EEE-VPM Africa
Enhancing the use of Economic Evidence in Vaccine Policymaking in Africa

HERU
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POLICY BRIEF
June 2026

Cost-Effectiveness and Budget Impact Analyses of Strategies to Improve Measles-containing Vaccine (MCV1 and MCV2) Coverage in Kenya

Key messages:

- Continuing improvement in measles vaccination coverage over 10 years based on historical trends (constant improvement scenario) is cost-effective compared with maintaining the current coverage levels (82% for MCV1 and 60% for MCV2).
- Rapidly scaling up both MCV1 and MCV2 coverage to 95% within 10 years (intensified improvement scenario) is more cost-effective compared with the constant improvement scenario, making it the stronger value for money option.
- Measles case-reporting rates and vaccine procurement costs were the main drivers of the cost-effectiveness results, highlighting the importance of strong surveillance data and cost management.
- While the intensified improvement scenario offers better cost-effectiveness, it carries a very high-budget impact compared to the constant improvement scenario, which had a moderate budget impact. This emphasises that decisions about scale-up need to consider affordability and financing.

Introduction

Measles control efforts have been implemented over the years; however, elimination of the disease is yet to be realised. Kenya has remained committed to measles control, but several challenges persist, including cross-border population movement, delays in the implementation of supplementary immunization activities (SIAs), and uneven vaccination coverage.



Improvements in vaccination coverage have also been modest, and in some periods stagnant. For example, between 2018 and 2024, national measles-containing vaccine dose 1 (MCV1) coverage increased from 78% to 82%, while MCV2 coverage improved from 42% to 60%. Both doses remained well below the 95% threshold recommended by the World Health Organization to achieve herd immunity and prevent sustained transmission.

We assessed the cost-effectiveness and budget impact of scaling up vaccination coverage in Kenya towards the measles elimination goal, using the measles-rubella (MR) vaccine, delivered as MCV1 at nine months and MCV2 at 18 months of age, in line with the country's immunization schedule. The analysis focused specifically on the impact of the MR vaccine on measles outcomes only.

Study approach

We conducted a cost-effectiveness analysis using a Markov Model (Figure 1) to evaluate the costs and health outcomes of alternative strategies to improve measles vaccination coverage in Kenya. The analysis was conducted from a health system perspective over a 10-year time horizon, with a new birth cohort entering the model each year. All costs were derived from secondary sources including UNICEF vaccine price lists, cost of illness studies, and literature on vaccine delivery costs and were reported in 2025 US dollars (USD). Epidemiological data was sourced from different sources including Ministry of Health data, literature sources on vaccine efficacy estimates and case-fatality ratios among other sources. The outcomes were reported in terms of disability adjusted life years (DALYs). The incremental cost-effectiveness ratio (ICER) was calculated as the net change in total costs and DALYs averted between comparators and assessed against a cost-effectiveness threshold of 0.5 times the GDP per capita (USD 1,280). Strategies with ICERs below the threshold were deemed cost-effective.

The analysis compared three scenarios of MCV1 and MCV2 coverage in Kenya over 10 years:

- **Baseline:** Assumed routine measles vaccination and SIAs continue, but no additional investment is made to improve coverage. Coverage therefore remains at the current level (82% for MCV1 and 60% for MCV2), with no further improvement over 10 years and SIAs conducted every 5 years.
- **Constant improvement**: Assumed current funding is maintained to ensure incremental improvements in vaccination coverage based on historical trends in the country. MCV1 increases at 0.3% per year reaching 84.7% by year 10, while MCV2 increases at 2% per year, reaching 78% by year 10. This is alongside SIAs conducted every 5 years.
- **Intensified improvement:** Assumed additional investments to reach hard-to-reach populations, with an increase in delivery activities related to communication and social mobilization, cold chain expansion and surveillance. These investments were assumed to enable faster scale-up to 95% coverage for both MCV1 and MCV2 in 10 years, with SIAs

A budget-impact analysis to assess the affordability of the alternative vaccination strategies compared with the baseline scenario was done over a 5-year time frame to inform short-to-medium term financial planning. The standardised budget impact threshold (SBIT) was classified based on the incremental per capita annual health expenditure per 1 million inhabitants (and as a proportion of current health expenditure) as follows: low <50 (<0.005%), moderate: 50 to <100 (0.005% to <0.01%), high: 100 to <200 (0.01% to <0.02%) and very high: 200 or more (>=0.02%).

