

Cervical Cancer ACTION

Coalition to STOP Cervical Cancer

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ISSUE BRIEF

The Cost of Cervical Cancer Prevention in Low- and Lower-Middle-Income Countries

Cervical Cancer Action co-chair, the American Cancer Society, partnered with the Center for Decision Science, Harvard School of Public Health to use sophisticated computer models to estimate the cost and health impact of cervical cancer prevention in low- and lower-middle-income countries, including both HPV vaccination and screening and preventive treatment. This brief highlights sections of the report focusing on countries with per capita GDPs under US\$2,585. See the full report for details of the methods, assumptions, and limitations of the study, and for information about costs and impact in middle-income countries.¹

In all countries, the authors assumed two-dose HPV vaccination of girls aged ten years. They modeled an ideally performing vaccination program in which all targeted girls are reached and accept vaccination, and there is no dropout between doses and no catch-up outside of the cohorts. The model increases vaccination coverage to full scale over ten years. For screening-related costs, they included direct medical costs associated with screening and preventive treatment of precancerous lesions, scaling to full coverage in five years. The screening model transitions over time from using visual inspection with acetic acid (VIA) to

| | |
|---------------------------------------|-------------------------|
| Total cost of prevention | \$3.06b over 10 years |
| Protects | 160m girls & 165m women |
| Lives saved | 3.59m |
| DALYs averted | 21.7m |
| Cancer treatment costs averted | \$653M |

HPV-DNA-based primary screening. Health outcomes included cervical cancer cases, cervical cancer deaths, and disability-adjusted life years (DALYs) averted due to HPV vaccination, screening and preventive treatment over the lifetime for the 160 million girls receiving vaccine, and the 165 million women receiving screening in the decade 2015–2024.

¹ Campos NG, Sharma M, Clark A et al. Comprehensive Global Cervical Cancer Prevention—Costs and Benefits of Scaling up within a Decade. Center for

Decision Science, Harvard School of Public Health and the American Cancer Society, July 1, 2016. See download link in the Resources section (last page).

Costs and impact

The model estimates that fully scaling HPV vaccination for all girls and screening and preventive treatment for all women aged 30 to 49 years in low- and lower-middle income countries will cost \$3.06 billion over ten years (Table 1). Annual costs increase over time as the programs scale up from about \$60 million in 2015 to \$550 million in 2024.

The cost per girl reached with vaccination is \$14.13 (cost of vaccine plus delivery). In all countries, the vaccine cost was assumed to be the price that Gavi, The Vaccine Alliance pays— \$4.55 per dose. The cost per girl for vaccination is slightly higher in less poor, lower-middle-income (LMI) countries due to higher service delivery cost.

The cost per woman reached with screening is \$8.36. Screening costs are about double in lower-middle-income countries compared to low-income countries due to both higher service delivery costs and more use of HPV testing.

Overall, VIA accounts for 31 percent of total screening program costs.

Approximately 11 percent of program costs are offset by averted cancer treatment costs in low-income settings. In low-middle-income settings up to GDP \$2585 per capita, where access to cancer treatment is higher, approximately 26 percent of the program costs are offset.

Vaccination will prevent 2.36 million cervical cancer deaths over the lifetimes of the 160 million girls in the vaccinated cohorts.

Screening will prevent 1.23 million cervical cancer deaths over the lifetimes of the 164 million women screened during the intervention decade.

The *net* cost per disability-adjusted life year (DALY) averted is \$170 for vaccination and \$70 for screening.

See Table 1 for details.

Table 1. Cost, outcomes, and cost effectiveness in low-income and lower-middle-income countries.

| | Program cost (millions) | Number reached (millions) | Deaths averted (1000s) | DALYs averted (millions) | CCTx cost averted (millions) | Net cost (millions) | Program cost per girl/woman reached* | Program cost per death averted* | Net cost per DALY averted |
|------------------|-------------------------|---------------------------|------------------------|--------------------------|------------------------------|---------------------|--------------------------------------|---------------------------------|---------------------------|
| Vaccine | | | | | | | | | |
| LI | \$629 | 61 | 1,256 | 5.0 | \$23 | \$605 | \$12.25 | \$598 | \$122 |
| LMI | \$1,272 | 99 | 1,099 | 4.7 | \$183 | \$1,089 | \$15.29 | \$1,379 | \$222 |
| Total | \$1,901 | 160 | 2,355 | 9.7 | \$207 | \$1,694 | \$14.13 | \$962 | \$170 |
| | | | | | | | | | |
| Screening | | | | | | | | | |
| LI | \$369 | 74 | 395 | 3.9 | \$83 | \$286 | \$5.71 | \$1,063 | \$66 |
| LMI | \$792 | 91 | 836 | 8.1 | \$363 | \$429 | \$10.52 | \$1,139 | \$71 |
| Total | \$1,161 | 165 | 1,231 | 12.0 | \$446 | \$715 | \$8.36 | \$1,115 | \$70 |
| | | | | | | | | | |
| Combined | | | | | | | | | |
| LI | \$997 | 135 | 1,651 | 8.9 | \$107 | \$891 | \$8.68 | \$709 | \$100 |
| LMI | \$2,064 | 190 | 1,935 | 12.8 | \$546 | \$1,518 | \$13.01 | \$1,276 | \$119 |
| Total | \$3,062 | 325 | 3,586 | 21.7 | \$653 | \$2,409 | \$11.21 | \$1,015 | \$111 |

