

# Navigating the unprecedented range of rotavirus vaccine options now available to Gavi- supported countries

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[www.gavi.org](http://www.gavi.org)

# Special thanks

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# Gavi support for rotavirus vaccination

- More than 100 million children immunised from 2008-2018, following WHO's recommendation for universal rotavirus vaccination<sup>1</sup>  
of which 70 million in AFRO
- 45 countries introduced as of June 2018, including India<sup>2</sup>, Pakistan<sup>2</sup>, Afghanistan and Uganda  
of which 29 in AFRO
- 10 countries approved and recommended for Gavi support for introduction  
of which 4 in AFRO

<sup>1</sup> WUENIC coverage data for 2018

<sup>2</sup> India introduced in 10 states in 2016-2018 (Q2); introduction in Uttar Pradesh state planned for July 2018; Pakistan introduced via a phased introduction 2017-2018

# Rotavirus vaccines supported by Gavi, 2018

2 options

Both single dose, liquid, refrigerated



# Rotavirus vaccines supported by Gavi, 2018-19

~~RotaTeq™~~

Rotarix™

Rotavac™  
Rotavac 5D™

Rotasiil™

# Rotavirus vaccines supported by Gavi, 2019

## 9 options

refrigerated, frozen, lyophilised,  
single dose, multi dose..

*Rotarix plastic tube*

*Rotavac in 10d or 5 d vials,  
frozen, or refrigerated*

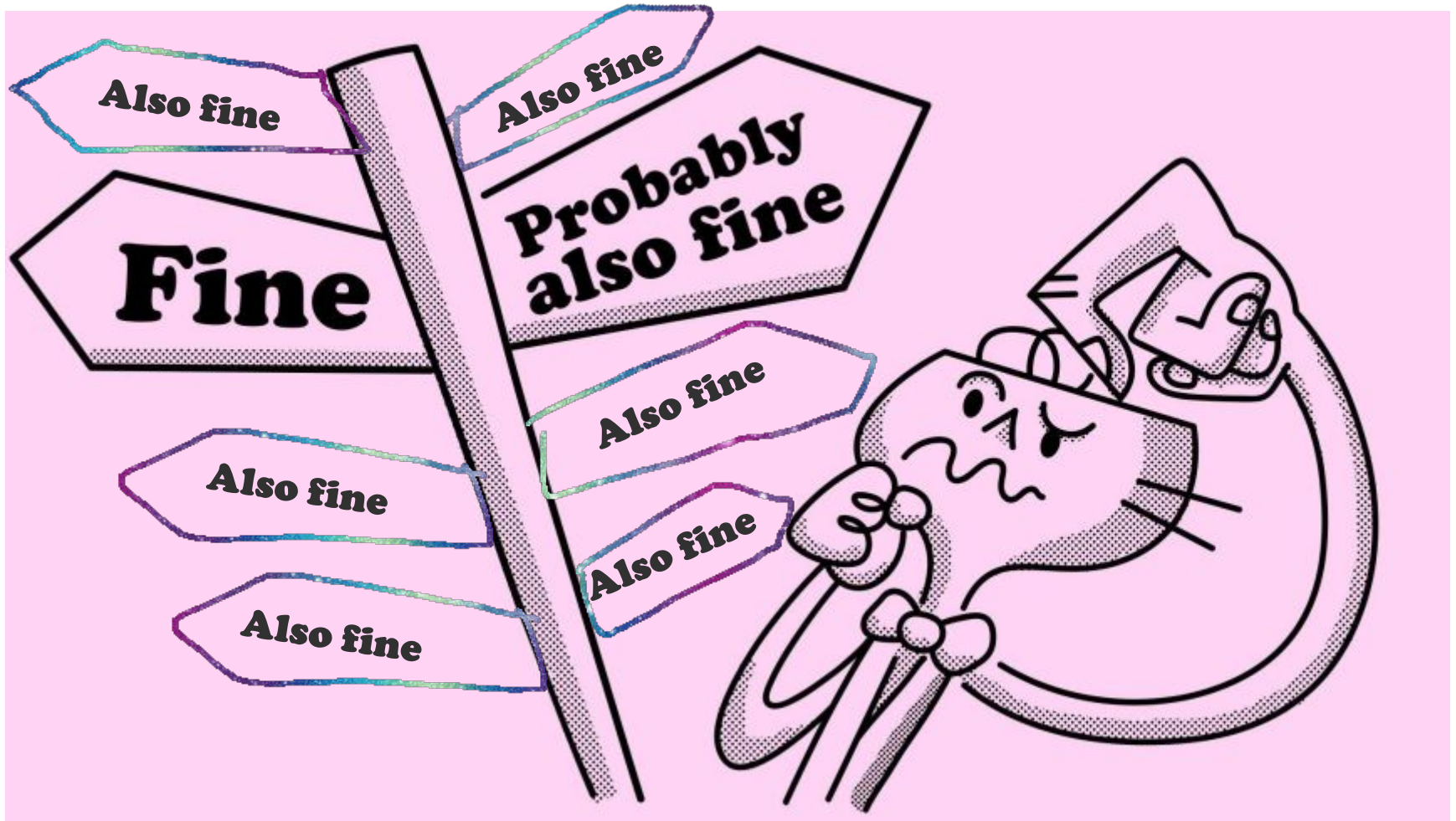
*Rotasiil liquid, plastic  
tube, in strip of tubes  
(2 of 5 tubes shown)*



