

Reevaluating the costs and cost-effectiveness of three rotavirus vaccines in Bangladesh, Ghana, and Malawi

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- 1 Context
- 2 Objectives of analysis
- 3 Methods
- 4 Results
- 5 Conclusions

Context


- PATH supports and collaborates with local teams to undertake economic evaluations of rotavirus vaccination to inform vaccine decision-making.
- Recent PATH rotavirus vaccine collaborations include: Afghanistan, Bangladesh, Bhutan, Ghana, Indonesia, Malawi, Mongolia, and Palestine.



PATH rotavirus vaccine cost-effectiveness workshop for regional stakeholders held in Bangkok, Thailand, 2016

Context

- In 2018, two new rotavirus vaccines received WHO prequalification, enhancing yet complicating vaccine introduction and product choice decisions.



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DEFEATDD

WHO-prequalified rotavirus vaccines:

- ✓ RotaTeq® : 2008
- ✓ ROTARIX® : 2009
- ✓ ROTAVAC® : 2018
- ✓ ROTASIL® : 2018




More options
= more access!


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Objectives of analysis



- To re-evaluate three recent impact and cost-effectiveness analyses as though the newly prequalified vaccines had been available at the time of analysis.
- To compare the relative costs and cost-effectiveness of ROTARIX, ROTAVAC, and ROTASIIL in 3 countries with different levels of Gavi support.
- To complement other evidence to inform product choices.

Clinical Infectious Diseases
SUPPLEMENT ARTICLE



  

 Cost-Effectiveness of Monovalent Rotavirus Vaccination of Infants in Malawi: A Postintroduction Analysis Using Individual Patient–Level Costing Data

Naor Bar-Zeev,^{1,2} Jacqueline E. Tate,³ Clint Pecenka,⁴ Jean Chikafa,¹ Hazzie Mvula,⁵ Richard Wachepa,¹ Charles Mwansambo,⁶ Themba Mhango,⁶ Geoffrey Chirwa,⁶ Amelia C. Crampin,^{5,7} Umesh D. Parashar,³ Anthony Costello,⁸ Robert S. Heyderman,^{1,3,10} Neil French,^{1,2} Deborah Atherly,⁴ and Nigel A. Cunliffe²; for the VACSURV Consortium

 Cost-effectiveness of rotavirus vaccination in Ghana: Examining impacts from 2012 to 2031 

Justice Nonvignon^{a,*}, Deborah Atherly^{b,1}, Clint Pecenka^{b,1}, Moses Aikins^a, Lauren Gazley^b, Devin Groman^b, Clement T. Narh^c, George Armah^d

 Impact and cost-effectiveness of rotavirus vaccination in Bangladesh 

Clint Pecenka^{a,*}, Umesh Parashar^b, Jacqueline E. Tate^b, Jahangir A.M. Khan^c, Devin Groman^a, Stephen Chacko^d, Md Shamsuzzaman^e, Andrew Clark^f, Deborah Atherly^a

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Methods

- We revisited three previous cost-effectiveness analyses conducted with the TRIVAC model to determine if new evidence on cost-effectiveness can inform product choice.
- Each analysis was previously undertaken using local and international data and country product preferences (i.e., ROTARIX).
- Re-analysis utilized model inputs from prior analyses (i.e., disease burden, vaccine efficacy, coverage) but assumed ROTAVAC and ROTASIIL had been available.
- Data inputs were altered to reflect distinct vaccine characteristics at the time of the analysis (i.e., # of doses, vaccine coverage, vaccine price, wastage).
 - Vaccine efficacy was not differentiated by product.

Methods: Key inputs

	ROTARIX	ROTAVAC	ROTASIIL
Doses per course	2	3	3
Presentation	1-dose	5-dose	2-dose
Wastage rate	5%	25%	5%
Price per dose (at time of analysis)	\$2.02	\$1	\$2

Methods: Key inputs

	Malawi	Bangladesh	Ghana
Incremental delivery cost per dose	\$0.42	\$0.54	\$1.30
Gavi status (at time of analysis)	Initial self-financing	Preparatory transition	Accelerated transition
Average country vaccine cost per dose	\$0.20 (ROTARIX); \$0.13 (ROTAVAC); \$0.13 (ROTASIIL)	\$0.29 (ROTARIX); \$0.14 (ROTAVAC); \$0.29 (ROTASIIL)	\$1.57 (ROTARIX); \$0.78 (ROTAVAC); \$1.55 (ROTASIIL)

