Assessing the Cost-Effectiveness of Measles Elimination in Uganda: Local Impact of a Global Eradication Program

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Background. Measles control has succeeded worldwide, and many countries have substantially reduced incidence and mortality. This has led to consideration of the feasibility of measles elimination in Uganda within the context of global eradication. Before an elimination program is initiated, it is important to consider its potential economic impact, including its cost-effectiveness.

Methods. Incremental cost-effectiveness ratios (ICERs) were estimated for measles mortality reduction and measles elimination in Uganda. A dynamic age-structured compartmental model of measles transmission was used to simulate scenarios and estimate health outcomes and costs. The main outcome measures were costs, measles cases, measles deaths, disability-adjusted life-years (DALYs), and ICERs measured as cost per DALY averted through either the year 2030 or 2050.

Results. Measles elimination by 2020 averted 130,232 measles cases, 3520 measles deaths, and 106,330 DALYs through the year 2030, compared with the next best scenario (95% mortality reduction by 2015), and it was the most cost-effective strategy, with ICERs of $556 per DALY averted (2030 time horizon) and $284 per DALY averted (2050 time horizon).

Conclusions. Measles elimination in Uganda, as part of a global eradication program, is projected to be highly cost-effective and should be considered among the available policy options for dealing with the disease.

Measles is one of the most infectious and severe diseases of childhood and remains an important cause of morbidity and mortality in developing countries. In the year 2005, a goal of 90% reduction in measles mortality by 2010 (compared with 2000) was adopted globally and by the African World Health Organization Region including Uganda [1]. Between 2002 and 2006, Uganda implemented a multifaceted measles control strategy that included strengthening of the routine immunization (RI) program, performance of large-scale catch-up and follow-up supplementary immunization activities (SIAs), and establishment of a nationwide case-based laboratory-backed system of surveillance [2]. As a result, Uganda has achieved the 90% mortality reduction (MR) goal, and the annual incidence of suspected measles in Uganda decreased from 331 cases per 100,000 population in 2001 to a record low of 7 per 100,000 population in 2005; it increased again to 22 cases per 100,000 population in 2006—still, a 93% decline over levels in 2001 [2]. Measles incidence has remained low, and the country is likely to maintain the 90% MR goal.
Because of the success in reducing measles mortality globally, the World Health Organization (WHO) has raised the question of whether global measles eradication is feasible [3]. Eradication is defined as the worldwide interruption of measles transmission, whereas elimination is defined as the interruption of measles transmission in a defined geographical area. Eradication of measles may be feasible on biological grounds: Humans are its only host, infection causes characteristic and easily identifiable symptoms, infection provides lifelong immunity, and vaccination provides long-term immunity [4]. Five of the 6 WHO regions have already adopted regional measles elimination targets [3], and Southeast Asia is pursuing a MR goal in line with the global 90% MR goal [1]. As the feasibility of measles eradication is evaluated, the World Health Assembly has set a goal of 95% global MR by 2015 (compared with 2000) [3].

Despite their merits, local elimination and global eradication would be difficult and costly, requiring a substantial increase in RI coverage, investment in SIAs, and increased surveillance—all of which would most likely increase programmatic and overall costs, at least initially. The aim of this study is to assess the potential cost-effectiveness of measles elimination efforts in Uganda in the context of a global eradication target, assuming that all countries would be working concurrently toward elimination to achieve global eradication.

**METHODS**

**Immunization Scenarios**

The analysis compared 4 alternative measles control goals with the present target already achieved of 90% MR (Table 1). Hence, the scenarios considered were (1) baseline 90% MR by 2013 (although Uganda has already reached the target of 90% MR, the 2013 date was chosen, because the study was conducted in global context; globally, the 90% MR target was assumed to be reached by 2013), (2) 95% MR by 2015, (3) 98% MR by 2020, (4) elimination in 2020, and (5) elimination in 2025.

All MR scenarios started the simulation with MCV1 (the first routine dose of measles-containing vaccine) coverage of 68% for 9-month-olds, SIA coverage of 90% for 9–47-month-olds, and SIAs occurring every 3 years. Scenario 1 (baseline 90% MR) was simulated by maintaining the current level of coverage of MCV1 (68%) and SIAs (90%). This scenario assumed that the status quo would be maintained with no additional investments in measles elimination and no decrease in current levels of funding.

