Measuring and Modeling the Costs of HIV/AIDS to Employers

Center for International Health and Development
Boston University School of Public Health

Sydney Rosen

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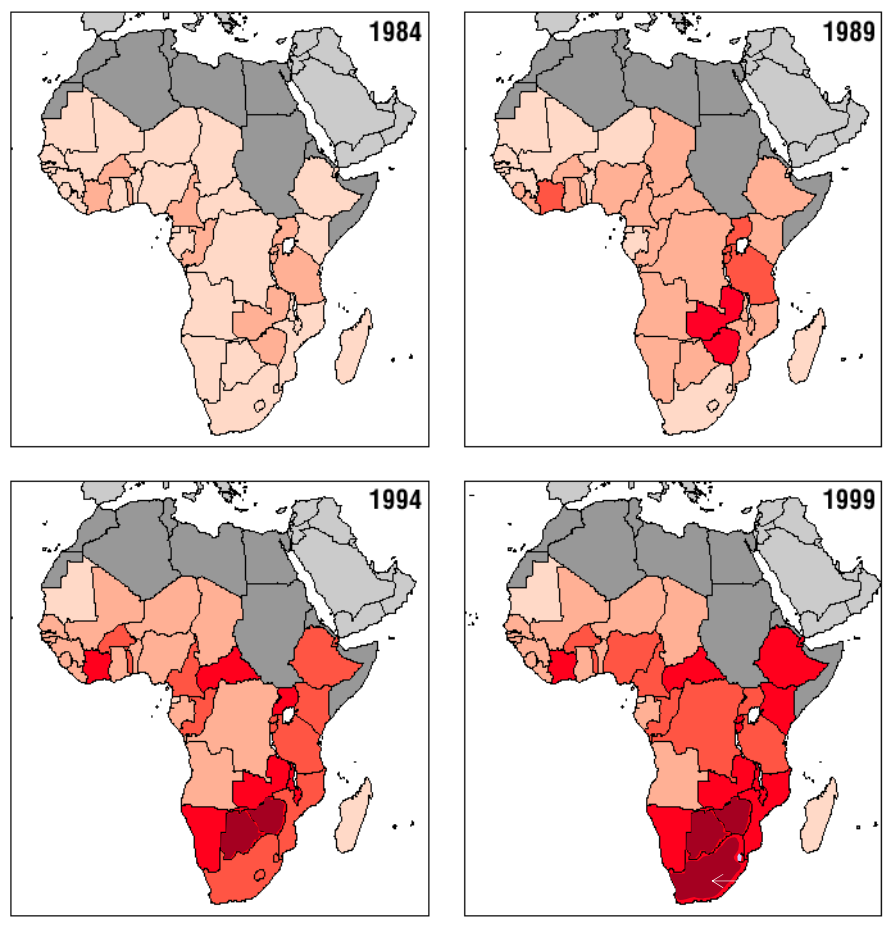
The Spread of HIV in Sub-Saharan Africa, 1984 to 1999



Estimated percentage of adults (15–49) infected with HIV

- 20% – 36%
- 10% – 20%
- 5% – 10%
- 1% – 5%
- 0% – 1%
- trend data unavailable
- outside region

Source: UNAIDS

Overview of Presentation

1. Analytical approaches
2. Measuring and modeling indirect costs
3. Research agenda

1. Analytical Approaches

- Units of analysis
- States of the art
- Focus: employers
- Basic model

Units of Analysis (Microeconomic)

- Households (including 1-person households)
- Firms (as employers and units of production)
- Public sector agencies (as employers and service providers)

States of the Art: Estimating the Costs of AIDS

Level	Methods	Data	Examples from South Africa
Households	Well established	Scarce; requires longitudinal survey data	Booysen, FS Naidu, Soweto OHS and DHS
Firms as employers	Recently developed	Increasingly available	Mining studies BU studies
Public sector agencies as employers	Just being developed	Little so far	Education and health sector assessments
Firms as producers, agencies as service providers	Not yet developed	Almost none	Consulting reports Research?

Costs to Employers: Approach

- Perspective is that of employer, not individual, household, or society.
- Costs are private or financial, not economic:

"Cost to" ≠ "Impact on"

- Focus is on (internal) labour costs, not (external) supply of inputs or demand for outputs.