*Rotasiil lyophilised in 2 or  
1 dose vials, with VVM 30*

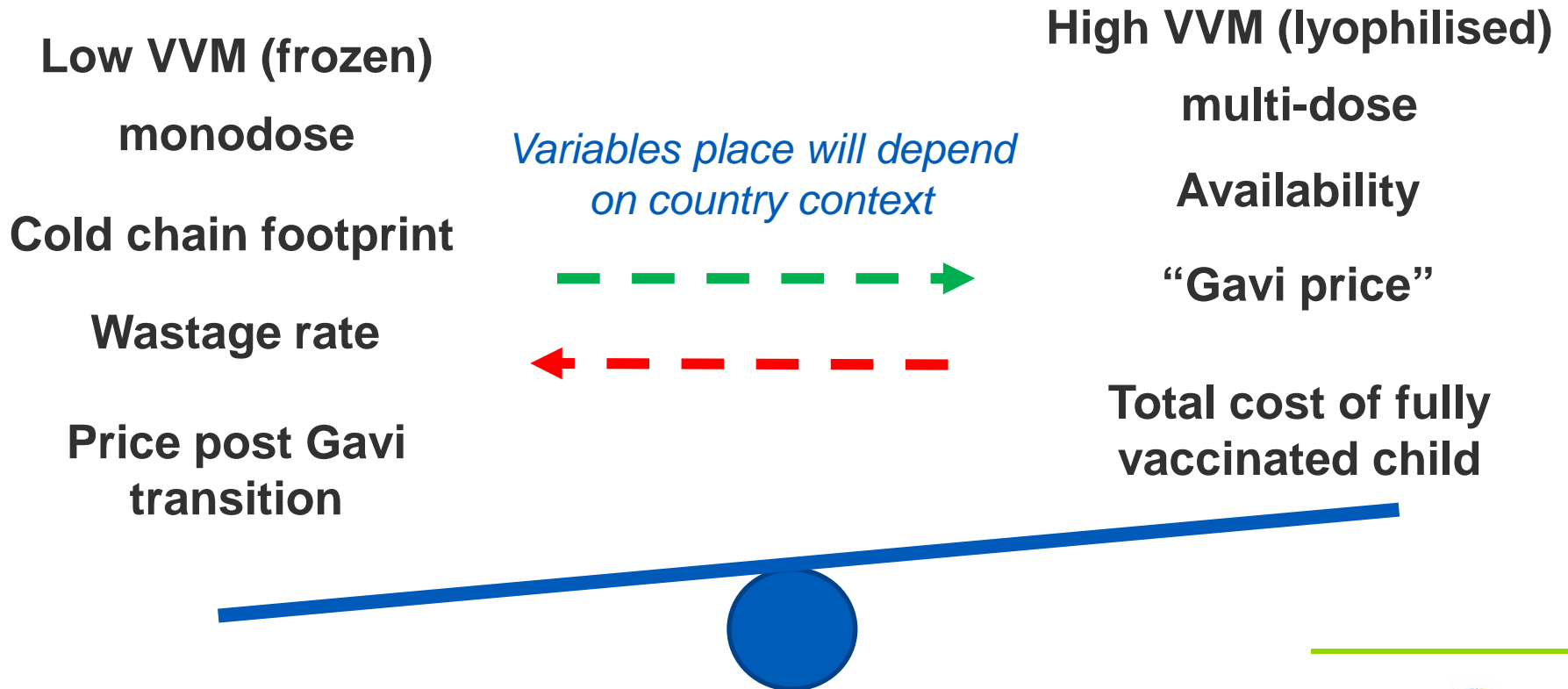
*Rotarix plastic tube in strip of  
tubes (4 of 5 tubes shown)*