Scenario 2 (95% MR by 2015) represents the current World Health Assembly target for measles control and was simulated by gradually increasing MCV1 coverage to 83% starting in 2012, introducing MCV2 (second routine dose of measles-containing vaccine) for 18-month-olds in 2013, and increasing SIA coverage to 95% for 9–59-month-olds. In this scenario, coverage in 2015 was 82.8% for MCV1 (for 12-month-olds), 69.7% for MCV2 (18-month-olds), and 95% for SIAs (9–59-month-olds).

Scenario 3 (98% MR by 2020), which was included as an alternative to elimination—as an intermediate target in the event that elimination by 2020 is not cost-effective or is prohibitively costly—was simulated by gradually increasing MCV1 coverage to 83% starting in 2012, introducing MCV2 for 18-month-olds in 2013, and increasing SIA coverage to 95% for 9–59-month-olds. In this scenario, coverage in 2020 was 84.7% for MCV1 (for 12-month-olds), 76.3% for MCV2 (18-month-olds), and 95% for SIAs (9–59-month-olds).

Scenario 4 (elimination in 2020) was simulated by gradually increasing MCV1 coverage starting in 2012, introducing MCV2 for 18-month-olds in 2013, and increasing SIA coverage to 95% for 9–59-month-olds. In 2020, coverage was 84.7% for MCV1 (12-month-olds) and MCV2 coverage was 76.3% (18-month-olds).

Scenario 5 (elimination in 2025) was simulated by gradually increasing MCV1 coverage starting in 2012, introducing MCV2 for 18-month-olds in 2013, and increasing SIA coverage to 95% for 9–59-month-olds. In 2025, coverage was 85.3% for MCV1 (12-month-olds) and MCV2 coverage was 76.8% (18-month-olds). In both elimination scenarios (scenarios 4 and 5), it was assumed that the provision of MCV1 and MCV2 (once introduced) through routine immunization services would continue for the whole study period. Since this study was carried out in the context of a global eradication target, we assumed that SIAs would discontinue once elimination was certified (in Uganda and globally).

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**Table 1. Immunization Scenarios Assessed and Their Projected Outcomes**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>MCV1 coverage, %</th>
<th>MCV2 introduced</th>
<th>Target MCV2 coverage, %</th>
<th>SIA coverage, %</th>
<th>Outcome</th>
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<td></td>
<td>Baseline</td>
<td>Target</td>
<td></td>
<td>Baseline</td>
<td>Target</td>
</tr>
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<td>1</td>
<td>68</td>
<td>68</td>
<td>No</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>68</td>
<td>83</td>
<td>Yes</td>
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<td>5</td>
<td>68</td>
<td>85</td>
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<td>90</td>
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</table>
Modeling
A dynamic age-structured compartmental model of measles transmission was developed to estimate health outcomes by age and year for the different scenarios over 2 time horizons: up to the year 2030 and up to year 2050. The model, which has been described elsewhere [5], divided individuals into susceptible, exposed, infectious, and recovered/immune, as well as 5 age classes: <1 year, 1–2 years, 3–5 years, 6–15 years, and ≥16 years. Uganda was considered to have 10 districts (aggregated from a total of 80 districts on the basis of average RI [MCV-1] coverage during the period 2001–2008), and the model was applied to each district using parameters specific to the district. It was assumed that the different immunization scenarios would be implemented concurrently in countries neighboring Uganda and that there would be no measles cases imported from these countries. Parameters for the model were obtained from primary data collection in Uganda, the United Nations Population Projections [6], expert WHO opinion, and literature sources.

Costs were incorporated into the analysis by attaching a monetary value to resources used for each immunization and to savings from not treating measles cases. Estimates of model parameters and costs were obtained from primary data collection in Uganda and literature sources. The analysis was performed from a limited societal perspective [7] with all prices and improved efficiencies assumed to increase at the same rate, and future costs and health outcomes were discounted at 3% per year [8]. Costs were estimated in 2010 US dollars.

