

# Potential impact and cost-effectiveness analysis of rotavirus vaccine introduction in Afghanistan

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# Outline

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- Methods
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# Introduction

- Rotavirus is the leading cause of severe diarrhea among children worldwide and is responsible for more than one-third of all childhood diarrhea deaths.
- The Eastern Mediterranean Region (EMRO) sees around 100,000 child deaths due to diarrhea and 13,000 due to rotavirus yearly.
- As of July 2019, 98 countries worldwide have introduced rotavirus vaccination.
- In 2013, Afghanistan was among the top 10 countries with the greatest number of rotavirus deaths among children under 5 globally.<sup>1</sup>

<sup>1</sup>Tate JE, Burton AH, Boschi-Pinto C, et al. Global, regional, and national estimates of rotavirus mortality in children <5 years of age, 2000-2013. *Clinical Infectious Diseases*. 2016;62(S2):S96-205.

# Introduction: Rotavirus burden in Afghanistan

<b>Estimated outcomes related to rotavirus in children aged 1-59 months during one year (without vaccination)-2017</b>	
Cases	497,999
Outpatient visits	269,898
Hospital admissions	20,069
Deaths	4,880
Total health service costs to government/society	US\$ 5.6 million / US\$12 million

# Introduction: Study background

- Discussions around conducting this cost-effectiveness analysis were concomitant to discussions about Afghanistan applying to Gavi for rotavirus vaccine support.
- The study was first published in 2017 in *Vaccine*.



Vaccine

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## Potential impact and cost-effectiveness of rotavirus vaccination in Afghanistan

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# Study Objectives

- Evaluate the **impact and cost-effectiveness** of introduction of rotavirus vaccine into Afghanistan's National Immunization Program (NIP).
- Develop and consolidate the evidence base to support a **decision about introduction** of rotavirus vaccine into NIP.
- Provide evidence for the **government to support and commit** to the vaccine program (co-financing).

# Methods

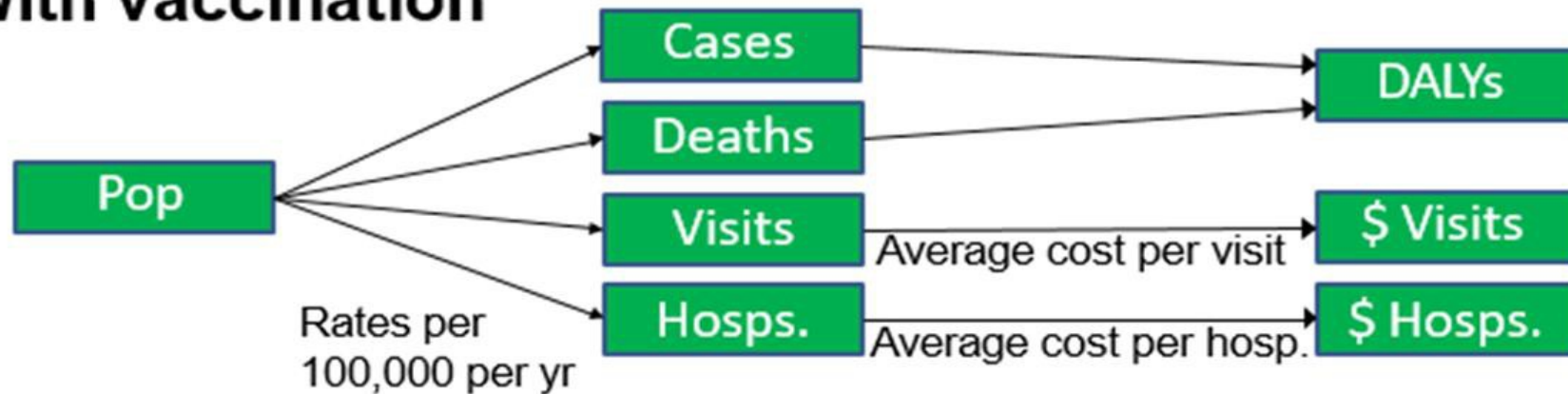
- We examined the use of ROTARIX (RV1) administered orally with a two-dose schedule at 6 and 10 weeks of age.
- The analysis used the ProVac Initiative's UNIVAC model (version 1.2.09), an Excel-based static cohort model developed at the London School of Hygiene and Tropical Medicine based on prior economic tools developed for PAHO's ProVac initiative and used widely in the America's and beyond since 2006.