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Results

	Malawi	Bangladesh	Ghana
Gavi status (at time of analysis)	Initial self-financing	Preparatory transition	Accelerated transition
Cost per DALY averted with Gavi subsidy, societal perspective	\$7 (ROTARIX); \$38 (ROTAVAC); \$32 (ROTASIIL)	\$61 (ROTARIX); \$153 (ROTAVAC); \$216 (ROTASIIL)	\$230 (ROTARIX); \$283 (ROTAVAC); \$358 (ROTASIIL)
Total country cost of vaccination program with Gavi subsidy	\$10.2M (ROTARIX); \$14.5M (ROTAVAC); \$13.5M (ROTASIIL)	\$41.6M (ROTARIX); \$53.5M (ROTAVAC); \$61.7M (ROTASIIL)	\$67.9M (ROTARIX); \$81.5M (ROTAVAC); \$100.5M (ROTASIIL)
Least costly and most cost-effective product	ROTARIX	ROTARIX	ROTARIX

Results

- All three rotavirus vaccines likely to be cost-effective.
- ROTARIX was least costly and most cost-effective.

BUT...

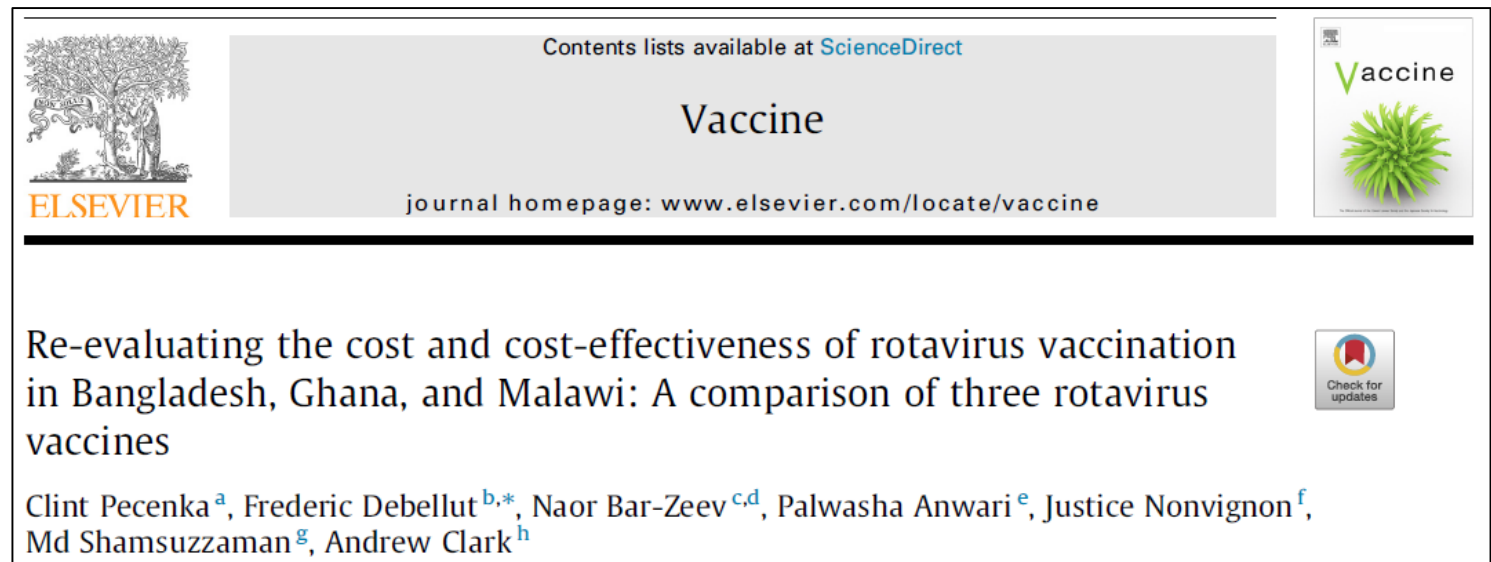
- The finding that ROTARIX is most cost-effective is “sensitive to relatively modest changes in input values.”
- Critical data on cost of delivery are unavailable.

Results: Threshold analysis

- How much would the cost to deliver a vaccine need to decrease to make another product more cost-effective than ROTARIX?

Not much!