# How to navigate this choice?



# Non-clinical vaccine profile variables

Several trade-offs to consider when assessing which option is preferred for the country:

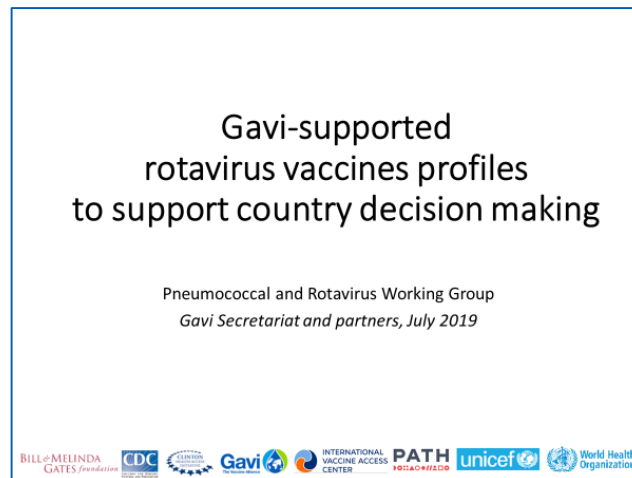




# Alliance support to country decision making

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- WHO **Total System Effectiveness (TSE)** approach to decision making
- Several partners supporting with **country-specific modelling**: CHAI, PATH, CDC
- New WHO position paper expected in 2020
- **Unbiased summary of vaccine profiles** (beyond the clinical characteristics)






## Available rotavirus vaccines supported by Gavi, either WHO prequalified, or expected to be prequalified

Trade name	Rotarix <sup>1</sup>		Rotavac		Rotavac 5D		Rotasiil		
Manufacturer	GSK	GSK	Bharat Biotech	Bharat Biotech	Bharat Biotech	Bharat Biotech	Serum Institute	Serum Institute	Serum Institute
Type	Rotavirus (live, attenuated)								
NRA	Belgium	Belgium	India	India	India	India	India	India	India
Presentation <sup>1</sup>	Plastic tube	Plastic tube, in strip of tubes	Vial	Vial	Vial	Vial	Two vial set	Two vial set	Plastic tube, in strip of tubes
Form	Liquid	Liquid	Liquid (frozen)	Liquid (frozen)	Liquid	Liquid	Lyophilised	Lyophilised	Liquid
WHO PQ decision	2009	2019	2018	2018	WHO PQ decision <b>expected</b> in Q1-Q2 2020	WHO PQ decision <b>expected</b> in Q1-Q2 2020	2018	2018	WHO PQ decision <b>expected</b> in 2020-2021

<sup>1</sup>The presentations of Rotarix in *plastic tube* or in '*plastic tube, in strip of tubes*' are considered similar. A switch from Rotarix in plastic tube to Rotarix in a strip of 5 tubes may not receive a switch grant.



