

# THE COSTS AND BENEFITS OF PREVENTING AND TREATING HIV/AIDS

*A Treatment Action Campaign Fact Sheet (updated: 5 February 2003)*

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## 1. Introduction

*The Treatment Action Campaign (TAC) commissioned the Centre for Actuarial Research (CARE) to investigate the effect of various treatment and prevention interventions on the HIV epidemic. This fact sheet describes the results of CARE's research and a further financial analysis conducted by Centre for Social Science Research (CSSR). Both CARE and CSSR are based at the University of Cape Town.*

Modelling the future is an inexact science. However, the results presented here are based on the best available information. Furthermore, the modelling work done by CARE is the most comprehensive analysis yet done of the future of the South African HIV epidemic. Given the urgency of the situation, it is essential that action is taken on the basis of this research.

*Dozens of people have assisted with this work. The TAC is grateful for their efforts.*

## 2. Key findings

- By implementing voluntary counselling and testing, mother-to-child transmission prevention, improved management of sexually transmitted infections and highly active antiretroviral therapy, nearly 3 million AIDS deaths can be averted and over 2.5 million HIV infections can be prevented by 2015.
- The cost of Highly Active Antiretroviral Therapy (HAART) for adults gradually increases from R224 million in 2002 to R6.8 billion in 2007 to a peak of R18.1 billion in 2015. These amounts include personnel and monitoring costs. It is assumed that current lowest-priced generic medicines that have been proven equivalent to patented brand-name drugs are available for use. With a realistic price reduction in antiretroviral medicines to R300 per month for a first-line regimen and R450 per month for a second-line regimen, the cost of Adult HAART can be reduced to R14.1 billion in 2015.
- Adult HAART is the most expensive of the health interventions modelled but has the most significant effect on life-expectancy and AIDS deaths.

## 3. Definitions of key concepts used in this fact sheet

**Intervention:** *A health service, e.g. mother-to-child transmission prevention.*

**Scenario:** *Combinations of interventions applied to the health services.*

**Phase-in:** *In this fact sheet, a measure of the percentage of people who have access to an intervention in the public health sector.*

**Opportunistic Infection:** *HIV weakens the human body's immune system, thereby exposing infected people to diseases known as opportunistic infections.*

**CD4 Count:** *Measure of the strength of the human body's immune system. Most HIV-negative people have CD4 counts above 800. A count below 200 renders a person highly susceptible to opportunistic infections.*

**Highly Active Antiretroviral Therapy (HAART):** *Three or more medicines used to treat someone with HIV/AIDS.*

**First-line and Second-line Regimens:** *Patients frequently have to change their HAART regimens after a period of time. Refers to whether they are on their first or second regimen.*

**Acyclovir:** *Medicine used to treat Herpes, a common sexually transmitted infection that increases the risk of an infected person and his or her sexual partners of contracting HIV.*

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#### 4. Description of interventions modelled

CARE have modelled four different interventions phased in over a number of years. No intervention is phased in beyond 90%. These interventions have been combined under three key scenarios.

**VCT:** Voluntary counselling and testing – counselling offered before and after HIV testing. Counselling on safer sex is included.

**MTCTP:** Mother-to-child transmission prevention of HIV – short-course Nevirapine (HIVNET 012) implementation, including use of formula milk by 50% of women.

**STI:** Improved management of sexually transmitted infections – syndromic management guidelines become the norm in the private sector, acyclovir used to treat herpes, drug shortages at public STI clinics eliminated, usage of acyclovir increases in public sector and among private practitioners, other drug shortages eliminated at STI clinics.

**HAART:** Highly Active Antiretroviral Therapy – adults CD4 count less than 200 are treated with antiretroviral therapy, children with CD4 count below 15% or in CDC stage C are treated with antiretroviral therapy.

Three scenarios have been modelled: scenario one consists of only treatment of opportunistic infections, scenario two consists of treatment of opportunistic infections (OIs) and the prevention interventions and scenario three consists of all the interventions in scenario two and HAART. Each intervention is phased in over a number of years. The following tables summarise this.

	VCT	MTCTP	STI	HAART
Scenario one (OIs only)	No	No	No	No
Scenario two (Prevention and OIs)	Yes	Yes	Yes	No
Scenario three (Treatment and prevention)	Yes	Yes	Yes	Yes