# Methods: Two scenarios

## Without vaccination



## With vaccination





# Methods: Model parameters and study inputs

- Study population: Children 1-59 months of age
- Analyzed for 10 cohorts, starting in 2017 through 2026
- Used demographic data from UN population division, 2015 revision
- Analyzed from both governmental perspective and societal perspective
- Examined both severe rotavirus gastroenteritis (RVGE) and non-severe RVGE cases
- Disease incidence based on a mix of global and local data including information from Afghanistan rotavirus surveillance (2013-2015)

# Methods: Model parameters and study inputs

- Vaccine efficacy: 53% after two doses
- Vaccine coverage: 77.3% for dose 1 (70.5% for dose 2) in year of introduction, with assumption to reach 90% coverage by end of 2020
- Vaccine price per dose: US\$2.02 and US\$0.20 (co-financing)
- Discount rate: 3% annual
- All monetary units were adjusted to 2017 US\$

# Results

## Changes in outcomes with rotavirus vaccine introduction (10 cohorts)

	No vaccine	With vaccine	Averted
<b>Discounted Health Outcomes</b>			
Cases	5,045,332	3,824,319	<b>1,221,013</b>
Outpatient visits	2,734,395	2,072,648	<b>661,746</b>
Hospitalizations	203,327	154,120	<b>49,207</b>
Deaths	49,444	37,478	<b>11,966</b>
DALYs			<b>756,264</b>
<b>Discounted Economic Outcomes</b>			
Outpatient visits (Government perspective)	US\$4,085,537	US\$3,104,902	<b>US\$980,635</b>
Outpatient visits (Societal perspective)	US\$8,764,901	US\$6,661,097	<b>US\$2,103,805</b>
Hospitalizations (Government perspective)	US\$1,554,307	US\$1,181,233	<b>US\$373,074</b>
Hospitalizations (Societal perspective)	US\$2,815,416	US\$2,139,643	<b>US\$675,773</b>

# Results: Incremental cost-effectiveness ratio

$$ICER = \frac{\text{Cost with vaccine} - \text{Cost without vaccine}}{\text{Outcome with vaccine} - \text{Outcome without vaccine}}$$

- From the government perspective, ICER = US\$82 per DALY averted

82	=	Vaccine programme costs	Healthcare costs averted
		55,008,967	1,353,709
		651,283	
		DALYs averted	