- Bangladesh: $-\$0.16$
- Ghana: $-\$0.36$
- Malawi: $-\$0.18$



Contents lists available at [ScienceDirect](#)

Vaccine

journal homepage: www.elsevier.com/locate/vaccine

Re-evaluating the cost and cost-effectiveness of rotavirus vaccination in Bangladesh, Ghana, and Malawi: A comparison of three rotavirus vaccines

Clint Pecenka^a, Frederic Debellut^{b,*}, Naor Bar-Zeev^{c,d}, Palwasha Anwari^e, Justice Nonvignon^f, Md Shamsuzzaman^g, Andrew Clark^h

Check for updates

Emerging information

- Vaccine pricing updates for 2019-2021:* ROTARIX, \$2.29; ROTAVAC, \$0.85; ROTASIIL, \$0.95
- Incremental delivery costs per dose of ROTAVAC are ~\$0.30 cheaper than ROTARIX in Palestine, mostly due to cold chain differences.**
- We applied these updated country vaccine prices and lower delivery costs for ROTAVAC (based on Palestine experience) in Bangladesh, Ghana, and Malawi.
- We then applied lower delivery costs to ROTASIIL.
 - NOTE: Delivery cost differences by product in Palestine may not be applicable to other countries or products due to different program cost structures by country and differences between products.

*<https://www.gavi.org/about/market-shaping/detailed-product-profiles/>

**Debellut et al. Assessing cost, impact and cost-effectiveness of rotavirus vaccination in Palestine: examining a change from ROTARIX to ROTAVAC. *Forthcoming*.

New results: Lower prices, lower delivery costs for ROTAVAC

	Malawi	Bangladesh	Ghana
Gavi status (at time of analysis)	Initial self-financing	Preparatory transition	Accelerated transition
Cost per DALY averted with Gavi subsidy, societal perspective	\$7 (ROTARIX); Cost-saving (ROTAVAC); \$32 (ROTASIIL)	\$76 (ROTARIX); Cost-saving (ROTAVAC); \$126 (ROTASIIL)	\$249 (ROTARIX); \$220 (ROTAVAC); \$251 (ROTASIIL)
Total country cost of vaccination program with Gavi subsidy	\$10.2M (ROTARIX); \$7.3M (ROTAVAC); \$13.5M (ROTASIIL)	\$43.6M (ROTARIX); \$29.5M (ROTAVAC); \$50.0M (ROTASIIL)	\$72.6M (ROTARIX); \$65.3M (ROTAVAC); \$73.3M (ROTASIIL)
Least costly and most cost-effective product	ROTAVAC	ROTAVAC	ROTAVAC

New results: Lower prices, lower delivery costs for ROTAVAC and ROTASIIL

	Malawi	Bangladesh	Ghana
Gavi status (at time of analysis)	Initial self-financing	Preparatory transition	Accelerated transition
Cost per DALY averted with Gavi subsidy, societal perspective	\$7 (ROTARIX); Cost-saving (ROTAVAC); Cost-saving (ROTAIIL)	\$76 (ROTARIX); Cost-saving (ROTAVAC); Cost-saving (ROTAIIL)	\$249 (ROTARIX); \$220 (ROTAVAC); \$207 (ROTAIIL)
Total country cost of vaccination program with Gavi subsidy	\$10.2M (ROTARIX); \$7.3M (ROTAVAC); \$6.4M (ROTAIIL)	\$43.6M (ROTARIX); \$29.5M (ROTAVAC); \$28.0M (ROTAIIL)	\$72.6M (ROTARIX); \$65.3M (ROTAVAC); \$62.0M (ROTAIIL)
Least costly and most cost-effective product	ROTAIIL	ROTAIIL	ROTAIIL

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Conclusions

- Vaccine choice is a multifactorial decision.
- **All of the rotavirus vaccines are likely to be impactful and cost-effective in all three countries.**
- The most cost-effective product is sensitive to small input changes and likely varies by country.
- While economics may not be the primary factor in product choice decisions in Gavi countries, additional delivery cost data for different products is needed.
- Newer vaccine products are likely to be highly competitive in non-Gavi countries due to economic considerations.