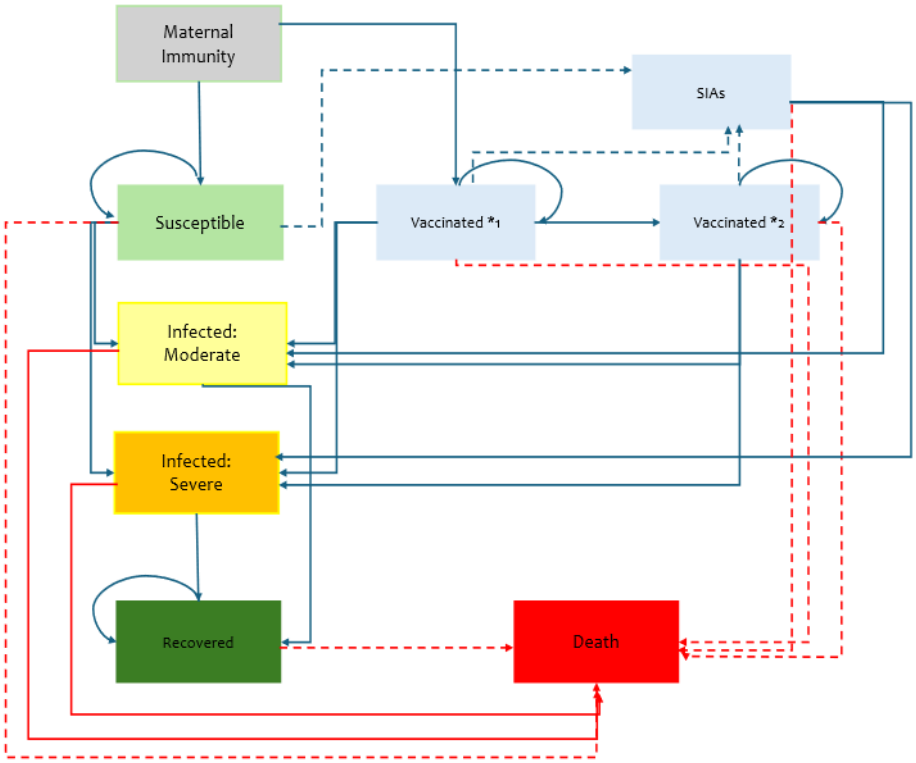


Figure 1: Markov Model Structure

Key findings:

1. **The constant improvement scenario was cost-effective compared with the baseline scenario (ICER: USD 1,269).** See Table 1. This means that continuing to improve measles vaccination coverage at the pace seen in recent historical trends is a cost-effective option compared with no further improvement.
2. **The intensified improvement scenario was even more cost-effective than the constant improvement scenario (ICER: USD 1,093).** See Table 1. This means that scaling up faster to reach 95% coverage for both measles vaccine doses is more cost-effective than continuing at the current pace of improvement.
3. **The intensified improvement scenario had a much larger health impact.** It averted about 4.1 times as many measles cases (45,370 vs 11,317) and 4.12 times as many deaths (879 vs 213) over 10 years compared with the constant improvement scenario. See Table 1. This means that improving coverage faster to reach 95% produces much larger health gains but requires higher costs.

	Averted cases- Median (2.5-97.5th percentile)	Averted deaths- Median (2.5-97.5th percentile)	Total costs (million USD) Median (2.5-97.5th percentile)	Total DALYs Median (2.5-97.5th percentile)	Mean ICER
Baseline scenario	-	-	80.64 (61.15 – 104.64)	105,969 (83,158 – 139,488)	
Scenario 1 (Constant improvement)	11,317 (8,761 – 14,396)	213 (161 -276)	88.55 (67.12 – 114.23)	99,924 (77,841 – 132,392)	1,269 (1,205– 1,333)
Scenario 2 (Intensified improvement)	45,370 (33,263 – 65,576)	879 (626 – 1,284)	115.83 (86.60 – 151.85)	74,730 (56,741 – 102,709)	1,093 (1,029 – 1,157)

Table 1: Clinical outcomes, costs and cost-effectiveness of different vaccination strategies over a 10-year horizon from a health system's perspective for 10 consecutive birth cohorts

4. **The cost-effectiveness results were mainly driven by measles case-reporting rates and vaccine procurement costs.** Varying the measles case-reporting rate changed the ICERs substantially, from about a 77-78% decrease to an 82-87% increase. Varying vaccine procurement costs increased the ICERs by about 16–29%. This means that the findings are particularly sensitive to how many measles cases are reported and the cost of procuring vaccines.

5. **The Intensified improvement scenario had a substantially higher budget impact**. The 5-year net budget impact for the Intensified improvement scenario was USD 11.92 million, compared with USD 1.88 million for the Constant improvement scenario, relative to the Baseline scenario. This means the Intensified improvement scenario required about 6.3 times more additional budget over 5 years. This is reported in summary in Table 2 and in detail in the Annex

6. **The Intensified improvement scenario was less affordable than the Constant improvement scenario.** When assessed against Kenya's health expenditure using SBIT, the Intensified improvement scenario had a very high budget impact (SBIT: 0.0252%–0.0539% over 5 years), while the Constant improvement scenario had a moderate budget impact (SBIT: 0.0079%–0.0089% over years 2–5). This means that accelerating scale-up to 95% coverage would require more deliberate financing, even though it produces much larger health gains.