Scenarios were compared on the basis of projected measles incidence, costs, cases of measles averted, deaths averted, disability-adjusted life-years (DALYs) averted, and incremental cost-effectiveness ratios (ICERs) measured as costs per measles case averted, cost per death averted, and cost per DALY averted. A gross domestic product (GDP)-based approach has been used by various authors for judging cost-effectiveness, with thresholds ranging from 1 to 3 times GDP [9–11]. Uganda’s GDP per capita was $474 at the real exchange rate [12]. Therefore, scenarios were judged to be very cost-effective if the ICER, measured as cost per DALY, was <$474 per DALY (1 times per capita GDP) and cost-effective if the ICER was <$1423 per DALY (3 times per capita GDP) through either year 2030 or 2050.

Estimation of Costs
The cost of each scenario was estimated as the sum of the following costs over the time horizon of the analysis: (1) cost of measles immunization activities (MCV1, MCV2, and SIAs), including cost of measles surveillance and outbreak response; and (2) household costs of immunization. The cost savings from reduced measles treatment for cases averted were calculated by multiplying the average cost of treatment and subtracting from the sum. The costs per immunized child through RI and SIA increased on the basis of the new activities and inputs needed to achieve higher coverage as unvaccinated children become increasingly rare and expensive to reach at high coverage levels.

Because the Ugandan health care delivery system is decentralized, both central and district data were used to estimate the cost of RI. National level data were obtained from Uganda’s 2008 Comprehensive Multi-Year Plan (cMYP) and included costs of vaccines and injection supplies, cold chain storage at the central level, transport from central to district levels, monitoring, surveillance, personnel salaries, social mobilization, training, and capital costs.

Personnel costs were estimated by multiplying the average time spent on RI and SIAs obtained from the cMYP by annual salaries. Vaccine and injection supply costs were estimated by multiplying the number of children in the target population by RI and SIA wastage and coverage rates. The prices of vaccines and injection supplies were based on current UNICEF prices, and wastage rates were taken from country data reported in the cMYP. Shared costs for RI were allocated by assuming that 10% are for measles immunization. Transport and social mobilization costs were estimated by multiplying the value of the resources by the amounts required. For example, the number of liters of fuel used for transport of vaccines and other materials to districts was multiplied by the cost of 1 L of fuel in Uganda. Social mobilization costs were taken from the cMYP.

Monitoring and surveillance costs were estimated by multiplying the amounts required by the unit costs of refresher training for surveillance focal persons, regional surveillance review meetings, printing of surveillance tools, transport of specimens, specimen collection supplies, measles laboratory reagents and supplies, monitoring and supervision of case-based surveillance, and printing of surveillance tools. The annualized amortized value of capital goods required for measles eradication (eg, cold chain equipment, vehicles, and laboratory equipment) was estimated when these are purchased for measles elimination and/or eradication. Capital costs were included only if additional cold chain equipment, vehicles, and laboratory equipment would be purchased for measles eradication activities.

District level costs of RI were based on the findings of a primary survey using a structured questionnaire. A survey of program managers, cold chain officers, surveillance officers, and health workers at health centers in 4 districts was conducted to assess the level of their expenditures on immunization programs, including (1) transport of vaccines and injection supplies from the district level to health subdistricts and (2) maintenance and fuel for the cold chain. The districts were chosen to reflect the diversity of settings in Uganda: a “typical” district (Mbarara); a district with a poorly developed primary health care system (Mubende); a postconflict district (Lira); and a hard-to-reach, island district (Kalangala).

The costs of increasing RI coverage were estimated on the basis of an assessment by immunization officials of the
additional inputs required. A model was developed to estimate the costs required to increase coverage at different levels of coverage: 60%–80% and 80%–90%. The 6 types of inputs that were identified by immunization officials were (1) hiring of additional staff, (2) improvements in transport (eg, more trucks, motorcycles, and boats) and fuel, (3) improvements in cold chain equipment, (4) more social mobilization through increasing allowance to village health teams, and (5) improvements in surveillance (more training, better supervision, and increases in allowances for transport). The costs are assumed to increase moderately for each 1% of additional coverage at the 60%–80% coverage level and more rapidly at the 80%–90% level.

SIA costs were estimated using data on SIA expenditures from the WHO in Kampala. The data included expenditures from 2003, 2006, and 2009 campaigns. The cost components include vaccines and supplies, cold chain maintenance, fuel and equipment, transport, social mobilization, training, and supervision. The cost of increasing SIA coverage was based on the cost differentials of the 2006 and 2009 campaigns.

