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Care and Treatment to Extend the Working Lives of HIV-Positive Employees: Calculating the Benefits to Business

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Abstract

Although HIV infection rates in South Africa have been high and rising for nearly a decade, the epidemic of HIV/AIDS-related morbidity and mortality is just beginning. As South African adults start to sicken and die, concern is mounting about the potential costs to companies of HIV/AIDS among employees. When a business recognizes the threat posed by HIV among employees, it can pursue three basic response strategies for mitigating short- and long-term financial consequences: (1) try to prevent new infections; (2) avoid or reduce the costs associated with existing and future infections; and (3) provide treatment and support for infected employees to extend their productive working lives and thus postpone the costs of infection. This paper assesses the potential benefits to South African businesses of the third strategy. We describe an approach and methodology for analyzing the benefits of interventions that extend the working life of employees and demonstrate such an analysis using published data on the costs of HIV/AIDS to companies. The analysis indicates that the benefits to companies of investments in treatment and care are likely to exceed the costs for some existing interventions. Further work is needed to identify effective and affordable interventions, assess the benefits to companies of implementing the interventions, and bring these benefits to the attention of business and government leaders.

Introduction

Although HIV infection rates in South Africa have been high and rising for nearly a decade, the epidemic of HIV/AIDS-related morbidity and mortality is just beginning. As South African adults start to sicken and die, concern is mounting among business managers, shareholders, and benefit providers about the potential costs to companies of HIV/AIDS among employees. These costs range from readily measurable impacts on employee benefits, absenteeism, and recruiting and training needs to much more difficult to estimate effects on individual and work unit productivity, morale, and discipline. Although there is a dearth of reliable information about the true costs of HIV/AIDS to firms—Michael (1999/2000) cites South African press reports of employee productivity losses ranging from 2 to 50 percent—it is evident that the epidemic will impose serious hardships on some businesses in most, if not all, sectors of the economy.

When a company recognizes the threat posed by HIV among employees, it can pursue three basic response strategies for mitigating short- and long-term financial consequences. It can (1) try to prevent new infections; (2) avoid or reduce the costs associated with existing and future infections; and (3) provide treatment and support for infected employees to extend their productive working lives and thus postpone the costs of infection (Simon et al. 2000). A good deal of effort is being invested by researchers, business managers, and consultants in strategy 1, assessing the costs and benefits of interventions aimed at preventing new infections. Although no research has been published on it yet, strategy 2—the shifting of costs from businesses to other sectors of society—is likely to receive increasing attention in the coming decade.

In this paper, we look at the potential benefits to South African businesses of strategy 3: investing in treatment and care initiatives that are likely to extend the working lives of HIV+ employees. The humanitarian and ethical arguments for companies to provide treatment and care to employees are clear and compelling, but a strong financial case for investing in treatment and care has not yet been made. The purpose of this paper is to describe an approach to analyzing the benefits of interventions that extend the working lives of employees and to demonstrate such an analysis using published data on the costs of HIV/AIDS to companies.

The rest of this paper is structured as follows. In the next section, we propose an approach to estimating the costs of HIV/AIDS that is based on the present value of a new (incident) infection, rather than the current costs of existing (prevalent) infections. Interventions that extend the working lives of employees provide financial benefits to companies by reducing this present value. In section 3, we apply this approach to published data on African companies and calculate the potential benefits of interventions that extend HIV+ employees' working lives by one, three, and five years. The paper concludes in section 4 with a discussion of the results.

2. An Incidence-Based Approach to the Costs of HIV/AIDS

The timing of cases and costs

One of the differences between HIV/AIDS and most other common infectious diseases is the long latency period between HIV infection and the onset of symptoms. Figure 1 depicts the progression of the disease and its costs within a formal sector workforce.

As the figure illustrates, a company is not likely to begin to incur the major costs of HIV/AIDS until five or so years after an employee is infected.[1] Assuming that the company stays in business and retains the employee in its workforce, however, it does acquire a liability for these costs as soon as the employee acquires the infection. In other words, from the moment of infection, the company becomes responsible for a stream of future costs.[2]

This observation suggests that it is incident infections, not prevalent ones, that should be the units of concern to a company. Yet, virtually all previous work on the costs of HIV/AIDS to companies has estimated the *current costs* of prevalent infections. This prevalence-based approach fails to generate the information companies need to evaluate HIV prevention and treatment programs as productive investments, rather than simply as budgetary expenditures. This is because the returns to such programs equal the *future costs* that companies avoid if new infections are prevented or infected employees stay productive and in the workforce longer (Rosen et al. 2000). By focusing on these costs, the incidence-based approach generates the financial information firms need to evaluate HIV prevention and treatment programs in the same way they evaluate any potentially profitable investment.

