Investing in the Epidemic: the Costs of AIDS and the Benefits of Interventions

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Overview of Presentation

• Introduction and methods
• Results 1: Costs of HIV/AIDS to employers
• Results 2: Benefits and costs of interventions
• Conclusions
Introduction

- Research questions
- Analytical framework
- Companies in the study
Research Questions

1. What is the cost to an employer of an HIV-positive employee at each level of the workforce?
2. Is there is a financial incentive for employers to invest in prevention and treatment?
# Timing of Cases and Costs

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Progression of HIV/AIDS in the Workforce</th>
<th>Cost to Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 0</td>
<td>Employee becomes infected.</td>
<td>No cost to company at this stage.</td>
</tr>
<tr>
<td>Year 0-8</td>
<td>Employee remains asymptomatic and fully productive.</td>
<td>No cost to company at this stage.</td>
</tr>
<tr>
<td>Year 2-8</td>
<td>Morbidity begins (some early mortality, some long-term non-progressors).</td>
<td>Morbidity-related costs are incurred (absenteeism, productivity loss, supervisor’s time, medical care)</td>
</tr>
<tr>
<td>Year 6-12</td>
<td>Employee leaves workforce through death or disability retirement (some long-term survivors).</td>
<td>End of service costs are incurred (death and disability benefits, management time, loss of morale, institutional memory, and experience)</td>
</tr>
<tr>
<td>Year 6-12</td>
<td>Company hires replacement employee.</td>
<td>Turnover costs are incurred (vacancy, recruiting, training)</td>
</tr>
</tbody>
</table>
Analytical Framework

**Direct Costs**
- Benefits payments
- Medical care
- Recruitment and training of replacement worker
- Insurance premiums
- Accidents due to ill and inexperienced workers
- Litigation over benefits, dismissals, etc.

**Indirect Costs**
- Reduced on-the-job productivity
- Increased absenteeism
- Supervisor’s time
- Vacancy
- Lower productivity during replacement’s startup period
- Senior management time
- Production disruptions
- Loss of workforce morale
- Loss of experience and institutional memory
- Reduced returns to training investments
- Deteriorating labor relations

**From one employee with HIV/AIDS (individual)**
- Benefits payments
- Medical care
- Recruitment and training of replacement worker

**From many employees with HIV/AIDS (organizational)**
- Insurance premiums
- Accidents due to ill and inexperienced workers
- Litigation over benefits, dismissals, etc.

**Total Cost to Firm of HIV/AIDS in the Workforce**
Basic Methodology

- Collected detailed data from companies on workforce, costs, HIV prevalence.
- Estimated present value of costs associated with individual case of HIV/AIDS at each level of workforce.
- Multiplied present value per infection by projected number of infections (aggregate analysis not presented here but included in paper).
- Modeled effectiveness and costs of interventions using parameters from the literature.
## Companies in the Study

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector</td>
<td>Heavy industry</td>
<td>Agric. Mining</td>
<td>Mining</td>
<td>Mining</td>
<td>Retail</td>
<td>Media</td>
</tr>
<tr>
<td>Location</td>
<td>South Africa</td>
<td>KwaZulu Natal</td>
<td>Botswana</td>
<td>KwaZulu Natal</td>
<td>KwaZulu Natal</td>
<td>South Africa</td>
</tr>
<tr>
<td>Size of workforce</td>
<td>&gt;25,000</td>
<td>5,000-10,000</td>
<td>500-1,000</td>
<td>500-1,000</td>
<td>&lt;500</td>
<td>1,000-5,000</td>
</tr>
</tbody>
</table>

**Assumptions:**
- Discount rate: 7% (real)
- Median survival time: 9 years
Results 1: Cost Per Infection

- Cost estimates
- Productivity results
- Why do the costs vary so much?
Cost Per Incident HIV Infection

Males, aged 35-49

Present value per infection (2001 $US)

Co A: 3.6x
Co B: 0.8x
Co C: 3.2x
Co D: 0.8x
Co E: 0.5x
Co F: 2.9x

(multiple of median annual salary)

Non-permanent  Unskilled  Skilled  Supervisor  Manager
## Productivity Results

<table>
<thead>
<tr>
<th>Type of cost</th>
<th>Source of data; method</th>
<th>Mean</th>
<th>High</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sick leave (days)</td>
<td>Human resource database; estimated difference in leave used by current employees and by employees who died or went on disability in last year of service.</td>
<td>35</td>
<td>68</td>
<td>11</td>
</tr>
<tr>
<td>Loss in productivity when at work</td>
<td>Questionnaires to supervisors of employees who died or went on disability; estimated magnitude and duration of reduction in employee’s performance.</td>
<td>38%</td>
<td>63%</td>
<td>22%</td>
</tr>
<tr>
<td>Supervisor’s time required (days)</td>
<td>Questionnaires to supervisors of employees who died or went on disability; estimated own use of time in employee’s last year of service.</td>
<td>14</td>
<td>25</td>
<td>7</td>
</tr>
</tbody>
</table>
### What Accounts for Differences in the Cost Per Infection?