	Total Net 5-Year Budget Impact (USD)	Affordability rating
Baseline scenario	-	-
Constant improvement	1,829,451	Moderate budget impact (SBIT=0.0077% to 0.0086%)
Intensified improvement	11,915,919	Very high budget impact (SBIT=o.0245% to0.0530%)

Table 2: Summary of Budget impact analysis for the different measles vaccination coverage strategies and affordability rating

Policy recommendations

1. **Sustain current gains:** Kenya should protect and continue investments that support routine measles vaccination coverage.
2. **Plan for phased scale-up:** Given the high resource needs of intensified improvement, policymakers could consider a phased approach that progressively moves Kenya towards 95% coverage for both measles vaccine doses.
3. **Explore options to improve affordability:** Given the high-budget impact of intensified improvement and the sensitivity of the results to vaccine procurement costs, options such as price negotiation, market shaping, pooled procurement, and other feasible efficiency measures could help make accelerated scale-up more affordable.
4. **Improve measles case reporting and data quality:** Since the cost-effectiveness results were highly sensitive to the measles case-reporting rate, improving the completeness and accuracy of reported measles cases would strengthen measles burden estimates, elimination tracking, and future economic evaluations.

Explanation of key terms

1. **Cost-effectiveness:** Assesses whether the additional health benefits of a strategy are worth the additional costs.
2. **Incremental cost-effectiveness ratio (ICER):** Measures the additional cost required to gain one additional unit of health benefit when comparing two strategies and is a standard measure of cost-effectiveness.
3. **Budget impact:** Estimates the total financial resources needed to implement a strategy and whether this is likely to be affordable within available health resources.
4. **Standardised budget impact threshold (SBIT):** A measure used to assess how large the additional budget required for a strategy is relative to available health expenditure. It helps classify the budget impact as low, moderate, high, or very high.
5. **Disability-adjusted life years (DALYs):** A measure of overall disease burden. One DALY represents one year of healthy life lost due to illness, disability, or premature death.

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Recommended citation

Orangi S, Mandaliya P, Jalang'o R, Amoth P, Banda A, Anosike C, Masiye F, Onwujekwe O, Barasa E. Cost-Effectiveness and Budget Impact Analyses of Strategies to Improve Measles-containing Vaccine (MCV1 and MCV2) Coverage in Kenya. Nairobi, Kenya. 2026.

About the brief

This policy brief was developed under the Enhancing the Use of Economic Evidence in Vaccine Policymaking in Africa (EEE-VPM Africa) project, a collaboration between the Health Economics Research Unit (HERU) at the KEMRI-Wellcome Trust Research Programme, the University of Zambia, and the University of Nigeria. The research informing this brief was funded by the Wellcome Trust. For more information about this work, please see: Orangi S, Mandaliya P, Jalang'o R, Amoth P, Banda A, Anosike C, Masiye F, Onwujekwe O, Barasa E. (2026) Cost-effectiveness and budget impact analyses of strategies to improve measles vaccination coverage in Kenya. PLOS Global Public Health 6(9): e0006440. https://doi.org/10.1371/journal.pgph.0006440.

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Annex

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Baseline scenario						
Treatment costs	-	116,548	196,894	264,365	324,522	902,329
Vaccination costs	4,076,906	7,125,084	7,609,721	7,831,643	8,044,906	34,688,260
Total Net Costs	4,076,906	7,241,632	7,806,615	8,096,008	8,369,428	35,590,589
Scenario 1: Constant improvement						
Treatment costs	-	112,814	187,537	251,822	309,816	861,989
Vaccination costs	4,136,868	7,553,117	8,080,916	8,309,652	8,530,761	36,611,314
Total Net Costs	4,136,868	7,665,931	8,268,453	8,561,474	8,840,577	37,473,303
Net Budget Impact	**59,962**	**424,299**	**461,838**	**465,466**	**471,149**	**1,882,714**
Scenario 2: Intensified Investment						
Treatment costs		90,381	143,531	192,463	238,527	664,902
Vaccination costs	5,211,413	9,758,789	10,366,688	10,624,364	10,880,352	46,841,606
Total Net Costs	5,211,413	9,849,170	10,510,219	10,816,827	11,118,879	47,506,508
Net Budget Impact	**1,134,507**	**2,607,538**	**2,703,604**	**2,720,819**	**2,749,451**	**11,915,919**

Table 3: Budget impact analysis for the different measles vaccination coverage strategies (USD)

		Year 1	Year 2	Year 3	Year 4	Year 5
Health Expenditure (per capita)		84.96	89.21	93.67	98.35	103.27
Population		53,031,700	54,198,398	55,390,763	56,609,359	57,854,765
Standardised budget impact threshold	**Scenario1: Constant**	13 (0.0013%) (Low)	88 (0.0088%) (Moderate)	89(0.0089%) (Moderate)	84 (0.0084%) (Moderate)	79 (0.0079%) (Moderate)
	Scenario 2: Intensified investment	252(0.0252%)	539(0.0539%) (Very High)	521(0.0521%) (Very High)	489(0.0489%) (Very High)	460(0.0046%) (Very High)

Table 4: Standardised Budget Impact Threshold by vaccination strategy





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