

Cost-effectiveness evidence – a case study

This document is intended to support immunization programme managers and staff in their efforts to secure sustainable funding for immunization.

HOW TO USE THIS DOCUMENT

It is important that decision-makers and partners appreciate the importance of immunization, not just as a public health intervention but as a national investment that yields socioeconomic returns and health care savings.

This document presents summaries and key findings from a cost-effectiveness study. It is one of ten such studies drawn from evidence published in peer-reviewed journals and official documentation. The summaries can be drawn upon to support your

country's efforts to raise the profile of immunization and ensure continued investment in it within the context of health care prioritization.

Use the summaries as inspiration, to prepare for a meeting or to hand out to stakeholders.

The case studies will help most when they are used to help paint a national picture and a strong country-specific case for continued support in immunization. Present the studies alongside descriptions of the national issues and challenges. If available, supplement them with your own national data. If the same data is not available, consider using other national data that can serve as a proxy.



Cost-effectiveness evidence for the introduction of a vaccine

Case study: Armenia – rotavirus¹

KEY POINTS:

A cost-effectiveness study on the introduction of rotavirus was conducted in Armenia. Key findings included the following.

Vaccination will be cost-saving to the health service by 2025, if the cost of vaccine purchase decreases as expected. Once coverage reaches high levels, per birth cohort rotavirus vaccination is predicted to:

- prevent 8 deaths and 25,000 cases;
- prevent 3000 primary care consultations and 1000 hospitalizations;
- reduce health care expenditure by US\$180,000 and societal costs by \$470,000;
- cost US\$257,000.

Methods

In Armenia, a cost-utility analysis was performed for time horizon 2012-2025. The analysis compared no vaccination with universal Rotarix vaccination. It used a decision simulation based on an age structured cohort model.

Input parameters

- demographics and disease burden
- vaccine efficacy and coverage
- vaccination costs
- medical and societal costs.

About rotavirus

Rotaviruses are the most common cause of severe diarrhoeal disease in young children worldwide. They are also the cause of gastroenteritis and dehydration.

Worldwide, it causes an estimated 453 000 deaths in children below 5 years of age annually.

In the European Region deaths are rare, but there are 87 000 hospitalizations annually, which result in high health care costs.

There are two available rotavirus vaccines, Rotarix and RotaTeq, which are both considered safe and effective at preventing gastrointestinal disease.

¹ Jit, M., R. Yuzbashyan, G. Sahakyan, T. Avagyan, and L. Mosina. 2011b. The Cost-Effectiveness of Rotavirus Vaccination in Armenia. *Vaccine* 29:9104–11.

Results

Health impact

Once coverage has reached high levels, rotavirus vaccination – per birth cohort vaccinated – would prevent about

Deaths:	8
Cases:	25,000
Primary care consultations:	3,000
Hospitalizations:	1,000
DALYs lost:	600

Cost-effectiveness

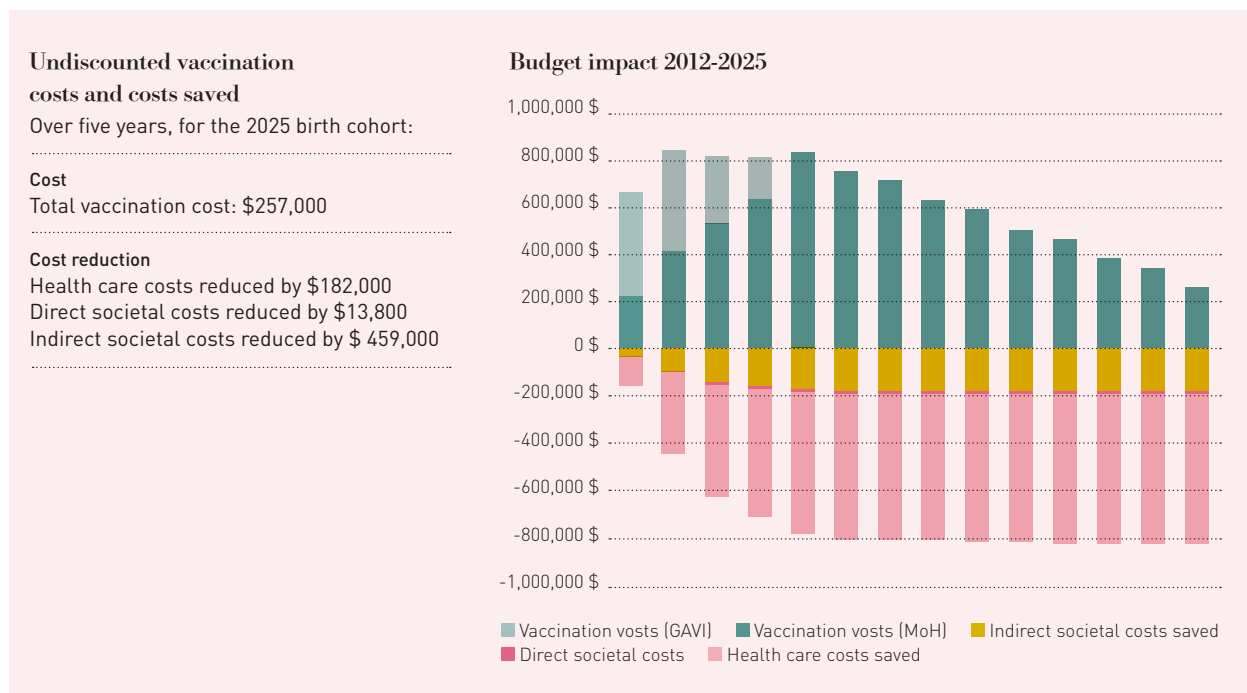
For birth cohorts 2012 to 2025: incremental cost per DALY saved

From the Ministry of Health perspective	\$650
From the total health care perspective	\$850
From a direct societal perspective	\$820
Including indirect societal costs	\$44

Rotavirus vaccination in Armenia would be **very cost-effective** by WHO criterion.² (cost per DALY averted US\$ 44 - US\$ 850, GDP per capita US\$ 3,800).

