

# The Cost-Effectiveness of HIV Prevention In Developing Countries

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There is overwhelming evidence that HIV prevention strategies can reduce the incidence of new infections and be cost-effective in developing countries. Key findings about the cost-effectiveness of HIV prevention include:

- The benefit of prevention is highest if programs are introduced when HIV prevalence is still low.
- Prevention is most cost-effective when targeted to high-risk groups.
- Seven key strategies have been found to be highly cost-effective: condom promotion, STD control, voluntary counseling & testing, female condom promotion, injection drug user interventions, screening the blood supply, and antiretroviral drugs to prevent mother-to-child transmission.
- These steps range in cost-effectiveness from actually saving funds to costing US\$19 per disability-adjusted life year, or US\$506 per HIV infection averted.

No matter what new resources are brought to bear to fight the global AIDS epidemic, little gain will be realized if they are used inefficiently. It is imperative that funds be spent for interventions that prevent the most infections per dollar spent.<sup>1</sup>

## When is an intervention cost-effective?

The “cost-effectiveness ratio” is the ratio of program costs to health-related outcomes such as lives saved, life-years saved, or cases of HIV prevented. One measure of health benefits is the Disability-Adjusted Life Year or “DALY.” DALYs are weighted to reflect quality of life and economic productivity.

## What do we know about the cost-effectiveness of HIV prevention?

While data have not been gathered on all potential interventions, the follow HIV prevention approaches have been found to be cost-effective in resource-poor countries:

### *Commercial sex worker interventions*

Due to high rates of partner change and infection with STDs, commercial sex workers (CSWs) should receive high priority for HIV prevention. Peer education programs have been shown to be highly effective in reducing transmission from and to CSWs.<sup>2,3</sup> A 1991 analysis of 1,000 CSWs in Nairobi found that a

program of STD control and condom promotion was able to prevent between 8,000 – 10,000 new cases of HIV infection per year.<sup>4</sup> Due to modest cost, the program averted each new HIV infection for only \$8 - US\$12.

### *Sexually transmitted disease control*

Sexually transmitted diseases (STDs) significantly amplify risk of HIV transmission.<sup>5</sup> A study of STD services in Tanzania demonstrated a statistically significant effect in lowering HIV incidence.<sup>6</sup> The intervention costs were US\$350 per HIV infection averted or US\$13 per DALY gained.

### *Voluntary HIV counseling and testing*

The most definitive study on voluntary HIV counseling and testing (VCT) came in a trial in Tanzania and Kenya.<sup>7</sup> The study examined changes in cost-effectiveness according to HIV prevalence of the client population and the proportion of clients enrolled as couples and individuals. The cost per HIV infection averted was US\$249 and \$346 in Kenya and Tanzania respectively, and the cost per DALY was \$13 and \$18. The intervention was most cost-effective for HIV-infected people and couples.

### *Male condom promotion*

Many studies have demonstrated that male condom promotion reduces the frequency of risky sex and HIV in high-risk populations.<sup>2,3</sup> While no published studies consider it as a stand-alone intervention, male condom promotion is an adjunct to a cost-effective package of services including peer education and STD control.<sup>4</sup>

### *Female condom promotion*

A recent study analyzed cost-effectiveness of female condoms if supplied to a hypothetical cohort of 1,000 commercial sex workers (CSWs) in South Africa.<sup>8</sup> The study found that this program would generate net savings to the public sector of US\$9,163 or about US\$9 per CSW served. A program focusing on non-CSWs with only one casual partner would also save money.

### *Improving blood supply safety*

The cost-effectiveness of blood supply safety programs is highly dependent on HIV prevalence in the service area. A 1995 study found a cost of US\$172 per HIV infection averted through screening the blood supply, indicating that these interventions can be very cost-effective.<sup>9</sup>

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### ***Prevention of mother-to-child transmission***

Recent analysis of mother-to-child HIV transmission (MTCT) prevention in a hypothetical population of 20,000 pregnant women in a working class urban South African population<sup>10</sup> examined four different formula feeding interventions, three anti-retroviral (ARV) regimens and a combined ARV plus formula feeding intervention. The study concluded that ‘short course’ ARV interventions are cost-effective with or without formula feeding. In fact, the so-called ‘CDC’ zidovudine (AZT) regimen with formula recommended (but not provided free of charge) would be cost-saving.

A regimen consisting of a single dose of nevirapine to the mother at onset of labor and to the child within 72 hours of birth costs just US\$4 per mother-child pair, far lower than other regimens.<sup>11</sup> Because dosing is administered so late in pregnancy, it is easier than alternatives requiring prenatal care.

### ***Intervening with injection drug users***

A number of studies, mostly from the United States, have demonstrated that various strategies to reduce the spread of HIV among IDUs are cost-effective. A study in Belarus found a comprehensive program including needle exchange, safe sex counseling, condom promotion, bleach and STD program referrals averted HIV infections for about US\$68.<sup>12</sup>

### **Political commitment to comprehensive strategy**

A comprehensive approach that includes prevention, treatment and research is urgently needed in the global response to HIV/AIDS. Yet despite the wealth of empirical evidence on the cost-effectiveness of HIV prevention interventions, current funding is approximately \$0.8 billion, though it is estimated by UNAIDS that \$4.8 billion is needed annually.<sup>13</sup> Political will to use and fund evidence-based approaches to prevention is key to reducing the incidence of new HIV infections.

### **ENDNOTES**

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- <sup>3</sup> Laga, M., M. Alary, et al. (1994). “Condom promotion, sexually transmitted diseases treatment, and declining incidence of HIV-1 infection in female Zairian sex workers.” *Lancet* **344**(8917): 246-8.
- <sup>4</sup> Moses, S., F. A. Plummer, et al. (1991). “Controlling HIV in Africa: effectiveness and cost of an intervention in a high-frequency STD transmitter core group.” *AIDS* **5**(4): 407-11.
- <sup>5</sup> Grosskurth, H., F. Mosha, et al. (1995). “Impact of improved treatment of sexually transmitted diseases on HIV infection in rural Tanzania: randomised controlled trial.” *Lancet* **346**(8974): 530-6.
- <sup>6</sup> Hayes, R., M. Wawer, et al. (1997). “Randomised trials of STD treatment for HIV prevention: report of an international workshop. HIV/STD Trials Workshop Group [see comments].” *Genitourinary Medicine* **73**(6): 432-43.
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- <sup>8</sup> Marseille, E., J. G. Kahn, et al. (2001). “Cost-effectiveness of the female condom in preventing HIV and STDs in commercial sex workers in rural South Africa.[In Process Citation].” *Soc Sci Med* **52**(1): 135-48.
- <sup>9</sup> European Commission (1995). *Safe Blood in Developing Countries: The Lesson from Uganda*. R. Winsbury. Luxembourg, Office for Official Publications of the European Commission.
- <sup>10</sup> Soderlund, N., K. Zwi, et al. (1999). “Prevention of vertical transmission of HIV: analysis of cost effectiveness of options available in South Africa [see comments].” *BMJ* **318**(7199): 1650-6.
- <sup>11</sup> Guay, L. A., P. Musoke, et al. (1999). “Intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: HIVNET 012 randomised trial.” *Lancet* **354**(9181): 795-802.
- <sup>12</sup> Kumaranayake L., Watts C., et al. (2000). *The cost-effectiveness of HIV preventive measures among injecting drug users in Svetlogorsk, Belarus : Draft*. Geneva, UNAIDS.
- <sup>13</sup> UNAIDS, “Calculating The Cost Of An Effective Global Campaign Against HIV/AIDS,” UNAIDS, June 2001