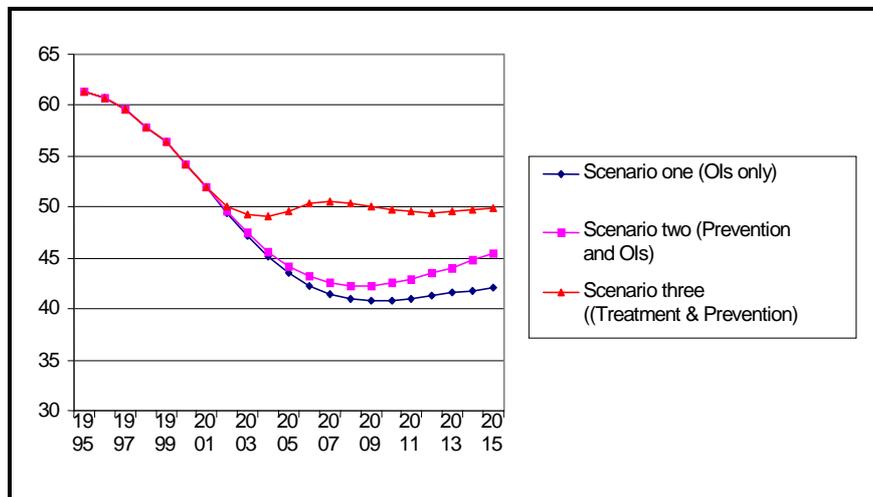
**Table 1: Interventions modelled in three scenarios**

Intervention	2001	2002	2003	2004	2005	2006
MTCTP	10%	30%	50%	70%	85%	90%
All other interventions	0%	20%	40%	60%	80%	90%

**Table 2: Rates at which interventions are phased in as of the end of each year.**

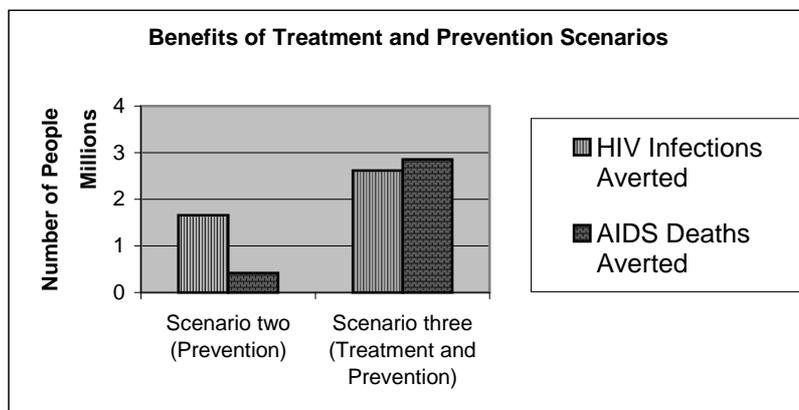
## 5. Benefits of the Prevention and Treatment Scenarios

The benefits of scenario two and three are demonstrated below in figures and tables showing *life-expectancy*, *number of new HIV infections averted*, *number of AIDS deaths averted* and *reduced number of orphans*. If only OIs are treated (i.e. scenario one), by 2015 a cumulative total of 15.5 million HIV infections will have occurred since 1985. Of these 15.5 million people, 9.3 million will have died. Life-expectancy will drop to just above 40. The tables below demonstrate that scenarios two and three can significantly improve these figures.



The numbers on the left show age. The numbers on the bottom show the year. The three lines show how long the average South African will live in a particular year. For example, in scenario one the average South African lives to just above 40 in 2009. But in scenario three (treatment and prevention) the average South African lives until about 50.

Figure 1: Life-expectancy under the three scenarios (from Johnson and Dorrington, 2002)



This graph shows that between July 2002 and June 2015, scenario two (prevention) will reduce HIV infections by over 1.5 million. It will reduce AIDS deaths by less than 500,000. Scenario three (treatment and prevention) reduces the number of infections and AIDS deaths by over 2.5 million each.

Figure 2: HIV infections and AIDS deaths averted, July 2002 to June 2015 (from Johnson and Dorrington, 2002)

### Reduction in Orphans

By 2015, if only scenario one is implemented, the epidemic will produce nearly 3 million maternal orphans under the age of 18. By implementing scenario three (treatment and prevention), this number can be reduced by approximately 700,000. Scenario two (prevention only) actually results in slightly more orphans than scenario one. Furthermore the number of double-orphans (children under 18 who have lost both parents) is reduced (in 2015) from approximately 2 million in scenario one to approximately 1 million if VCT and HAART are implemented (Johnson and Dorrington, 2002).

## 6. How much will it cost?

CSSR has used the results of CARE’s analysis to calculate the direct financial cost of each intervention. HAART for adults is the intervention which gives the most benefits, but it is also the most expensive. The cost of HAART peaks in 2015, when over 2.3 million adults receive HAART (excluding medical schemes, which accounts for about 220,000 people on HAART in 2015). For the cost of HAART for adults, current prices of generic antiretroviral medicines from around the world, that have been proven equivalent to their brand-name counterparts, were taken into account.