In the sensitivity analysis, even in the **most pessimistic scenario** (no decline in vaccine prices, low estimates of disease burden, age weighted DALYs), rotavirus vaccination was **still cost-effective** in Armenia (US\$ 8300 per DALY averted).

Budget impact



² WHO criterion : Adams T, Baltussen R, Tan-Torres T, Evans D, Hutubessy R, Acharya A, Murray CJL. Making Choices in Health. In: WHO Guide to Cost-Effectiveness Analysis. Geneva: World Health Organisation; 2003.

Parameters and input values for the model

	PARAMETER	INPUT	SOURCE
DEMOGRAPHICS	BIRTH COHORT	1.2% OF POPULATION	WHO-UNICEF (1)
DISEASE BURDEN	HOSPITALIZATION	RATE 6.5 PER 1,000 CHILDREN	SENTINEL SURVEILLANCE
	AGE DISTRIBUTION (MONTHS)	6.9% <-6; 28% 6-11; 36% 12-23; 29% 24-59	SENTINEL SURVEILLANCE
	UNDER 5 MORTALITY	RATE 16 PER 100,000	WHO (2), SENTINEL SURVEILLANCE
	PRIMARY CARE	8,829 UNDER-5 DIARRHOEA CONSULTATIONS, 51% ROTAVIRUS	EMAIL SURVEY
	SYMPTOMATIC ROTAVIRUS	INCIDENCE 0.24 A YEAR, DISABILITY WEIGHT OF 0.119 PER EPISODE	INCIDENCE (3, 4, 5), DISABILITY WEIGHT (6)
EFFECTIVENESS	VACCINE EFFICACY	E.G. TWO-DOSE EFFICACY PREVENTING HOSPITALIZATION 79%	EQUIVALENT TO LATIN AMERICAN TRIALS
	VACCINE COVERAGE	50% 2012, 90% 2013, 93% 2014, 95% 2015	WHO-UNICEF (1)
COSTS	VACCINATION COST	\$0.72, \$1.44, \$2.16, \$2.88 PER DOSE IN 2012, 2013, 2014, 2015. LIKELY \$4 PER DOSE 2016 LINEAR PRICE DROP TO \$1 PER DOSE BY 2025 (PRICE MATURITY)	MOH, GAVI (7) GAVI (7) GAVI (7)
	PROGRAMME COSTS	COMMUNICATION ETC \$30,000 (GAVI FUNDING \$60,000 IN 2012) TRAINING \$20,000 EVERY TWO YEARS (GAVI FUNDING \$40,000 IN 2012) MONITORING \$15,000 EVERY YEAR COLD CHAIN \$130,000	WHO-UNICEF (1) WHO-UNICEF (1) WHO-UNICEF (1) WHO-UNICEF (1)
	DIRECT MEDICAL COSTS	PAEDIATRIC HOSPITALIZATIONS \$195 PER CASE RVGE PRIMARY CARE CONSULTATION \$5.95 PER CONSULTATION	UNIT HEALTH CARE COSTS EMAIL SURVEY, WHO-CHOICE STUDY (8)
	DIRECT SOCIETAL COSTS	CAREGIVERS' TRANSPORT, ACCOMMODATION \$14.90 PER PATIENT	NATIONAL STATISTICAL SERVICE
	INDIRECT SOCIETAL COSTS	CAREGIVER PRODUCTIVITY LOSS \$7.29 HOSPITALIZATION//\$2.43 ANY EPISODE PRODUCTIVITY LOSS DUE TO CHILD DEATH \$53,112.73	NATIONAL STATISTICAL SERVICE NATIONAL STATISTICAL SERVICE

1. WHO-UNICEF Guidelines for Comprehensive Multi-Year Planning for Immunization (2013) Available from: http://www.who.int/immunization/programmes_systems/financing/tools/cmyp/en [accessed on 08.09.14]
2. World Health Organization (WHO). World health statistics. (2008) Available from <http://www.who.int/whosis/whostat/2008/en/> [accessed on 08.09.14]
3. Parashar U D, Hummelman E G, Bresee J S, Miller M A, Glass R I. Global illness and deaths caused by rotavirus disease in children, Emerg Infect Dis 2003;9(May (5)):565-72.
4. Bilcke J, Van Damme P, Van Ranst M, Hens N, Aerts M, Beutels P. Estimating the incidence of symptomatic rotavirus infections: a systematic review with meta-analysis. PLoS One 2009;4(June(6)):e6060.
5. Armenia 2005: Results from the Demographic and Health Survey. Stud Fam Plann 2008; 39(September (3)):221-6.
6. Murray C J L, Lopez A D. The global burden of disease a comprehensive assessment of mortality and disability from disease, injuries and risk factors in 1990 and projected to 2020. WHO (1996).
7. PATH. Accelerating the introduction of rotavirus vaccines into GAVI-eligible countries (October, 2006) Available from: http://www.gavialliance.org/resources/Rotavirus_Investment_Case_Oct06.pdf [accessed on 08.09.14]
8. WHO. Choosing Interventions that are Cost-effective (WHO-CHOICE). Estimates of unit costs for patient services for Armenia (2010) Available at: <http://www.who.int/choice/country/arm/cost/en/index.html> [accessed on 08.09.2014]