Calculating the present value of a new infection

The incidence-based approach uses standard financial analysis techniques to collapse the future stream of HIV/AIDS costs into a single present value. Costs are discounted at the rate the company uses for other future cash flows and summed up, as follows:

$$C_I \equiv \sum_{t=0}^{T} c(t)(1+i)^{-t} . \qquad (1)$$

C_I is the present value of the future cost stream. $t=0$ is the year when an employee becomes infected, while $t=T$ represents the final year in which the company incurs costs from the infection. c*(t)* is the cost the infection imposes on the company in year t, and i is the discount rate.

If a company invests in activities that prevent new infections, then for each infection averted, it saves the full amount of the present value C_I. These savings represent the return on its investment. Interventions that slow the progression of the disease can also reduce the present value, however, by pushing costs further into the future. The return on investments in such interventions then equals the difference between the baseline present value given by (1) and a new present value,

$$\tilde{C}_I \equiv \sum_{t=0}^{\tilde{T}} \tilde{c}(t)(1+i)^{-t} . \qquad (2)$$

In this expression, the magnitude and timing of costs and the overall time horizon might all differ from those in (1). Investments at time 0 are financially worthwhile as long as they cost less than $C_I - \tilde{C}_I$. Interventions made at points other than the inception of an infection can

[1] Symptoms can begin at any time after infection. The five-year estimate in Figure 1 should be regarded as a reasonable average for the duration of the latency period in Africa.

[2] If a company's workforce is not stable, such there are high rates of employee turnover even in the absence of HIV, the company's liability for future costs may be smaller than that for a company with a stable workforce.

be evaluated by changing the beginning of the summations in (1) and (2) from $t=0$ to $t=t'$, the new reference point.

3. Estimating the Benefits of Interventions to a Company

As just demonstrated, the incidence-based approach to calculating the costs of HIV/AIDS exposes the fact that if the timing of costs changes, due to alterations in a company's cost structure or the progression of the disease, the present value of a new infection also changes. In this section, we calculate the benefits to companies of potential treatment and care interventions that change the progression of the disease by extending the average time from HIV infection to death for employees from a baseline estimate of 7 years to 8, 10, and 12 years (i.e. 1, 3, and 5 additional years).

The data for the analysis come from published analyses of the costs of HIV/AIDS to businesses in Africa. In this literature, the direct (out-of-pocket) costs analyzed typically include pension and provident fund contributions, service gratuities, death or funeral benefits, health clinic use, recruitment, and training. Indirect (productivity) costs typically include absenteeism and reduced performance. Studies in Kenya, Botswana, Zimbabwe, Malawi, and South Africa have found that increased benefit claims, increased absenteeism, and increased expenditures on recruitment and training are among the largest HIV-related costs faced by companies (Roberts and Rau 1995, Smith and Whiteside 1995, Jones 1996, Biggs and Shah 1997, Collins 1997, Greener 1997, Rugalema 1998, Morris and Cheevers 2000). We therefore focus on these three cost components.

In both the baseline and intervention scenarios, we model a company that incurs the following HIV/AIDS-related costs:

1. Paid sick leave (absenteeism)—Employees who terminate due to AIDS take an average of 27.7 additional paid sick days in each of the two years before termination, for a total of 55.5 days.[3] This estimate comes from a study of a South African sugar company (Morris and Cheevers 2000). The cost to a company of a day of paid absenteeism is conservatively estimated at 2 times daily salary (Morris and Cheevers 2000; Greener 1997).

2. Pension benefits—Total pension payments to employees who terminate due to AIDS, and their beneficiaries, equal three times annual salary. This estimate comes from a study of a tea estate in Malawi (Jones 1996). In many South African companies, pension and provident fund benefits, death benefits, and service gratuities are all distributed as single lump-sum payments upon retirement or death. While the total amount that employees and their beneficiaries receive upon termination varies widely from company to company, three times annual salary appears to be within the normal range.[4]

[3] This is a relatively modest amount of additional absenteeism. ING Barings (1999) estimated that a typical employee of a South African company loses about 250 productive days over the course of the illness.

[4] While some companies offer far less than 3 times annual salary, others provide more. If the average lengths of service prior to termination for HIV/AIDS cited in Biggs and Shah (1997) are applied to the benefits policy described in Smith and Whiteside (1995) for a cement company in Zambia, the average termination benefit ranges from 3 to 4 times annual salary.

3. Recruitment and training costs—Based on a five-company study in Botswana (Greener 1997), the average cost to recruit and train a replacement for an employee lost to AIDS is R8,405.[5]

We also assume in all scenarios that annual salaries average R25,000 for unskilled employees, R50,000 for skilled employees, and R100,000 for managers. These amounts are based on consultations with representatives of formal-sector companies in South Africa. They should be regarded as indicative values. A final common assumption is that the real discount rate is 10 percent. This is the inflation-adjusted 1999 interest rate reported by the International Monetary Fund for South Africa, rounded to the nearest percent (IMF 2000).