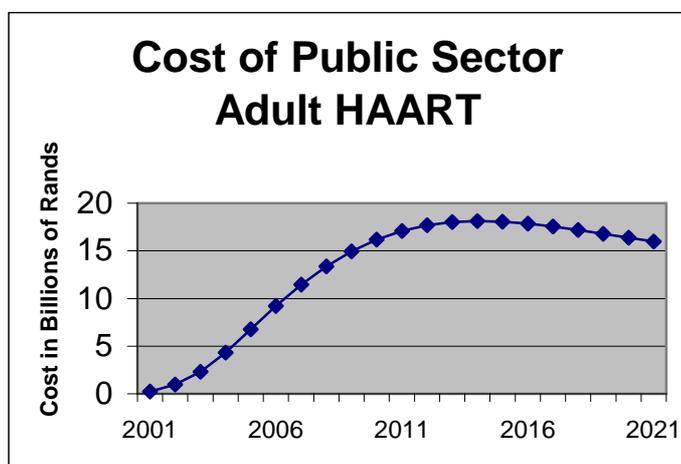
	2010		2015 (most expensive year)	
	Scenario two (Prevention)	Scenario three (Treatment and Prevention)	Scenario two (Prevention)	Scenario three (Treatment and Prevention)
VCT	21 million	17 million	16 million	13 million
MTCTP	121 million	121 million	111 million	108 million
STI	78 million	90 million	53 million	69 million
Adult HAART	Zero	15 billion	Zero	18.2 billion
Child HAART	Zero	1.5 billion	Zero	1.5 billion

**Table 3: Cost of treatment and prevention strategies for 2010 and 2015 for the non-medical scheme population (prices in Rands)**

Note that because the implementation of the interventions are phased in (up to 90%), there is a not a sudden colossal impact on the health budget. The table below demonstrates that by gradually implementing HAART, there is adequate time to prepare for large budgetary increases (best current generic prices assumed):

Year ending in June	2003	2004	2005	2006	2007
Phase-in	20%	40%	60%	80%	90%
Adult HAART	226 million	966 million	2.3 billion	4.3 billion	6.8 billion

**Table 4: Phasing in Adult HAART (monetary amounts in Rands)**



**Figure 3: Cost of treating adults with HAART in the public sector**

## Cost of Public Education, Infrastructure and Condoms

A number of other costs were examined. For the scenario two and three interventions to be successful, public education programmes will have to be instituted and the health care infrastructure will have to be improved. While accurate estimates of this have been made for MTCTP, much more research is needed to make similarly accurate estimates for the other interventions. The cost of increased condom and fermidom distribution was also estimated.

We calculate that these three costs, once fully phased in, should not exceed R370 million per year. Most of this is on public education.

## Financial Savings Due to Treatment

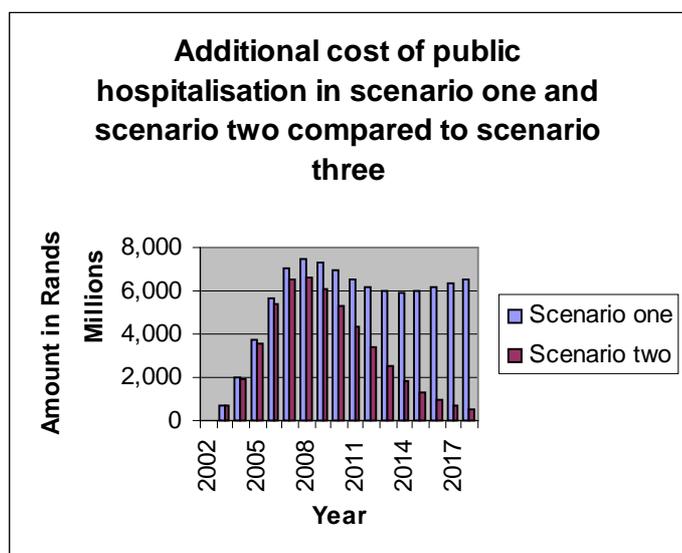
The direct financial cost of treatment is extremely high, more than 70% of the current health budget. However, there are direct and indirect savings to the state incurred by treatment. Indirect savings are difficult to measure, but they are just as important as direct savings. Indirect savings include (a) savings to the economy through reduced sick leave and employee replacement costs, (b) preservation of human capital (such as nurses, teachers and educated high school students) and (c) reduction in social disruption (e.g. due to fewer orphans). The main direct savings to the state are:

- *Reduced Hospitalisation Costs*
- *Reduced Grants and Expenditure for Orphans*

Both of these are large but difficult to calculate. **Only the savings on hospitalisation costs for people with HIV/AIDS have been investigated in this research.** This analysis also demonstrates that high levels of rationing are occurring in the public health sector and will get substantially worse as the epidemic progresses.

**Rationing:** It is Government policy that the public health sector is obliged to treat opportunistic infections of people with HIV. However, it has too little funding and capacity to adequately treat all these cases. Many people are not treated in hospitals and clinics when they should be. Failing to treat cases of illness that are supposed to be treated is known as rationing.