## WHO Prequalified Rotavirus vaccines supported by Gavi

## Available in 2019

<b>Trade name</b>	<b>Rotarix</b>		<b>Rotavac</b>		<b>Rotasiil</b>	
<b>Prese- ntation*</b>	Plastic tube	Plastic tube, in strip of tubes	Vial	Vial	Two vial set	Two vial set
<b>Form</b>	Liquid	Liquid	Liquid (frozen)	Liquid (frozen)	Lyophilised	Lyophilised
<b>VVM</b>	7	7	2	2	30	30
<b>Doses in each unit</b>	1	1	5	10	1	2
<b>Picture</b>						

# Rotavirus vaccines supported by Gavi and expected to be WHO Prequalified

New options expected to be available in 2020-2021  
*(in addition to vaccines available in 2019)*

<b>Trade name</b>	<b>Rotavac 5D</b>	<b>Rotavac 5D</b>	<b>Rotasiil</b>
<b>Presentation*</b>	Vial	Vial	Plastic tube, in strip of tubes
<b>Form</b>	Liquid	Liquid	Liquid
<b>VVM</b>	7	7	7
<b>Doses in each unit</b>	1	5	1
<b>Picture</b>			

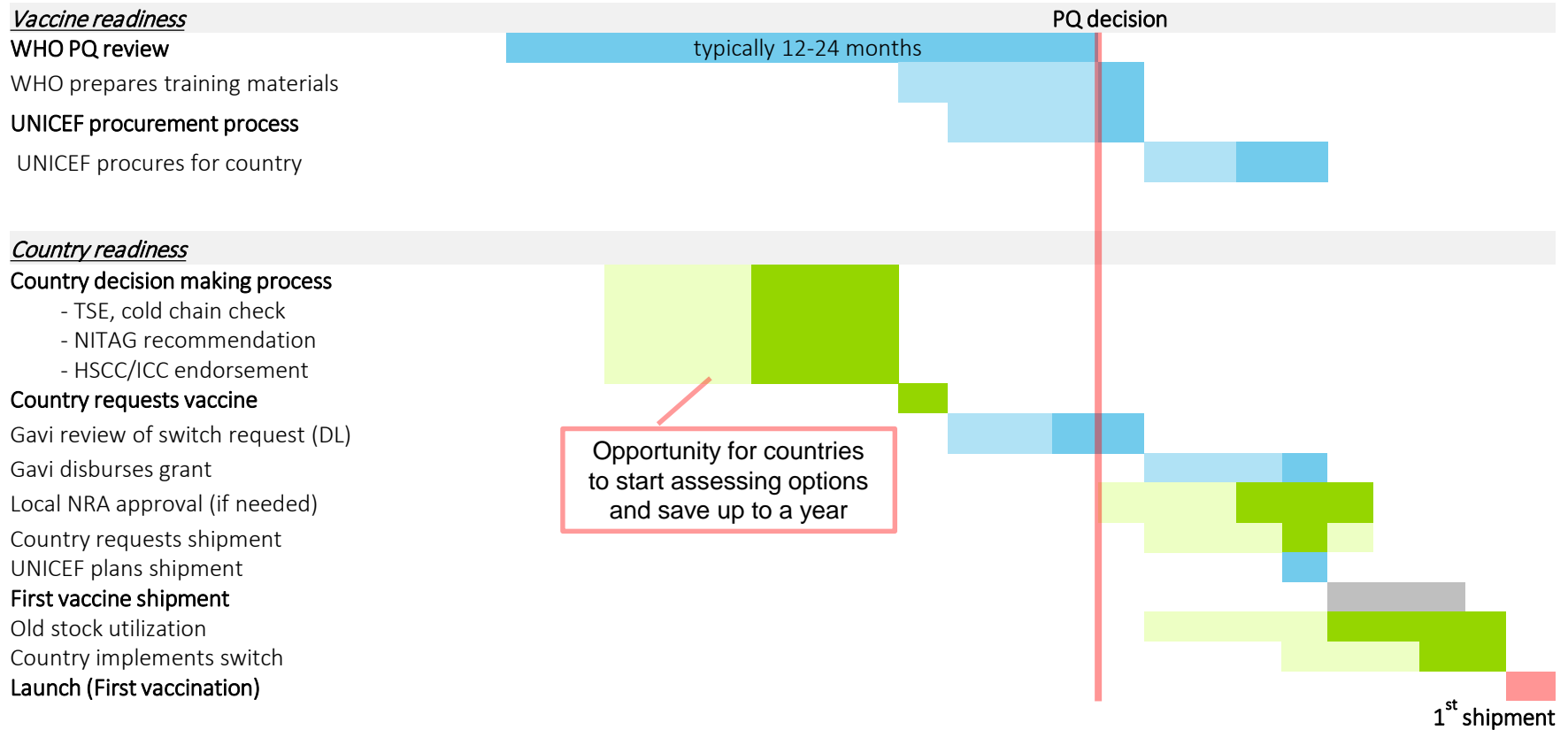
# The availability of new vaccines is linked to **country decision making speed**

Gavi starts offering a new vaccine when it enters PQ review.