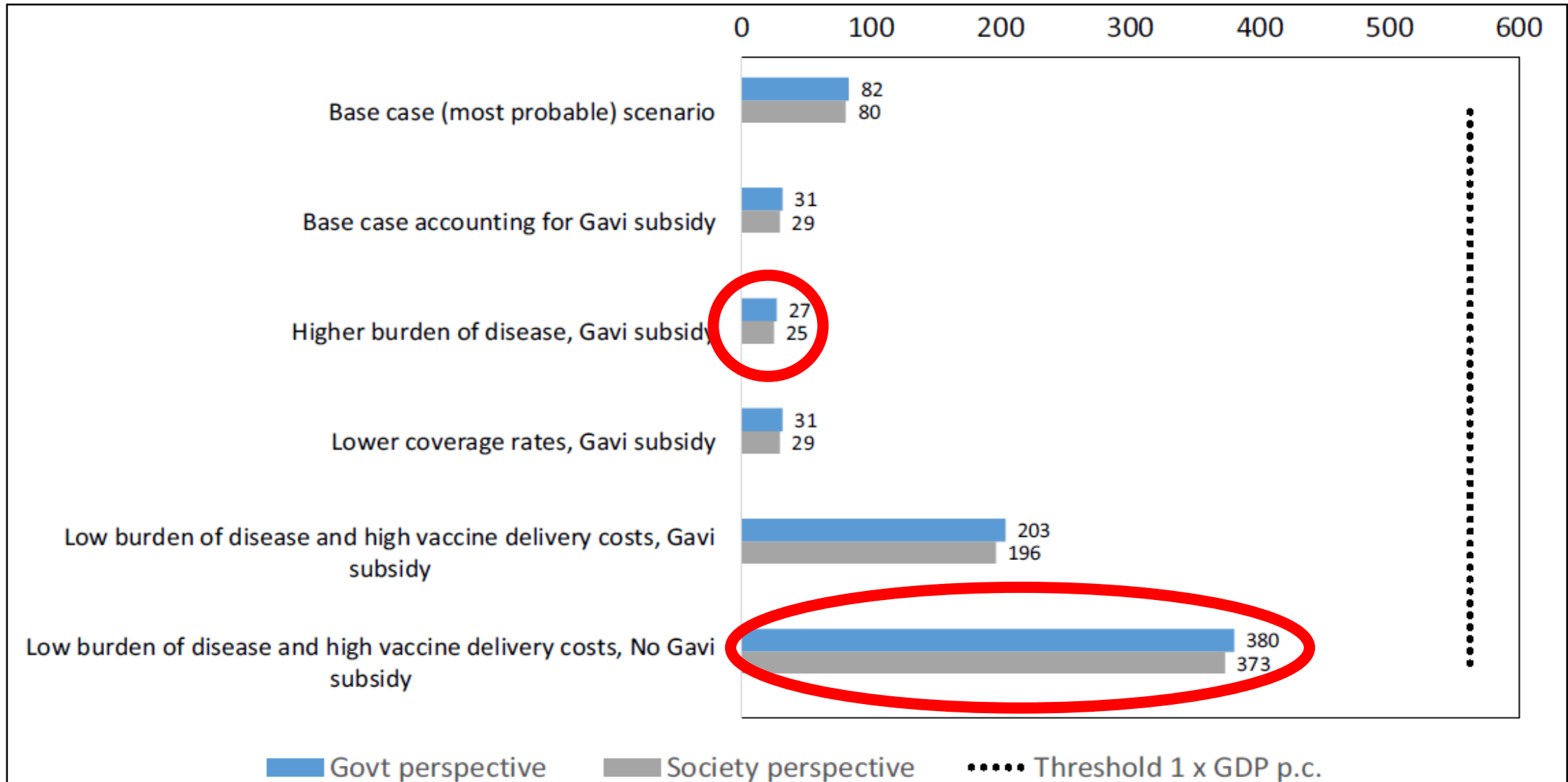
- From the societal perspective, ICER = US\$80 per DALY averted

80	=	Vaccine programme costs	Healthcare costs averted
		55,008,967	2,779,578
		651,283	
		DALYs averted	

All figures discounted

**ICER = 0.14 share of Afghanistan's GDP**

# Results: Cost per DALY averted for all scenarios





# Conclusion

- Introduction of rotavirus vaccination in Afghanistan is likely to be highly cost-effective.
- Rotavirus vaccine can avert a substantial health and economic burden linked to rotavirus disease in Afghanistan.
- A rotavirus vaccination program is estimated to cost **US\$2.2 million** per year on average accounting for Gavi support or **US\$5.5 million** without Gavi support.
- Rotavirus vaccination program cost would represent **2.8%** of the total immunization budget expected in 2017 or **0.1%** of Afghanistan's total health expenditures.

# Conclusion

- This study played an important role in justifying Afghanistan's decision to introduce rotavirus vaccination.
- Afghanistan started introducing rotavirus vaccine nationally in January 2018.
- In 2018, after introduction of vaccine, the country established a hospital-based surveillance system to measure rotavirus vaccine impact and effectiveness.
- As of today more than 2,500 cases of acute severe diarrhea disease among children under 5 enrolled
- Vaccination card reviewed for 93%



Afghanistan Minister of Public Health H.E. Dr. Ferozuddin Feroz delivers the first dose of rotavirus vaccine to a child at the launch ceremony. Photo: WHO/EMRO

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## Conflict of interest statement:

The authors have no conflicts to declare.

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Any questions?