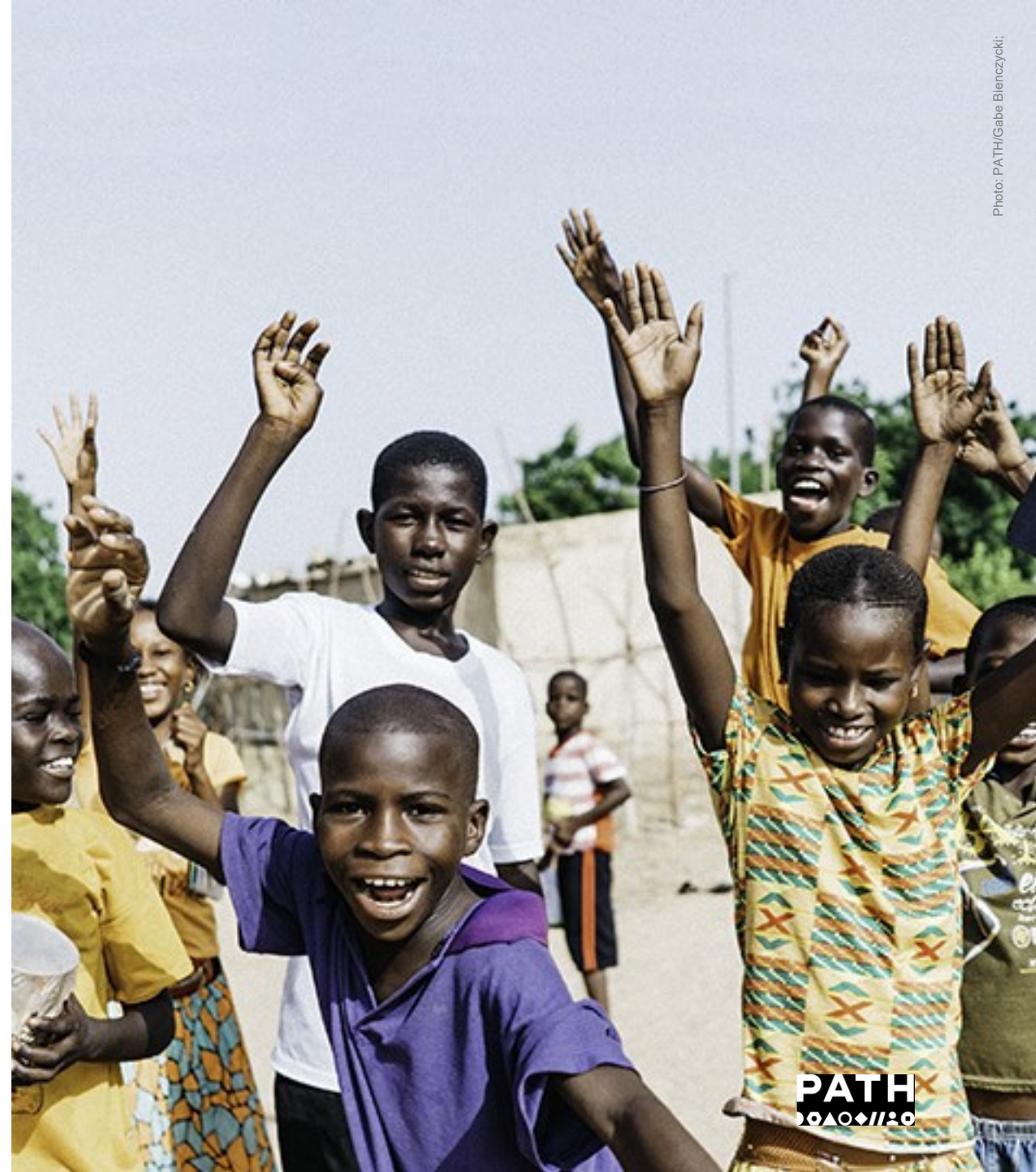
Conclusions (cont.)

- PATH is able to help countries assess economic implications of vaccine introduction and product choice decisions.
- PATH does not favor any single rotavirus vaccine product.

Thank you!
For more
information contact:

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Key inputs with updated information

	Malawi	Bangladesh	Ghana
Incremental delivery cost per dose for ROTAVAC	\$0.12	\$0.24	\$1.00
Gavi status (at time of analysis)	Initial self financing	Preparatory transition	Accelerated transition
Average country vaccine cost per dose (ROTARIX, ROTAVAC, ROTASIIL)	\$0.20; \$0.13; \$0.13	\$0.33; \$0.12; \$0.14	\$1.54; \$0.57; \$0.64

Wastage from the cost effectiveness perspective

Country perspective ICERs for ROTAVAC at different wastage rates

	5%	25% (base)	50%
Malawi	\$32	\$38	\$55
Ghana	\$256	\$283	\$348
Bangladesh	\$130	\$153	\$208