**Countries starting the decision making process before PQ decision will be ready to receive the new vaccine up to a year earlier than waiting after PQ decision.** A country switch will be conditional to a positive PQ review outcome.

## Timeline for new vaccines availability (assuming accelerated Alliance efforts)

← typically 18-24 m, but can be 10m →



# Vaccine efficacy, effectiveness and safety

## Summary of Key Characteristics of Currently WHO-Pre-qualified Rotavirus Vaccines

Characteristics	<i>Rotarix (RV1; GSK)</i>	<i>Rotateq (RV5; Merck)</i>	<i>Rotavac (RV1; Bharat)</i>	<i>Rotasiil (RV5; Serum Institute)</i>	
Pooled effectiveness or efficacy for preventing severe rotavirus disease	Both efficacy and effectiveness data available, from multiple countries and multiple regions. Effectiveness data are shown below by country mortality profile. <sup>1</sup>		Only efficacy data are available, and from one country - India	Only efficacy data are available, and from two countries - India and Niger	
	Low mortality	82% (95% CI, 72%-88%)	Low mortality	88% (95% CI, 83%-91%)	
	Medium mortality	66% (95% CI, 51%-77%)			
	High mortality	58% (95% CI, 51%-65%)	High mortality	49% (95% CI, 40%-57%)	56% (95% CI= 37 -70) <sup>2</sup>
	Vaccine policymakers recognize differences in the vaccines' compositions and schedules but, overall, generally regard these vaccines as similar in performance				India: 37% (95% CI= 17 -51%) <sup>3</sup> Final analysis = 39.5%  Niger: 67% (95% CI= 50 -78%) <sup>4</sup>
Study sites	Multiple countries at different income and mortality levels.	Multiple countries at different income and mortality levels.	3 sites in India	6 sites in India and one site in Africa (Niger)	
Date of WHO prequalification	March 2009	October 2008	January 2018	September 2018	
Safety	WHO has concluded that the benefits of rotavirus vaccination against severe diarrhoea and death from rotavirus infection far exceed the risk of intussusception. <sup>5</sup>		Intussusception risk in vaccinated group was not higher than in placebo group	Intussusception risk in vaccinated group was not higher than in placebo group	
Mixed schedules & interchangeability of different products	<ul style="list-style-type: none"> <li>Whenever possible, WHO recommends that the same vaccine product should be used to complete the infant vaccination series;               <ul style="list-style-type: none"> <li>If a series cannot be completed with the same type of vaccine, the available rotavirus vaccine product should be used;</li> <li>Restarting a series is not recommended;</li> </ul> </li> <li>No published data yet exist on performance of any mixed vaccine courses that include <i>Rotavac</i> or <i>Rotasiil</i>;               <ul style="list-style-type: none"> <li>The published safety and efficacy data on mixed schedules or interchangeability that exist for <i>Rotarix</i> and <i>Rotateq</i> are reassuring;<sup>6,7</sup></li> </ul> </li> </ul>				
<b>References:</b>					
<sup>1</sup> Jonesteller CL. Et al. <i>Clin Infect Dis</i> . 2017		<sup>5</sup> Report of the WHO Global Advisory Committee on Vaccine Safety, 6-7 December 2017; <a href="http://apps.who.int/iris/bitstream/handle/10665/259874/WER9303.pdf?sequence=1">http://apps.who.int/iris/bitstream/handle/10665/259874/WER9303.pdf?sequence=1</a>			
<sup>2</sup> Bhandari N, et al., <i>Lancet</i> 2014		<sup>6</sup> Libster R, et al. <i>Pediatrics</i> 2016.			
<sup>3</sup> Kulkarni PS, et al., <i>Vaccine</i> 2017		<sup>7</sup> Daniel C. Payne, 2018: Oral presentation at the 13 <sup>th</sup> Rotavirus Symposium, Belarus, 2018;			
<sup>4</sup> Isanaka S, et al., <i>NEJM</i> 2017					

## Vaccine cost (direct)

The cost estimated below includes the cost of devices, and **excludes wastage**.

