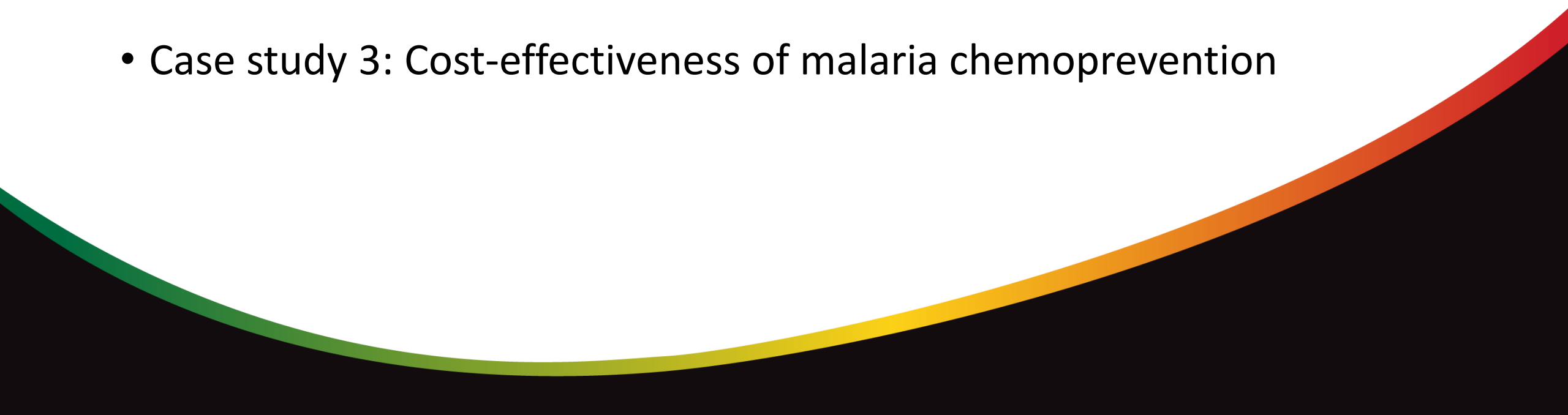




Case studies of HTA implementation  
from around the world  
Justice Nonvignon

# Setting Health Priorities 2018

# Outline

- Case study 1: Ghana's HTA pilot study on hypertension
  - Case study 2: Cost-effectiveness of rotavirus vaccination in Ghana
  - Case study 3: Cost-effectiveness of malaria chemoprevention
- 

# Ghana Pilot HTA Study on Hypertension



# Methods

**Objective:** To estimate the cost-effectiveness and budget impact of drugs to reduce blood pressure to prevent cardiovascular disease (CVD)

**Approach:** Developed based on the recommendations of the standard treatment guidelines as well as clinical practice

**Population:** Patients with hypertension, excluding those with pre-existing CVD or diabetes, and pregnant women

**Interventions:** First line drugs (main classes):

- A. ACE inhibitors or ARB
- B. Beta-blockers
- C. Calcium Channel Blockers
- D. Thiazide-like Diuretics

**Comparator:** No intervention (NI)

**Outcomes:** Coronary heart disease (heart attack), stroke, heart failure, diabetes, disability adjusted life years (DALY), and costs