Low income (LI) = GNI pc < \$1045, Lower-middle income (LMI) = GNI pc \$1046 - \$2585, CCTx = treatment of invasive cervical cancer, DALY = disability-adjusted life year

* The Program Cost per Girl/Woman Reached and Program Cost per Death Averted figures were derived from undiscounted program costs (not shown) to be consistent with the undiscounted denominator.

In addition to the global numbers presented above, the Harvard team also created cost estimates for specific interventions:

| HPV vaccination | Cost (USD)^a | Deaths prevented^b | DALYs averted^c |
|---|-----------------------------------|---|--------------------------------------|
| 1. Service delivery costs for vaccinating one million young adolescent girls in a country receiving HPV vaccine from Gavi (two-dose regimen, service delivery costs only, no GAVI co-pay included). | \$5m | NA | NA |
| 2. Purchase vaccine doses for one million young adolescent girls in a middle-income country (two-dose regimen, vaccine only). | \$27m | NA | NA |
| 3. Vaccinate all young adolescent girls in the five highest-burden low- and lower-middle-income countries (Gavi countries, two-dose regimen, vaccine plus service delivery). | \$24m/yr | 66,000 | 355,000 |
| 4. Vaccinate all young adolescent girls in the 21 highest-burden countries in Africa (two-dose regimen, vaccine plus service delivery, 19 Gavi countries, 2 non-Gavi countries). | \$167m/yr | 148,000 | 798,000 |
| Screening and preventive treatment | Cost (USD)^a | Deaths prevented^b | DALYs averted^c |
| 5. Screen and treat one million women aged 30–49 years in a sub-Saharan African country using VIA and cryotherapy. | \$9.2m | 6800 | 64,000 |
| 6. Screen and treat one million women aged 30–49 years in India using HPV DNA testing and cryotherapy. | \$11m | 9500 | 93,500 |
| 7. Screen and treat one million women aged 30–49 years in a sub-Saharan African country using HPV DNA testing and cryotherapy. | \$16.8m | 15,100 | 132,000 |
| 8. Screen and treat one million women aged 30–49 years in a Latin American country using HPV DNA testing and cryotherapy. | \$33m | 7500 | 69,750 |
| 9. Screen and treat one million women aged 30–49 years in the 21 highest-burden African countries using HPV DNA testing and cryotherapy in one year. | \$16.6m | 15,900 | 138,800 |

a undiscounted *program* costs do not account for cancer treatment costs averted by prevention.

b over the lifetime of women reached by prevention program.

c over the lifetime of women reached by prevention program, discounted at 3% per annum.

Conclusion

While \$3.06 billion over ten years is a lot of money, in the global scheme of things it is affordable and a net cost of \$111 per DALY averted represents good value. Without investment at this scale, and soon, millions of women—wives, mothers, and grandmothers—will be lost to an eminently preventable disease, along with the resultant loss of social support, economic contributions, and productivity. Cervical Cancer Action feels strongly that these investments must be made for many reasons: family cohesion and healthy outcomes for children, gender equity, and global equity.

It is the right thing to do, and now is the time to do it.

Resources

- 1) **Comprehensive Global Cervical Cancer Prevention—Costs and Benefits of Scaling up within a Decade** (Harvard School of Public Health and the American Cancer Society)
<https://www.cancer.org/content/dam/cancer-org/cancer-control/en/reports/the-cost-of-cervical-cancer-prevention.pdf>
- 2) **RHO Cervical Cancer Library** (PATH)
www.rho.org
- 3) **Comprehensive Cervical Cancer Control: A Guide to Essential Practice** (2nd Edition—WHO)
www.who.int/reproductivehealth/publications/cancers/cervical-cancer-guide/en/index.html
- 4) **CCA maps showing progress in prevention worldwide**
cervicalcanceraction.org/comments/maps.php

Cervical Cancer Action

Cervical Cancer Action: A Global Coalition to Stop Cervical Cancer (CCA) was founded in 2007 to expedite the global availability, affordability, and accessibility of new and improved cervical cancer prevention technologies to women in developing countries.

Web: www.cervicalcanceraction.org
Contact CCA: info@cervicalcanceraction.org

This issue brief was written by Scott Wittet (PATH) and was proofread by Ashley Morganstern.