The country specific waste-adjusted cost will vary depending on the country's own wastage rate for each presentation.

To estimate the wastage rate please use the new [WHO Vaccines Wastage Rates Calculator](#)

Trade name	Rotarix		Rotavac		Rotavac 5D		Rotasiil		
Form	Liquid		Liquid (frozen)		Liquid		Lyophilised		Liquid
Presentation	Plastic tube	Plastic tube, in strip of tubes	Vial		Vial		Two vial set		Plastic tube, in strip of tubes
Doses in each unit	1		5	10	1	5	1	2	1
2019-21 price per dose (USD)	\$2.29 <sup>1</sup> [€1.88]		\$0.85	\$0.85	\$1.58 <sup>2</sup>	\$1.14 <sup>2</sup>	\$1.55 <sup>2</sup>	\$0.95	\$1.55 <sup>2</sup>
Doses per fully immunised person	2		3						
2020 price per fully immunised person (USD)	\$4.58		\$2.55	\$2.55	\$4.74	\$3.42	\$4.65	\$2.85	\$4.65
Indicative wastage rate	4%		23%	41%	4%	10%	4%	10%	4%
2020 waste-adjusted price per fully immunized person (USD)	\$4.77		\$3.31	\$4.32	\$4.94	\$3.80	\$4.84	\$3.17	\$4.84
Reference for WHO calculator <a href="#">WHO Vaccines Wastage Rates Calculator</a> <sup>3</sup>	Rota_liq		Rota_liq_frozen		Rota_liq		Rota_lyo		Rota_liq

<sup>1</sup>The price in US dollars reflects conversion at a currency exchange rate of 1.218 USD/EUR, which reflects an average across a 5-year period (Bloomberg projected foreign exchange rates). The actual exchange rate that will be utilised to calculate the USD price at the moment of the transaction may vary.

<sup>2</sup> Final price to be confirmed after signature of Long Term Agreement between UNICEF SD and the manufacturers

<sup>3</sup>Session frequency assumptions: 20% of service points with daily sessions, 70% with 2 sessions per week, 10% with 2 sessions per month

# Cost and co-financing implications of switch options

Gavi estimates, to be confirmed country by country. May vary after year 1 of implementation if waste rates vary.

Estimated impact on financial cost of vaccine co-financing<sup>1</sup>:

Switch option	Programmatic changes that impact cost <sup>3</sup>	Drivers of direct financial cost	Country in initial self-financing	Country in transition, or fully self-financing
Rotarix > Rotavac frozen in 5 doses/vial	Increase in freezing capacity need Reduction in refrigerated capacity need	+ 19% wastage (from 4% to 23% in year 1) - 63% price per dose (from 2.29 to 0.85\$) + 30% doses per fully vaccinated child (from 2 to 3) No price commitment post Gavi transition	Likely more costly	Likely less costly
Rotarix > Rotavac frozen in 10 doses/vial	Increase in freezing capacity need Reduction in refrigerated capacity need	+ 37% wastage (from 4% to 41% in year 1) - 63% price per dose (from 2.29 to 0.85\$) + 30% doses per fully vaccinated child (from 2 to 3) No price commitment post Gavi transition	Likely more costly	Marginal difference
Rotarix > Rotasiil lyophilised in single dose /vial <sup>2</sup>	Increase in refrigerated capacity need <sup>4</sup> Increased administration complexity <sup>4</sup>	- 32 % price per dose (from 2.29 to 1.55\$) + 30% doses per fully vaccinated child (from 2 to 3) No price commitment post Gavi transition	No difference	Marginal difference
Rotarix > Rotasiil lyophilised in 2 doses/vial	Increased administration complexity <sup>4</sup>	+ 6% wastage (from 4% to 10% in year 1) - 59 % price per dose (from 2.29 to 0.95\$) + 30% doses per fully vaccinated child (from 2 to 3) No price commitment post Gavi transition	Marginal difference	Likely less costly
Rotarix > Rotavac 5D liquid in single dose/vial <sup>2</sup>	Increase in refrigerated capacity need	- 31% price per dose (from 2.29 to 1.58\$) + 30% doses per fully vaccinated child (from 2 to 3) No price commitment post Gavi transition	No difference	Marginal difference
Rotarix > Rotavac 5D liquid in 5 doses/vial <sup>2</sup>	Reduction in refrigerated capacity need	+ 6% wastage (from 4% to 10% in year 1) - 50% price per dose (from 2.29 to 1.14\$) + 30% doses per fully vaccinated child (from 2 to 3) No price commitment post Gavi transition	Marginal difference	Likely less costly
Rotarix > Rotasiil liquid in plastic tube strip of 5 single doses <sup>2</sup>	Increase in refrigerated capacity need	- 32% price per dose (from 2.29 to 1.55\$) + 30% doses per fully vaccinated child (from 2 to 3) No price commitment post Gavi transition	No difference	Marginal difference
Rotarix in plastic tube > Rotarix multi-strip	Reduction in refrigerated capacity need	No change	No difference	No difference

