Health Economic Evaluations on Dengue Vaccine in Indonesia

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Q&A

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Background

Dengue is a significant public health issue in Indonesia, with hundreds of cases reported annually.

- Vaccination is a preventive intervention for dengue, protection against severe disease and hospitalization
- Combined with vector control and surveillance measures, it hold promise in reducing dengue's burden in endemic regions.

Health economic evaluations provide a rigorous means of assessing the costs and benefits associated with health interventions, and support informed decision-making concerning resource allocation to maximize population health benefits.

Objectives

To conduct an economic evaluation study on dengue vaccines combined with the *Wolbachia* program (vaccine plus) by simplifying the previous Markov model.

Methods

- Economic evaluation type: Cost-effectiveness analysis (CEA)
- Model: Markov probabilistic[1]
- Study population: Children in the age group nine years old
- Setting and location: Indonesia
- Comparator: Vaccine only
- Perspective: Payer
- Time horizon: 10 years
- Currency, price date, and conversion: USD (in 2022) purchasing power parity (PPP)
- Analysis uncertainty: Probabilistic sensitivity analysis (PSA)
- Outcomes: Quality of adjusted life-years (QALY)
- Discount rate: Three percent (3%)
- Analysis statistic tool: RStudio BCEA package[2]

Results

Cost-effectiveness analysis of the reference intervention: vaccine plus and comparator intervention: vaccine summarize that the optimal decision: choose Vaccine for k < and for k >=, and analysis for willingness to pay parameter k = 20,000. Expected net benefit vaccine plus 24,377 and vaccine 22,351. Therefore, the optimal intervention (max expected net benefit) for k = 20,000 is vaccine plus by incremental cost-effectiveness ratio (ICER) 1564.8, expected incremental benefit (EIB) 2026.4, cost-effectiveness acceptability curve (CEAC) 0.8245, and expected value of perfect information (EVPI) 207.48.

Table 1. Model parameters of the study

Parameter	Value	Distribution	Reference
Clinical			
Dengue infection rate	0.05%	Dirichlet	3
Case fatality rate	0.83%	Dirichlet	3
Cost			
Healthcare cost of outpatient	$19.22	Gamma	4
Healthcare cost of hospitalization	$297.79	Gamma	4
Payer cost of outpatient	$0.62	Gamma	5
Payer cost of hospitalization	$227.94	Gamma	6
Vaccine price per dose	$20.00	Gamma	7
Cost of vaccine administration	$3.42	Gamma	7
Cost of *Wolbachia* program	$3	Gamma	8
Cost of health education	$0.02	Gamma	9
Utilities			
QALY loss of outpatient	0.00009	Beta	4,7
QALY loss of hospitalization	0.00038	Beta	4,7
QALY loss of fatal	1	Beta	4,7
Others			
Targeted population	4,701,100	Unvaried	10
Discount rate	3%	Unvaried	11
Time horizon	10 years	Unvaried	

Table 2. Summary statistics of study

ICER	CEAC	EIB	EVPI
1,564.8	0.8245	2,026.4	207.48

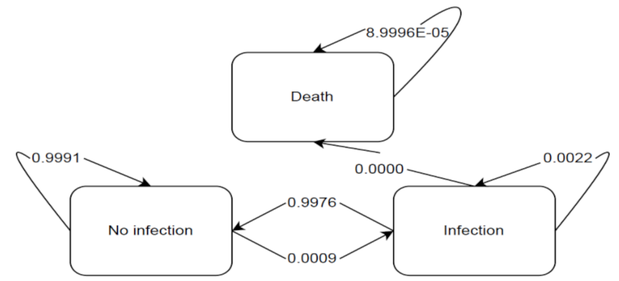

Figure 1. Markov model of dengue status in all states

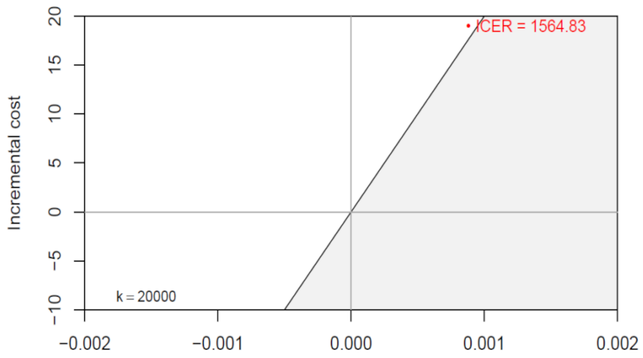

Figure 2. Cost-effectiveness plane vaccine plus vs vaccine

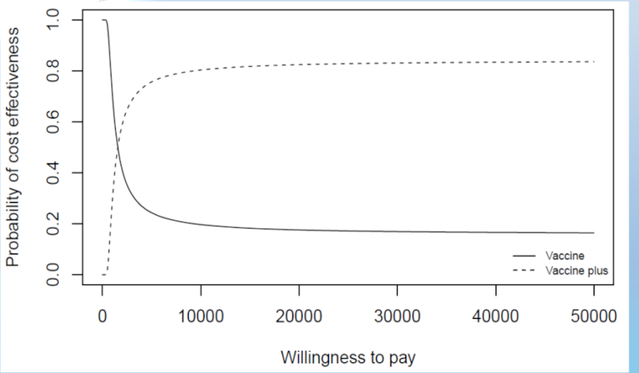

Figure 3. CEAC vaccine plus vs vaccine

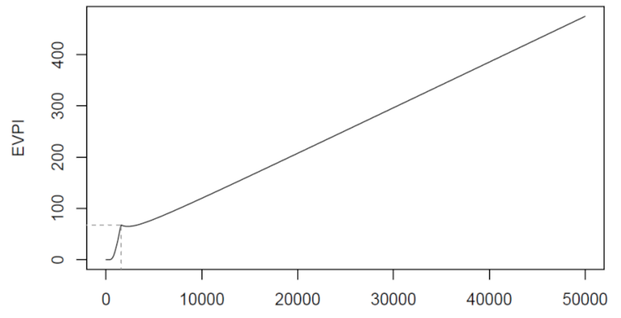

Figure 4. EVPI

Conclusions

Our study demonstrates the dengue vaccine plus intervention to be the most cost-effective regarding statistical analysis, and PSA consistently shows higher benefits and lower costs. This has important implications for resource-constrained settings, and we recommend the intervention as a priority for reducing the economic burden of dengue infection.

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