# Results: ICER & budget impact

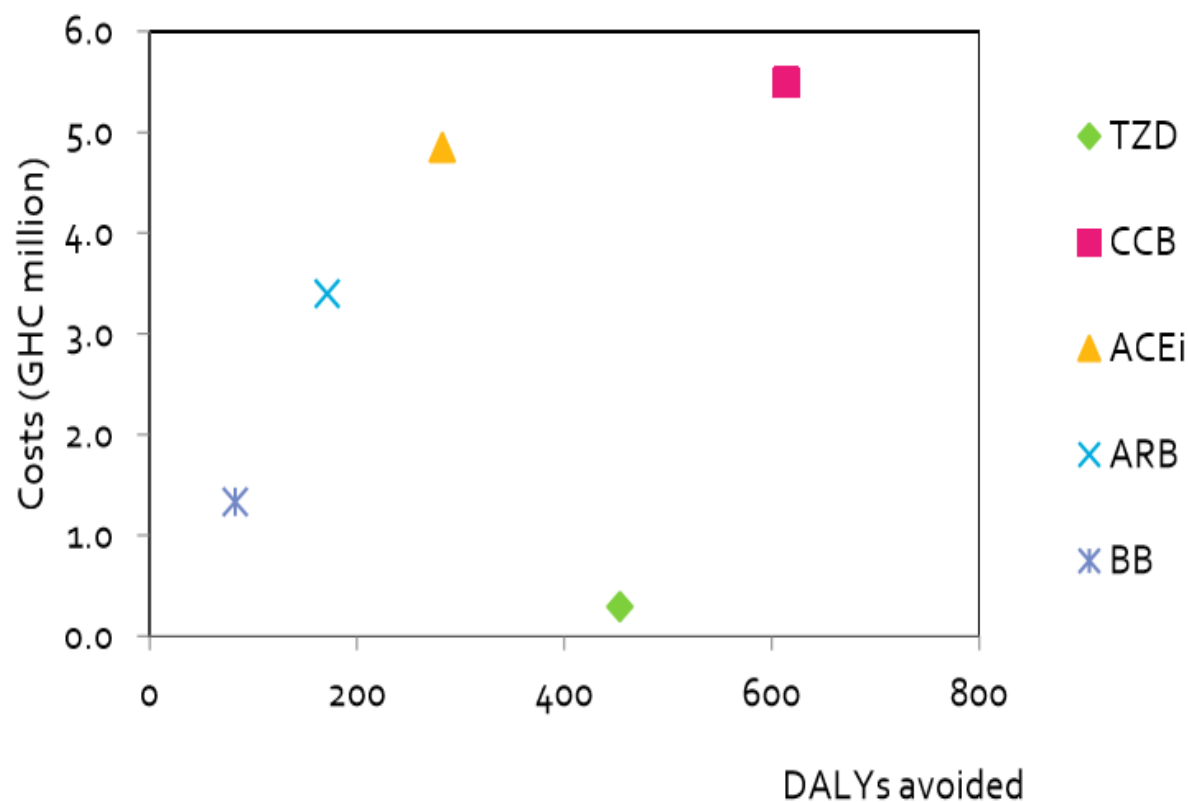
Incremental cost-effectiveness analysis (per 1,000 treated)

	Compared with no intervention		ICER (GH¢ per DALY avoided)
	Additional cost (GH¢)	DALYs avoided	
TZD	290,933	453	642
CCB	5,498,126	614	32,482
ACEi	4,847,175	282	Dominated
ARB	3,398,147	171	Dominated
BB	1,334,573	83	Dominated

## Budget impact over 5 years

	Total costs (GH¢ discounted)				
	Year 1	Year 2	Year 3	Year 4	Year 5
NI	5,347,183	6,082,649	6,499,465	6,708,038	6,781,829
TZD	8,181,309	12,548,675	12,526,516	12,373,027	12,134,744
CCB	69,386,769	127,865,019	121,118,914	114,705,942	108,654,743
ACEi	64,168,270	117,113,688	110,582,387	104,394,251	98,589,550
ARB	47,124,757	84,772,356	80,167,115	75,758,854	71,599,337
BB	21,841,437	37,149,504	35,569,569	33,942,948	32,335,183
TZD vs NI	2,834,127	6,466,027	6,027,051	5,664,989	5,352,915
CCB vs TZD	61,205,459	115,316,343	108,592,399	102,332,914	96,519,999

Costs & DALYs per 1,000 people treated compared with no intervention  
Mean discounted over lifetime horizon