<table>
<thead>
<tr>
<th>Variable</th>
<th>High-cost firms</th>
<th>Low-cost firms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Most important:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type and level of death and disability</td>
<td>Defined benefit pension; risk benefit levels stable</td>
<td>Premiums capped; risk benefit levels falling</td>
</tr>
<tr>
<td>benefits</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other differences:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical care</td>
<td>Medical aid coverage for all employees</td>
<td>Most use company clinics and public hospitals</td>
</tr>
<tr>
<td>Status of unskilled workers</td>
<td>Permanent employees with full benefits</td>
<td>Many are contractors with few benefits</td>
</tr>
<tr>
<td>Salaries (labor productivity)</td>
<td>Higher, so absences and turnover cost more</td>
<td>Lower, so absences and turnover cost less</td>
</tr>
</tbody>
</table>
Distribution of the Present Value of an Incident Infection

Company A

- Leave and absenteeism: 8%
- Productivity loss: 15%
- Retirement, death, and disability: 45%
- Medical care: 8%
- Recruitment and training: 4%

Company B

- Leave and absenteeism: 4%
- Productivity loss: 36%
- Recruitment and training: 56%
Results 2: Returns to Investment

- Prevention
- Treatment
There is a financial case for an employer to invest in HIV prevention activities if:

<table>
<thead>
<tr>
<th>The savings from postponing the impacts of an infection for one year</th>
<th>The cost of averting that infection for one year</th>
</tr>
</thead>
<tbody>
<tr>
<td>[= \text{cost per infection} - \frac{\text{cost per infection}}{(1+r)}]</td>
<td>[= \frac{\text{cost of prevention program}}{\text{per year/number of infections prevented per year}}]</td>
</tr>
</tbody>
</table>

**NB:**

1. **The cost of the prevention program is incurred this year and every year; the benefit is accrued far in the future and may not be captured by the current employer.**

2. **Prevention programs are usually delivered to populations, not individuals.**
For an HIV prevention program that:
- Reduces HIV incidence by 50%
- Is provided to the entire workforce
- Costs the amount shown/employee/year

The net present value (return) to the employer for the whole workforce would be:

- Company D: $0
- Company F: $25,000

Net Benefits of Prevention
Companies D and F
Investing in Treatment

There is a financial case for an employer to invest in HIV/AIDS treatment if:

\[
\begin{align*}
\text{The savings from postponing the impacts of HIV/AIDS morbidity and mortality for } X \text{ years} &= \text{cost per infection} - \frac{\text{cost per infection}}{1+r}^X \\
\text{The cost of care and treatment for } X \text{ years} &= \text{PV of } [(\text{cost of VCT + pre-ARV care} + \text{ARVs}) - \text{costs of ARV-related morbidity}] 
\end{align*}
\]
For a treatment program that:

- Starts in year 8 for all patients
- Extends working life by 5 years average
- Has no associated morbidity
- Costs the amount shown per patient per year

The net present value (return) to the employer per employee treated would be:

- **Company D**
  - Unskilled worker
  - Skilled worker
  - Manager

- **Company F**
  - Unskilled worker
  - Skilled worker
  - Manager

Cost = $500/patient/year  
Cost = $1000/patient/year
Equity Implications of the Financial Case for Treatment

If treatment cost $717/patient/year, the NPV to Company D would be ≈ $0 (i.e. break even). But:

- Treatment is likely to be a profitable investment for Company D, but financial considerations alone would not produce an equitable outcome.

![Bar chart showing NPV for different groups.](image)
Conclusions (1)

• The cost to an employer of HIV/AIDS is $0.5\text{-}4.0 \times$ the affected employee’s annual salary.

• The variation stems mainly from differences in employee benefits.

• These results are based on conservative assumptions, and they exclude all of the “organizational” costs of HIV/AIDS.
Conclusions (2)

• There is probably a financial case for employer investments in prevention, but:
  - Data on effectiveness are lacking
  - Benefits may not be captured by the employer
  - Results are sensitive to the cost of the prevention program.

• There is clearly a financial case for investing in care and treatment for many organizations, even though:
  - Data on effectiveness are lacking, especially for long term
  - Too early to know true costs of workplace programs.
Conclusions (3)

• HIV/AIDS programs have many other benefits, such as:
  - Retaining experience and institutional memory
  - Strengthening employee morale and discipline and improving labor relations
  - Maintaining social stability in the surrounding community
  - Maintaining shareholder confidence.
• Employers are systematically under-investing in HIV/AIDS programs. They will have positive financial, social, and ethical returns for many (perhaps most) organizations.
Research Agenda

- Effectiveness and costs of workplace interventions.
- Measurement and valuation of productivity (threshold effects, critical paths, coping strategies).
- Application of methodology to public sector agencies.
- Implications of findings for public policy.
- Public debate on optimal allocation of economic burden of HIV/AIDS among public sector, private sector, and households.