Costs of surveillance were estimated by using WHO data on resource requirements for training sessions and review meetings in 2008 and are combined with those of suspected case investigations and laboratory equipment contained in the cMYP. The cost per dose for each immunization given during outbreak response was assumed to be the same cost per dose as an SIA.

Data on household costs of obtaining immunizations were obtained from a survey of caretakers of children being immunized. Our team conducted, on average, 10 interviews with caretakers in 3 districts. The cost of treating a case of measles in Uganda was estimated on the basis of the Dayan et al 2004 study of treating measles in Zambia [13].

**Cost-Effectiveness Analysis**

The primary endpoint in the ICER analysis was the additional cost per DALY averted. Two related secondary endpoints are also reported: cost per case averted and cost per death averted. The 4 alternatives to the baseline scenario (of 90% MR by 2013) are each compared with the baseline and with each other, using efficiency frontier analysis. The efficiency frontier [14] is a line connecting each scenario plotted on the cost-effectiveness plane and allows the comparison of each scenario with the next best scenario. The economic feasibility of the ICER was assessed in relation to per capita GDP.

**Sensitivity Analysis**

A subset of transmission and cost parameters were assigned a range of plausible values, and sensitivity analyses were performed on key epidemiological and cost parameters to determine which of them had a substantial effect on estimates of costs or health outcomes.

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**RESULTS**

**Measles Incidence**

Figure 1 shows the trend in monthly incidence of measles for scenarios 1–3 (MR scenarios). Measles incidence remains at a relatively constant low rate in each of the 3 scenarios, and the model predicts 230,428 measles cases under scenario 1, 156,828 cases under scenario 2, and 70,657 cases under scenario 3 by 2030 (see Tables 2–5). Figure 2 shows the trend in monthly incidence of measles for scenarios 4 and 5 (elimination scenarios). The incidence of measles gradually declines as the elimination target dates are approached, and the model predicts 26,595 measles cases under scenario 4 and 35,287 cases under scenario 5 (see Tables 2–5).

**Measles Costs**

The average cost of a single RI dose was $1.83 at the central level and $0.52 at the district level. The average cost of a single SIA dose was $1.24. The cost per additional percentage of coverage for RI was $0.04 between 60% and 80% coverage and $0.08 between 80% and 90% coverage. The cost per additional percentage point increase in coverage for SIA was $0.01. The household time and transport cost of obtaining measles immunization was $0.58. The estimated average cost of treating a measles case was $6.

**Incremental Cost-Effectiveness Analysis**

The cost and health outcomes of each of the 4 scenarios are compared with the baseline scenarios for 2030 (Table 2) and...
2050 (Table 3). The results of an efficiency frontier analysis are shown for 2030 (Table 4) and 2050 (Table 5).

Scenario 1 was the least costly but led to the least favorable outcomes in both time horizons. In comparison with baseline, each of the 4 alternative scenarios would appear to have an “acceptable” ICER, by conventional standards. Scenario 4 had the most favorable ICER in both the 2030 ($1570 per DALY averted) and the 2050 time horizon ($804 per DALY averted). Scenario 2 had the least favorable ICER in the 2030 time horizon ($3587 per DALY averted), and scenario 3 had the least favorable ICER in the 2050 time horizon ($1368 per DALY averted).

In the efficiency frontier analysis, in both the 2030 and 2050 time horizons, scenarios 3 and 5 were more costly and led to less favorable outcomes than other scenario and were dominated. Using a GDP-based willingness-to-pay threshold, scenario 4 would be the optimal scenario for both the 2030 time horizon (ICER of $556 per DALY averted) and the 2050 time horizon (ICER of $284 per DALY averted).

Sensitivity Analysis
The model was sensitive to variations in the following parameters: (1) the probability of case importation from outside Uganda, which increased the ICER (obtained from the efficiency frontier analysis) by ≥108%; (2) case fatality rate, which changed the ICER by ≥98%; (3) the cost of treating measles, which changed the ICER by ≥73%; (4) the cost per percentage increase in RI coverage, which changed the ICER by ≤48%; and (5) the initial cost of RI, which changed the ICER estimates by ≤35%.

DISCUSSION
By integrating a transmission model into an economic evaluation, this study found that elimination by 2020 was the most cost-effective scenario, compared with other MR and elimination goals. In both time horizons, the ICER for elimination in 2020 was below the 3 times GDP per capita threshold of $1423. Sensitivity analyses suggested that the result was robust and consistent for both “optimization” and “independence” analyses.