# Policy scenarios

Scenario	Patients changing drugs	DALYs avoided	Lifetime cost to NHIS, GH¢ millions	Budget impact (vs. current practice), GH¢ millions					
				Year 1	Year 2	Year 3	Year 4	Year 5	Total 1-5
1) 10% cut in mean drug prices	0	0	-93.7	-3.2	-6.1	-5.7	-5.4	-5.1	-25.5
2) 10% shift from ACEi/ ARB/ BB to TZD	6,050	1,558	-19.1	-0.7	-1.3	-1.2	-1.1	-1.1	-5.4
3) 10% shift from CCB to TZD	13,033	-2,089	-67.9	-2.3	-4.4	-4.1	-3.9	-3.7	-18.4

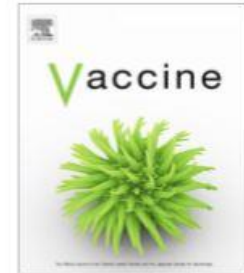
# Cost-effectiveness of rotavirus vaccine in an era of transition from health aid



Contents lists available at [ScienceDirect](#)

Vaccine

journal homepage: [www.elsevier.com/locate/vaccine](http://www.elsevier.com/locate/vaccine)



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

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# Research objective

- With limited economic resources, does continued RV vaccination yield efficient allocation of scarce resources
  - Does such decision present value-for-money to the country?
    - ✓ Up to four RV vaccines available
      - Rotarix® by GSK
      - Rotateq® by Merck
      - Rotavac® by Bharak Biotech
      - Rotasiil® by Serum Institute
- This study analyzes the cost-effectiveness of RV vaccines over 20-year period (2012-2031), i.e. from introduction of vaccines to future date when Ghana is expected to be fully self-financing



# Cost-effectiveness Model & Inputs

- **TRIVAC model 2.0** (precursor to UNIVAC) used to calculate costs, effects, and CE estimates
  - TRIVAC model developed by LSHTM to estimate CE of RV, pneumococcal conjugate vaccine, *haemophilus influenza b*
  - Widely used across the world (30+ countries)
- **Inputs included:**
  - Demographic data from UNPOP
  - RV cases and deaths from local and published studies
  - Disability-adjusted life years (DALYs) from 2013 Global Burden of Disease study
  - Utilization data 2014 Ghana Demographic and Health Survey (DHS)
  - Treatment cost data from National Health Insurance Scheme tariff schedule 2015
  - Household expenditure data estimated from WHO Global Expenditure Database
  - Vaccine costs, coverage and efficacy data from GAVI, published studies
  - Study incorporates local expert perspective

# Analysis

- **Costing perspectives:** Government (program-related costs) and societal (program costs plus household out-of-pocket costs on treatment)
- **Costing horizon:** 20 years, i.e. 2012-2031
- Costs in 2015 USD
- Incremental costs and benefits, i.e. compare scenarios with and without vaccination and examine the difference
- Effect measures and CE ratios calculated for:
  - ✓ Number of RV cases averted
  - ✓ Number of deaths averted
  - ✓ Total life years gained & Total DALYs averted
- Examined two vaccine price scenarios
  - **Scenario 1** – Ghana receives declining Gavi support until graduation in 2022
  - **Scenario 2** – Ghana pays full vaccine price for duration of analysis, 2012 to 2031
- Sensitivity analysis conducted to understand how variation in key input variables would impact results
- Share of severe disease; delivery cost per dose; incidence; vaccine efficacy; inpatient and outpatient treatment costs; and treatment seeking for severe cases

# Results

Cost-effectiveness of rotavirus vaccination, 2012-2031.

Indicator	Scenario 1 <sup>*</sup>		Scenario 2 <sup>^</sup>	
	Government perspective	Societal perspective	Government perspective	Societal perspective
Cost per immunized child (\$)	4.27	4.27	5.73	5.73
Cost per case averted (\$)	28	27	39	38
Cost per DALY averted (\$)	249	238	344	332
Cost per death averted (\$)	7115	6798	9798	9481
Cost per life-year gained (\$)	253	242	349	337

Notes:

<sup>\*</sup> Scenario 1 represents the price paid by Ghana per dose.

<sup>^</sup> Scenario 2 represents the total price per dose of vaccine, which includes the price paid by GAVI and the price paid by Ghana.

Incremental cost of rotavirus vaccination, 2012-2031 (millions \$).