Baseline scenario

In the baseline scenario, the average time from HIV infection to death is 7 years in the absence of specific interventions to prolong life. This estimate is based on recent data from a Ugandan cohort (Malamba et al. 1999).[6]

In line with Morris and Cheevers (2000), we assume that half of the increased absenteeism occurs 6 years after infection. The remaining half, and all pension payments and recruitment and training costs, occur in year 7 (i.e., the year of death). Table 1 shows the present value of the three cost components under these timing assumptions. This represents the application of equation (1) above.

Table 1. Baseline scenario: present value of the future costs of a new HIV infection, assuming 7-year interval between infection and death.

Cost component	*Salary=R25,000*	*Salary=R50,000*	*Salary=R100,000*
Paid sick leave	R5,741	R11,481	R22,961
Pension benefits	R38,487	R76,974	R153,947
Recruitment/training	R4,313	R4,313	R4,313
Total	R48,540	R92,767	R181,222

The total values in Table 1 are about 60 percent greater than the corresponding annual salaries. Note that these totals represent only a fraction of the total costs of HIV/AIDS to a company. They omit, among others, the costs of funeral leave and expenses, use of company health clinics, reduced on-the-job productivity, and the time managers and supervisors devote to HIV+ employees (see Figure 1).

Intervention scenarios

The baseline assumption of a seven-year average life expectancy following seroconversion is based on a rural African cohort with little access to medical care. Combination antiretroviral therapy (ARV) is known to extend the lives of many people who are HIV-positive, but the average duration of that extension remains uncertain (Detels et al. 1998; Mocroft et al. 1998;

[5] This is likely to understate the costs of recruitment and training for technical, supervisory, and managerial staff for many companies in South Africa. The cost of one year of university training in South Africa runs R25,000 (University of Pretoria 2000), while anecdotal evidence indicates that search firms charge in the range of 25 percent of annual salary per search.

[6] In modeling the epidemic in South Africa, Dorrington (1998) used a median interval of 10 years but did not fully document the source of this estimate.

Hogg et al. 1999). The cost and complexity of providing ARV have so far been prohibitive for the majority of South Africans, however. While the cost of the drugs is expected to fall sharply in coming years, the cost and difficulty of administering and monitoring antiretroviral therapy is likely to remain a major barrier to widespread use.

There is some evidence, however, that some lower-cost and simpler interventions have the potential to extend the asymptomatic period, and possibly the lifespan, of many people with HIV. For example:[7]

- A single 12-month course of tuberculosis prophylaxis (isoniazid) was found to increase the median survival time of an HIV-positive adult cohort in Spain by 3.0 years, from 6.25 years to 9.25 year (Moreno et al. 1997). This appears to be on the higher end of findings on the mortality impact of TB prophylaxis (Bell et al. 1999). The cost of a 12-month course is approximately $5.15, or R36.20 (UNAIDS 1998).[8]

- Prophylactic cotrimoxazole, given daily from discovery of infection until death, reduced the rate of severe events leading to hospitalization or death among HIV-positive adults in Ivory Coast by 43 percent (Anglaret et al. 1999). Increased survival time was suspected in that study but was not measured. The cost of the drug is $11.39 (R80.07) per year. For ten years of therapy, the present value is R492.00 at a 10-percent discount rate.

- Counseling and other psychosocial interventions to diminish stress and strengthen social support reduced the probability of developing AIDS at 5.5 years after infection by 2-3 times in a cohort of HIV-positive males in the U.S. (Leserman et al. 1999). The cost of this type of intervention is unknown but could be relatively modest.

There is also some evidence that nutritional improvements and other lifestyle changes, possibly in combination with other forms of therapy, can delay the onset of severe symptoms and/or prolong life (Jewett and Hecht 1993).

Although the evidence on the health impacts and costs of the types of interventions described above is sketchy and at times contradictory, it is clear that some steps can be taken to extend the average number of productive years between HIV infection and death. By extending the working lives of employees, these interventions push the costs associated with HIV farther into the future, thus causing them to be discounted more heavily.

For the purpose of illustrating the possible magnitude of these benefits, we have chosen three scenarios for extending the life expectancy of HIV-positive employees.

Scenario A: 1 year additional working life (8 years total)
Scenario B: 3 years additional working life (10 years total)
Scenario C: 5 years additional working life (12 years total)

We assume that all three costs are pushed back by the indicated number of years in each scenario. Holding all other assumptions the same as in the baseline scenario, the cost savings to the company—which, as discussed earlier, represent the financial return on the

[7] For a review of interventions, see Jewett and Hecht (1993).
[8] Exchange rate $1.00=R7.03 (13 June 2000).

interventions—are shown in Table 2 for each intervention scenario. The costs savings were calculated as the difference, $C_I - \tilde{C}_I$.