In the independence analysis, we assumed that the baseline 90% MR was the comparator and that all other scenarios were potentially independent and the scenario with the lowest ICER was the best choice. This analysis would be useful to policy makers if there were a lack of funds and if hidden costs, such as the costs of synchronizing international eradication efforts, were important. In this case, policy makers would implement the program that most accurately reflected the prevailing (local) resource ceiling.

In the optimization analysis, we assumed that scenarios were mutually exclusive and estimated cost-effectiveness by eliminating

Table 2. Costs and Incremental Costs, Health Outcomes, and Cost-Effectiveness in Comparison With Baseline of Measles Immunization Scenarios in Uganda Through the Year 2030

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Cost, Cases</th>
<th>Deaths</th>
<th>DALYs</th>
<th>Incremental costs, Cases</th>
<th>Deaths</th>
<th>DALYs</th>
<th>ICER, $/case</th>
<th>ICER, $/death</th>
<th>ICER, $/DALY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>134,111,220</td>
<td>230,428</td>
<td>35,287</td>
<td>184,425</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Elimination 2020</td>
<td>385,094,242</td>
<td>26,595</td>
<td>805</td>
<td>24,619</td>
<td>250,983,022</td>
<td>203,832</td>
<td>34,481</td>
<td>159,806</td>
<td>1231</td>
</tr>
<tr>
<td>Elimination 2025</td>
<td>400,993,954</td>
<td>35,287</td>
<td>1097</td>
<td>33,847</td>
<td>266,822,734</td>
<td>195,141</td>
<td>34,189</td>
<td>150,577</td>
<td>1367</td>
</tr>
<tr>
<td>98% MR 2020</td>
<td>454,257,788</td>
<td>70,657</td>
<td>2337</td>
<td>73,443</td>
<td>320,146,567</td>
<td>159,770</td>
<td>32,949</td>
<td>110,982</td>
<td>2003</td>
</tr>
<tr>
<td>95% MR 2015</td>
<td>325,958,785</td>
<td>156,828</td>
<td>4325</td>
<td>130,949</td>
<td>191,847,564</td>
<td>73,600</td>
<td>30,961</td>
<td>53,476</td>
<td>2606</td>
</tr>
</tbody>
</table>

NOTE. Costs are in US dollars, year 2010 values. Scenarios were arranged by increasing ICER. DALY, disability-adjusted life year; ICER, incremental cost-effectiveness ratio; MR, mortality reduction; SIA, supplementary immunization activity.

Figure 2. Simulated monthly incidence of measles in Uganda under scenarios 4 and 5. MCV, measles-containing vaccine.
all dominated strategies and all strategies with ICERs above the chosen threshold. This technique resulted in a single optimum strategy chosen by moving up the list of ICERs on the efficiency frontier, implementing successively more effective scenarios until the GDP-based threshold was reached. The analysis would be useful to policy makers if the chosen threshold were acceptable, funds were available, and stakeholders were looking to maximize efficiency.

Achieving measles elimination would require increased RI coverage; introduction of MCV2, which is currently not administered in Uganda; well-timed and high-coverage SIAs; and improved surveillance. Our simulation estimates that these improved vaccination activities would be highly cost-effective investments.

Previous studies in Uganda have evaluated the costs per vaccinated child of routine measles immunization [2] and measles immunization campaigns [2, 15] and the effectiveness of measles vaccination among 5-year-old children [16]. We found no evaluations that combined cost and effectiveness in the same analytic framework or examined the potential efficiency of MR or elimination of measles.

The incremental cost-effectiveness of measles elimination compared favorably with a number of health interventions that have been evaluated for cost-effectiveness in Uganda, such as facility-based care for HIV ($1396 per quality-adjusted life-year [QALY]) [10]; group psychotherapy with reinforcement for depression ($1150 per QALY) [17]; and home-based antiretroviral therapy, compared with using septrin alone ($597 per DALY) [18]. Measles elimination was less favorable, however, when compared with some other interventions in Uganda, including vitamin A fortification of oil ($18 per DALY) or sugar ($82 per DALY) [19] and traffic enforcement ($27 per life-year saved) [20].