Assuming no rationing occurs in the public sector, Figure 4 shows the large savings that would occur in scenario two, but especially in scenario three. However, the CSSR analysis also demonstrates that the current health budget (approximately R30 billion per year) is much too small to deal with the demand in the public sector health system. Therefore significant rationing must be taking place. This confirms the personal experiences of many patients, nurses and doctors involved in the public health care sector.



**Figure 4: Additional expenditure in hospitalisation costs in scenarios one and two over scenario three**

## Cost of Drugs

The price of drugs is the largest component in the cost of HAART. The table below shows the cost of the Adult HAART programme in 2015 under three different pricing options.

	Cost of HAART per adult per year (cost of drugs in brackets)	Total cost of adult HAART in 2015
Best patented drug offers	<b>10,654 (9,190)</b>	<b>24.6 Billion</b>
Best current generic prices	<b>7,877 (6,413)</b>	<b>18.2 Billion</b>
Possible future prices: R300 for 1 <sup>st</sup> line, R450 2 <sup>nd</sup> line	<b>6,381 (4,917)</b>	<b>14.7 Billion</b>

**Table 5: Cost of Adult HAART under three different pricing options (prices in Rands)**

### **7. How can adequate treatment and prevention be financed?**

An adequate response to HIV/AIDS incorporating both treatment and prevention interventions will be expensive. How can it be financed?

The per capita health budget has decreased in real terms since 1994. This is untenable given the seriousness of the HIV epidemic. No matter what policy choices are made, a substantial increase in per capita health spending will be necessary if the public health sector is to meet its legal obligations.

*It is important to note that the cost of starting the programme can easily be afforded without a substantial budgetary increase. The cost of the programme that CSSR has calculated at the peak of the programme in 2015, R18.2 billion for adult HAART, makes the pessimistic assumption that generic medicine prices will not come down any further. However, with improvements in technology and further pressure on pharmaceutical companies, both generic and brand-name ones, the cost of treatment should come down substantially.*

As a starting point for discussion, the TAC proposes that to meet the additional costs needed for the implementation of scenario three:

- 50% is covered through increases to the health budget
- 20% is covered through the Global Fund for HIV/AIDS Malaria and Tuberculosis
- 15% is covered through large employers covering HAART benefits for their employees
- 10% is covered by increased medical scheme coverage of people with HIV/AIDS
- 5% is covered by people with HIV/AIDS through a scale of benefits mechanism in the public sector

*Note: It must be emphasised that these percentages are merely a starting point for discussion. Further research will be needed to determine realistic and equitable percentages.*

## **8. What research is still needed?**

Much research is still needed to get a more accurate understanding of the different scenarios. Here are some areas for future research:

- The savings in state expenditure on orphans that occur under scenario three (treatment and prevention) need to be estimated.
- A detailed analysis of the effect of scenarios two and three interventions on opportunistic infections (especially Tuberculosis) and hospitalisation, as well as a more detailed examination of costs, needs to be done.
- Long-term MTCTP interventions will be more beneficial than the short-course Nevirapine intervention modelled here. They are also likely to be cost-saving.
- The costs and benefits of home-based care need to be integrated into the model.
- Methods for financing the interventions need to be examined.
- Post-exposure prophylaxis for rape and occupational exposure are very difficult to model, but might have a noticeable impact on the epidemic.
- The modelling and costing of all the interventions needs to be improved as new information becomes available.
- The effect of the different scenarios on human capital (e.g. nursing and teaching professions) needs to be determined.

## **9. Key Conclusions**

- The implementation of a comprehensive HIV/AIDS treatment and prevention plan is critical to alleviate immense suffering.
- Allowing the epidemic to run its course will be extremely expensive (because the state is legally obliged to treat opportunistic infections) and will result in immense suffering.
- Prevention interventions will save the state money and reduce the number of new HIV infections. However, implemented without treatment, they will have only a small effect on reducing AIDS deaths in the short-term (i.e. up to 2015).
- Treatment interventions that complement prevention will ensure that South Africans live much longer on average and massively reduce the number of people who die of AIDS and new HIV infections. It will also substantially reduce the number of orphans produced by the epidemic.
- A programme that includes treatment will cost a lot of money, but the social benefits will far outweigh the costs. The financial cost of treatment must be measured against the direct and indirect financial savings that will be incurred, which are substantial.
- Treatment and prevention are both essential for alleviating much of the suffering brought by the HIV epidemic. They should not be separated.
- Better management of sexually transmitted infections (STIs) will reduce the number of new HIV infections as well as the number of new STI incidents and save the state money.
- The price of drugs is the largest component in the cost of treatment. Voluntary or compulsory licenses for the production and importation of generic medicines will be crucial for reducing the cost of HAART.
- Per capita spending on public health must be substantially increased.