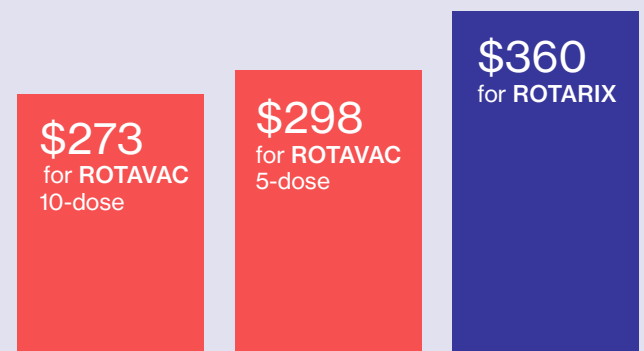
Accounting for the cost of the switch, costs of procuring and delivering each vaccine course, assumed similar health impact of the two vaccines, and the respective economic benefits of each vaccine, the analysis found that switching from ROTARIX to ROTAVAC was **cost-saving** for Ghana. While both vaccines are highly cost-effective compared to no vaccination, using ROTAVAC will save the government approximately US\$20 million in vaccine procurement costs over the next decade, even after the country stops receiving Gavi support. While the supply chain and delivery costs per course were higher for ROTAVAC due to its third dose, the lower cost of the vaccine outweighs these costs, resulting in a net \$10 million in savings for Ghana over 10 years.

### Estimated total rotavirus vaccination program costs from 2020 to 2029 (in US\$)



### Estimated cost per DALY\* averted (in US\$) from the societal perspective

\* DALY = disability-adjusted life-year, or one year of life lost due to illness or premature death.

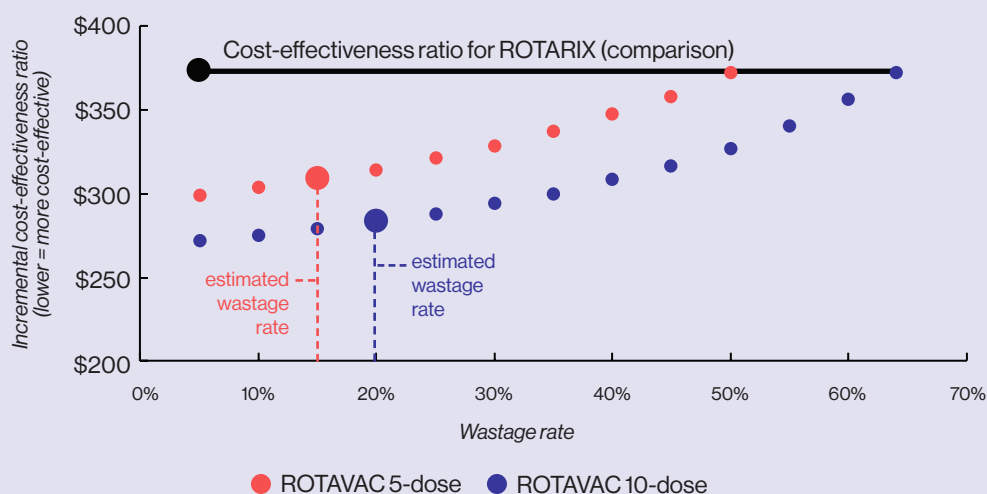


## The wastage rate question

A concern regarding the switch to ROTAVAC was whether the relatively higher vaccine wastage rate would impact the cost-effectiveness of the program. Higher wastage rates are expected with multidose vials such as ROTAVAC compared to single-dose vaccines such as ROTARIX. However, the analysis found that, even accounting for potential wastage rates up to 50 percent (for 5-dose ROTAVAC) or 64 percent (for 10-dose ROTAVAC), both ROTAVAC presentations remain more cost-effective than ROTARIX. Programmatic wastage rates for 5-dose vials of ROTAVAC are estimated to be around 15 percent, so ROTAVAC is very likely more cost-effective than ROTARIX.

However, this estimated wastage rate does not include the use of an open-vial policy, which Gavi has recently approved for ROTAVAC. If this policy is implemented in Ghana, wastage rates could be reduced further.