Our analysis has some limitations. Although elimination in 2020 was the most cost-effective, the analysis did not consider the probability of reintroduction of measles following elimination.

| Table 3. Costs and Incremental Costs, Health Outcomes, and Cost-Effectiveness in Comparison With Baseline of Measles Immunization Scenarios in Uganda Through the Year 2050 |
|---|---|---|---|---|---|---|---|---|
| Scenario | Cost, $ | Cases | Deaths | DALYs | Incremental costs, $ | Cases | Deaths | DALYs | ICER, $/case averted | ICER, $/death averted | ICER, $/DALY averted |
| Baseline | 228,702,222 | 413,112 | 10,531 | 523,234 | ... | ... | ... | ... | ... | ... | ... |
| Elimination 2020 | 629,688,565 | 26,595 | 805 | 24,619 | 400,986,342 | 386,516.52 | 9,725.89 | 498,615 | 1037 | 41,228 | 804 |
| Elimination 2025 | 650,433,859 | 27,733 | 1097 | 33,847 | 421,731,636 | 388,378.67 | 9,433.74 | 489,387 | 1094 | 44,704 | 861 |
| 95% MR 2015 | 577,918,530 | 244,168 | 6747 | 73,443 | 349,216,307 | 168,944.03 | 3,784.55 | 316,818 | 2067 | 92,274 | 1102 |
| 98% MR 2020 | 774,117,819 | 118,243 | 3922 | 124,775 | 545,415,596 | 294,868.29 | 6,609.48 | 398,458 | 1849 | 82,520 | 1368 |

**NOTE.** Costs are in US dollars, year 2010 values. Scenarios were arranged by increasing ICER. DALY, disability-adjusted life year; ICER, incremental cost-effectiveness ratio; MR, mortality reduction; SIA, supplementary immunization activity.

| Table 4. Costs and Incremental Costs, Health Outcomes, and Cost-Effectiveness of Measles Immunization Scenarios in Uganda Through the Year 2030 (Efficiency Frontier Analysis) |
|---|---|---|---|---|---|---|---|
| Scenario | Cost, $ | Cases | Deaths | DALYs | Incremental costs, $ | Cases | Deaths | DALYs | ICER, $/case averted | ICER, $/death averted | ICER, $/DALY averted |
| Baseline | 134,111,220 | 230,428 | 10,531 | 523,234 | ... | ... | ... | ... | ... | ... | ... |
| Elimination 2020 | 325,958,785 | 156,828 | 805 | 24,619 | 191,847,564 | 73,600 | 30,961 | 53,476 | 2,606 | 6196 | 3587 |
| Elimination 2025 | 385,094,242 | 26,595 | 805 | 24,619 | 59,135,457 | 130,949 | 3,784.55 | 106,330 | 454 | 16,798 | 804 |
| 95% MR 2015 | 577,918,530 | 244,168 | 6747 | 73,443 | 349,216,307 | 168,944.03 | 3,784.55 | 316,818 | 2067 | 92,274 | 1102 |
| 98% MR 2020 | 774,117,819 | 118,243 | 3922 | 124,775 | 545,415,596 | 294,868.29 | 6,609.48 | 398,458 | 1849 | 82,520 | 1368 |

**NOTE.** Costs are in US dollars, year 2010 values. Scenarios were arranged by increasing ICER. DALY, disability-adjusted life year; ICER, incremental cost-effectiveness ratio; MR, mortality reduction; SIA, supplementary immunization activity.

* The dominated scenario is both more costly and less effective than the dominating scenario.
Our analysis suggests that measles elimination would be cost-effective but would require substantial investments to increase RI coverage, provide MCV2, and maintain regular SIAs. However, successful elimination depends on a global effort that would curtail case importation, especially from neighboring countries. The decision to pursue elimination, therefore, must be considered with the support and collaboration of regional and international partners. These partnerships are particularly important in Uganda, because it is surrounded by relatively unstable countries with poorly developed public health systems. If Uganda were to unilaterally pursue elimination, the likelihood of case importation and failure would be substantial and would change its potential effectiveness and cost-effectiveness.

In summary, measles elimination would be a cost-effective policy option in Uganda in the context of wider regional and global efforts to eradicate the disease. Elimination will also depend on availability of funding, continued political stability and avoidance of armed conflict, favorable political will, and operational feasibility.

Funding

This work was supported by the World Health Organization.

Acknowledgments

We thank all the district health officials and the health workers who participated in the primary survey.

References