Indicator <sup>**</sup>	Scenario 1 <sup>*</sup>		Scenario 2 <sup>^</sup>	
	Government perspective	Societal perspective	Government perspective	Societal perspective
Total vaccine and program costs	70.00	70.00	93.99	93.99
Treatment cost savings	6.34	9.18	6.34	9.18
Total net costs	63.66	60.82	87.65	84.82

Notes:

<sup>\*</sup> Scenario 1 represents the price paid by Ghana per dose.

<sup>^</sup> Scenario 2 represents the total price per dose of vaccine, which includes the price paid by GAVI and the price paid by Ghana.

<sup>\*\*</sup> Future costs are discounted at 3% per year.

Health impact of rotavirus vaccination, 2012-2031.

Indicator <sup>*</sup>	No vaccine	RV vaccine	Averted
Number of immunized children	–	16,390,860	–
Total cases	6,379,874	4,145,727	2,234,147
Non-severe cases	5,926,903	3,851,380	2,075,523
Severe cases	452,971	294,347	158,624
Total deaths	25,568	16,622	8946
Total DALYs	728,840	4,737,100	255,140
Years of Life Lost (YLLs – DALYs due to mortality)	718,150	466,750	251,400
Years Lived with Disability (YLDs – DALYs due to morbidity)	10,690	6950	3740
Total life years gained	–	251,399	–

<sup>\*</sup> Future health benefits are discounted at 3% per year.

# Cost-effectiveness of malaria chemoprevention

Nonvignon *et al. Malar J* (2016) 15:367  
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Malaria Journal

RESEARCH

Open Access



## Cost-effectiveness of seasonal malaria chemoprevention in upper west region of Ghana

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# Methods

Study area: Upper West Region,  
pop 771,391

11 districts

Malaria prevalence 37.8% (national  
26.7%) DHS 2014

Study pop:

148,104 children 3-59 months

3,520 community health volunteers

Caregivers

## Sample

All children 3-59 months

121 volunteers

512 caregivers

Costing perspective: Provider (program-related costs) and societal perspectives (program costs plus productivity costs to caregivers)

Financial costs

Economic costs

Direct costs: recurrent and capital costs  
(discounted at 3%)

Indirect/productivity costs

Costs covered: planning, social mobilization,  
training of health workers and volunteers,  
dosing exercise, pharmaco-vigilance

Costs in 2015 US\$

✓ Number of cases averted

✓ Number of deaths averted

# Results

Additional number of cases averted were 24,881, deaths averted 808

Economic cost per child fully dosed was US\$22.53 PP & US\$67.35 SP

Inc Cost per case averted \$107.06 (PP), \$319.96 (SP)

Inc Cost per death averted \$3,298.36 (PP), \$9,858.02 (SP)

ICERs sensitive to mortality rate, protective efficacy

**Table 1 Cost-effectiveness of smc programme in the upper west region**

Item	Region
Target population (children under 5 years)	148,104.00
Number of fully dosed children	118,208.00
Cost of SMC programme (US\$, 2015 prices)	
Total financial cost	1142,040.80
Financial cost per fully dosed child	9.66 (95 % CI 7.46–14.21)
Economic cost (provider perspective)	2663,697.18
Economic cost (societal perspective)	7961,153.27
Effect of SMC programme	
Additional number of cases averted	24,881
Additional number of child deaths averted	808
Cost-effectiveness ratios (ICERs) (US\$, 2015 prices)	
Provider perspective <sup>a</sup>	
Economic cost per fully dosed child	22.53 (95 % CI 21.08–28.06)
Economic cost per additional case averted	107.06 (95 % CI 99.75–121.48)
Economic cost per additional child death averted	3298.36 (95 % CI 3073.26–3742.64)
Societal perspective <sup>b</sup>	
Economic cost per fully dosed child	67.35 (95 % CI 63.56–77.86)
Economic cost per additional case averted	319.96 (95 % CI 284.23–366.38)
Economic cost per additional child death averted	9858.02 (95 % CI 8757.11–11,288.08)