### ROTAVAC is more cost-effective than ROTARIX, even at potential wastage rates up to 50 percent and 64 percent (for 5- and 10-dose vials, respectively)



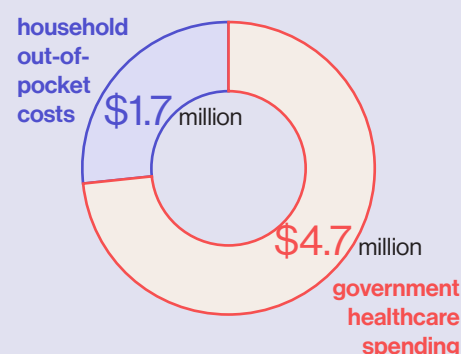
## Consistent health benefits

Ghana's use of ROTAVAC is projected to maintain the vaccination program's significant health impact, continuing to reduce rotavirus-related deaths and illness among children younger than five years and the associated healthcare costs. The analysis found that continued rotavirus vaccination with any of the vaccines is expected to avert \$6.4 million in healthcare costs over the next decade.

There are no clinical data for Ghana to evaluate the differences in the burden of rotavirus-specific or all-cause gastroenteritis with ROTAVAC compared to ROTARIX, and so the analysis assumed that the two vaccines have similar efficacy and health impact. (Separate, not comparative, clinical studies have found similar efficacy for ROTARIX and ROTAVAC.) A health impact analysis conducted in Palestine before and after their switch from ROTARIX to ROTAVAC found no change in the burden of rotavirus-specific or all-cause gastroenteritis because of the vaccine switch,<sup>1</sup> so it is likely that Ghana's switch also maintained the same health impact.

<sup>1</sup> PATH. The Health Benefits of Rotavirus Immunization for Children in Palestine: Results of a Vaccine Impact Analysis. 2021. Available at: <https://www.path.org/resources/health-benefits-rotavirus-immunization-children-palestine-results-vaccine-impact-analysis/>

### Rotavirus vaccination in Ghana will avert \$6.4 million in healthcare costs over 10 years



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# Did Ghana's switch to ROTAVAC free cold chain capacity?

Short answer: **yes**



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One of the two main motivating factors for Ghana's switch was to free cold chain capacity for other vaccines (the other factor was cost). ROTAVAC has a smaller cold chain requirement per course compared to ROTARIX. And while ROTARIX is stored in standard refrigerators at 2 to 8°C, ROTAVAC must be stored in freezers at the central level.

To analyze the impact of rotavirus vaccine presentations on Ghana's cold chain capacity, PATH, Ghana Health Service, and the University of Ghana collected information on cold chain equipment use and purchases related to the 2020 switch and combined that with publicly available data to estimate the total cold chain volume before and after the switch.

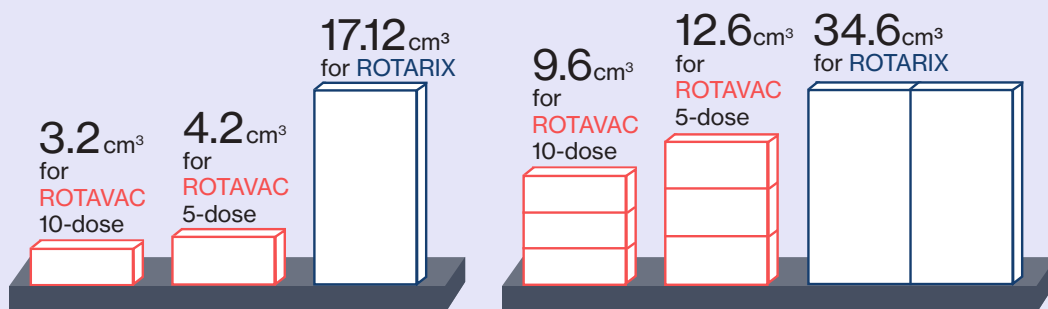
## Minimal additional cold chain purchases

Only one district in the study sample reported that a refrigerator had been provided to the facility because of the switch. The system also had enough transport capacity to accommodate ROTAVAC with no additional transportation purchases needed.

### A reduced cold chain requirement

The estimated cold chain volume per one single dose of vaccine is:

So, for a fully vaccinated child, the cold chain volume required for a full course of vaccine is:



Overall, the required cold chain volume for a full course of ROTAVAC – even accounting for an additional vaccine dose – is about one-third of the cold chain volume needed for a full course of ROTARIX. Additionally, while the Ministry of Health originally switched to the 5-dose vial presentation of ROTAVAC, they are now considering the 10-dose presentation due to its further reduced cost and even lower cold chain volume per course.

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