<sup>2</sup> final price to be confirmed after signature of Long Term Agreement between UNICEF SD and the manufacturers

<sup>4</sup> see details on later slides

This table shows the switch options that are currently applicable to all Gavi countries with ongoing rotavirus vaccination, except two countries. More options will be displayed in future editions. Marginal difference is defined as < 10%



## Rota manufacturers' pricing commitments for transitioned countries

Vaccine	Manufacturer	Commitment Duration	Summary of Conditions
Rotarix	GSK	10 years*	Country introduced with Gavi support*** Country already using GSK product May procure through UNICEF/PAHO Price freeze (=price paid during last year of support)
Rotasiil	Serum Institute of India (SII)	-	No price commitment
Rotavac	Bharat Biotech	-	No price commitment

Manufacturer pricing commitments are 'public announcements' made during the last Gavi replenishment, they are not legally binding.

This information is meant for the convenience and benefit of countries and should not give a false sense of assurance that Gavi is "guaranteeing" prices, and that prices are determined for every single product and country.

\* From date of transition to fully self-financing, where the country receives no Gavi support

\*\*\* Gavi support = country and Gavi co-financing

# Storage and transport

(shelf life, VVM, volume per fully immunised person)

Trade name	Rotarix	Rotarix	Rotavac	Rotavac	Rotavac 5D	Rotavac 5D	Rotasiil	Rotasiil	Rotasiil
<b>Presentation</b>	1 dose/plastic tube, liquid	1 dose/plastic tube, liquid in strip of tubes	5 doses/vial, frozen	10 doses/vial, frozen	1 dose/vial, liquid	5 doses/vial, liquid	1 dose/vial, lyophilised	2 doses/vial, lyophilised	1 dose/plastic tube, liquid (strip of 5 tubes)
<b>Shelf-life<sup>1</sup></b>	24 months at 2 - 8 °C	24 months at 2 - 8 °C	60 months at -20 °C, 6 months at 2-8 °C post thaw	60 months at -20 °C, 6 months at 2-8 °C post thaw	24 months at 2-8°C	24 months at 2-8°C	30 months at 2-8 °C	30 months at 2-8 °C	24 months at 2-8 °C
<b>Cold chain volume per fully immunised person (cm<sup>3</sup>)<sup>1</sup></b>	In cartons of 50 doses: 34.2 cm <sup>3</sup>	In cartons of 50 doses: 23.6 cm <sup>3</sup>	12.6 cm <sup>3</sup>	9.6 cm <sup>3</sup>	48 cm <sup>3</sup>	12.6 cm <sup>3</sup>	52.7 cm <sup>3</sup> , with diluent stored at ambient temperature 105.5 cm <sup>3</sup> , with diluent stored in the cold chain	31.6 cm <sup>3</sup> , with diluent stored at ambient temperature 63.3 cm <sup>3</sup> , with diluent stored in the cold chain	59.481cm <sup>3</sup>
<b>Wastage adjusted cold chain volume per fully immunised person (cm<sup>3</sup>)<sup>1 5</sup></b>	36.0 cm <sup>3</sup>	24.8 cm <sup>3</sup>	18 cm <sup>3</sup>	19.2 cm <sup>3</sup>	50.5 cm <sup>3</sup>	14 cm <sup>3</sup>	55.5 cm <sup>3</sup> , with diluent stored at ambient temperature 111.0 cm <sup>3</sup> , with diluent stored in the cold chain	35.2 cm <sup>3</sup> , with diluent stored at ambient temperature 70.3 cm <sup>3</sup> , with diluent stored in the cold chain	62.61cm <sup>3</sup>