Table 2. Intervention scenarios: reduction in the present value of the future costs of a new HIV infection due to interventions that extend life by 1, 3, or 5 years

Scenario A: Average life expectancy is extended by 1 year (infection to death=8 years)			
Item	*Salary = R25,000*	*Salary = R50,000*	*Salary = R100,000*
Savings on absenteeism	521	1,044	2,088
Savings on pension payment	3,499	6,997	13,995
Savings on recruitment/training	392	392	392
Total savings	4,412	8,433	16,475
Total savings as % of baseline cost[(a)]	9%	9%	9%
Scenario B: Average life expectancy is extended by 3 years (infection to death=10 years)			
Item	*Salary = R25,000*	*Salary = R50,000*	*Salary = R100,000*
Savings on absenteeism	1,428	2,856	5,710
Savings on pension payment	9,571	19,142	38,284
Savings on recruitment/training	1,073	1,073	1,073
Total savings	12,071	23,070	45,067
Total savings as % of baseline cost	25%	25%	25%
Scenario C: Average life expectancy is extended by 5 years (infection to death=12 years)			
Item	*Salary = R25,000*	*Salary = R50,000*	*Salary = R100,000*
Savings on absenteeism	2,176	4,353	8,704
Savings on pension payment	14,589	29,179	58,358
Savings on recruitment/training	1,635	1,635	1,635
Total savings	18,400	35,166	68,697
Total savings as % of baseline cost	38%	38%	38%

[(a)] "Baseline cost" = totals in Table 1.

The results in Table 2 indicate that the present value of a new HIV infection would fall by 9 percent if employees' average life expectancy could be extended for one year, by 25 percent for a three-year extension, and by 38 percent if five more years of productive life could be achieved.[9,10]

Since these savings represent the discounted future benefits to the company of investments that extend employees' working lives, the company can invest up to these amounts and still obtain positive returns on its investment. Even for firms with very modest HIV-associated costs, the benefits of investing in treatment and care certainly exceed the costs of the less expensive interventions described in the previous section, such as prophylactic cotrimoxazole

[9] These percentages simply reflect the impact of the change in the number of years of discounting. For example, at a 10-percent discount rate, discounting costs for three fewer years reduces the present value by $1-1/1.1^3$, which equals 25 percent.

[10] For pension payments, the estimates in Table 3 may understate or overstate the savings to a company of pushing back an employee's retirement age, depending on employee characteristics and the specific pension policies in effect. The dependents of an older employee who terminates will also be older, and will thus receive payments for fewer years. On the other hand, some pension plans calculate benefits on the basis of number of years worked at the company, and the dependents of employees who remain in the workforce for an additional three or five years will be eligible for larger payments. Company-specific analyses are required to determine the savings to individual companies.

and TB prophylaxis. For larger, better-established firms, there may well be a positive return even on investments in the more expensive, and more effective, life-extending therapies.

4. Conclusions

The financial benefits of pushing further into the future the types of costs analyzed above are only a subset of the overall gains to a company of investing in keeping its workforce as healthy as possible for as long as possible. By retaining skilled and experienced employees for an additional year or years, the company also:

- Buys time for drug prices to fall and for medical and social science researchers to develop new ways to treat HIV/AIDS
- Reduces the time managers and supervisors must spend coping with employee deaths and high turnover rates
- Reduces the impact on the morale, motivation, concentration of the rest of its workforce of having colleagues fall sick and die
- Creates more time to implement strategies to cope with the epidemic, such as training replacement employees, shifting to less labor-intensive technologies, and managing the loss of overall workforce skill, experience, institutional memory, and cohesion that HIV/AIDS is causing.

While not all of these benefits apply to all employers in South Africa, every organization likely has an opportunity to obtain some of them. This includes both large, formal-sector firms and small and medium sized enterprises, government agencies, universities, and NGOs.

If organizations are to be persuaded to make larger investments in care and treatment, there is an urgent need for further research and communication on several key issues, including:

- the effectiveness and cost of treatment and care interventions that can be implemented through the workplace, as well as at health facilities and in communities

- the costs to companies, in present value terms, of new HIV infections at each level of the workforce under different assumptions about life expectancy and discount rates

- the administrative feasibility of providing available care and treatment interventions to large numbers of employees in various kinds of companies and organizations.

While we still have a great deal to learn about the issues identified above, the analysis in this paper should provide strong encouragement to businesses, government, and other employers to think seriously about investing further in treatment and care of HIV-positive employees.

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Figure 1: Progression of cases and costs of workforce HIV/AIDS