<b>Vaccine vial monitor type<sup>1</sup></b>	Type 7	Type 7	Type 2	Type 2	Type 7	Type 7	Type 30	Type 30	Type 7
<b>Handling open vials<sup>1</sup></b>	n/a	n/a	Opened vials of this vaccine should be discarded 6 hours after opening or at the end of the immunization session, whichever comes first.		n/a	Opened vials should be discarded 6 hours after opening or at the end of the immunization session, whichever comes first.	n/a	Opened vials should be discarded 6 hours after opening or at the end of the immunization session, whichever comes first.	n/a
<b>Remarks WHO<sup>1</sup></b>	n/a	n/a	Can be stored at 2-8°C until discard point of VVM2. (at 5°C, the VVM2 discard point is 225 days). For the delivery to PAHO, without VVM, a maximum storage of 6 months at 2-8°C		TBD	TBD	n/a	n/a	TBD
<b>Notes</b>	n/a	n/a	ROTAVAC® can be subjected to 6 freeze- thaw cycles		TBD	TBD	The shelf-life of diluent is 60 months at 2 to 8°C. The diluent should not be frozen.		TBD

1 Source: WHO PQ webpage: WHO updates these webpages as new information on products becomes available. Please refer to these pages (WHO PQ link) for the most up-to-date information. For presentations not yet WHO prequalified, data is based on discussions with manufacturers and partners in 2017.

5 Source: Review of WHO indicative vaccine wastage rate assumptions, 2017

## Programmatic administration considerations (risks of incorrect preparation or incorrect delivery)

	<b>Rotarix</b>	<b>Rotarix (in strip of 5 tubes)</b>	<b>Rotavac (in 5 or 10 dose vials)</b>	<b>Rotasiil (in single or 2 dose vials)</b>	<b>Rotavac 5D</b>	<b>Rotavac 5D</b>	<b>Rotasiil (in strip of 5 tubes)</b>
Route	Oral	Oral	Oral	Oral	Oral	Oral	Oral
Form	Liquid	Liquid	Liquid (frozen)	Lyophilised	Liquid*	Liquid*	Liquid*
Doses per fully immunised child	2	2	3	3	3	3	3
Dose quantity	1.5 ml	1.5 ml	0.5 ml (5 drops)	2.5 ml	0.5ml (5 drops)	0.5ml (5 drops)	2ml
Devices per unit	1	1 (multi-monodose presentation with 5 single tubes connected by a bar)	2 (vial and dropper)	4 (single dose) 5 (2 dose vial) Diluent vial, vaccine vial, adapter, syringe for reconstitution and for oral administration	2 (vial and dropper)	2 (vial and dropper)	1 (5 single-dose tubes attached by a strip)
Preparation steps (see <a href="#">WHO training</a> slides for details)	1	1	4	8	1	1	1
Need for dose measurement	No	No	Yes	Yes	No	Yes	No

\*Liquid presentation expected to be available in 2020

# Summary

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- Several new rotavirus vaccines options are available
- **The value of each option will differ depending on country context:** transition status, cold chain characteristics, proportion of routine outreach, etc
- Timely country decision making is essential for speed of availability, especially for new presentations
- Gavi's Alliance supports to switches:
  - Unbiased vaccines profiles slides (Detailed Product Profiles)
  - Partners support (WHO TSE, CHAI, PATH)
  - Switch grant

[Google: Gavi Rotavirus Product Profiles](#)

Thank you