Costs to Employers: Inventory

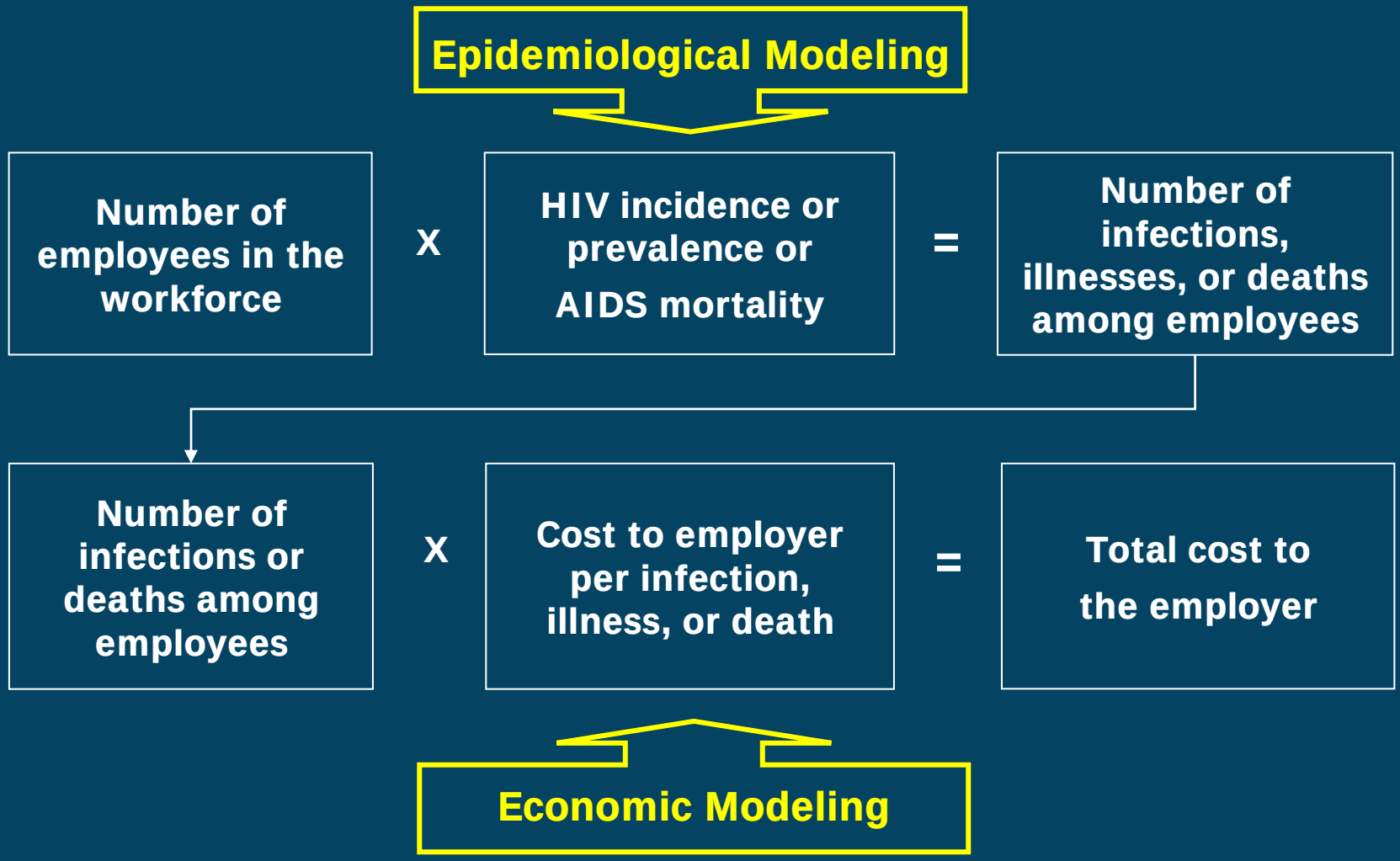
	Direct Costs	Indirect Costs
From each employee with HIV/AIDS (individual)	• Benefit payments • Medical care • Recruitment and training of replacement worker	• Increased absenteeism • Reduced performance when at work • Supervisor's time • Vacancy until replacement is hired • Lower productivity while replacement comes up to speed
From many employees with HIV/AIDS (organizational)	• Insurance premiums • Accidents due to ill and inexperienced workers • Litigation over benefits, dismissals, etc.	• Production disruptions due to missing skills, accidents, etc. • Breakdown of workforce morale & cohesion • Loss of workforce experience & institutional memory • Diversion of senior managers' time • Reduced returns to training investments • Deteriorating labor relations

MEASURED

UNMEASURED

→ **Total Costs of HIV/AIDS to an Employer**

Basic Model for Estimating Individual-Level Costs



2. Measuring and Modeling Indirect Costs

- Objectives of this work
- Methods for estimating indirect costs
- What do we know?
  - Evidence from South Africa
  - Evidence from Kenya

Objective: Estimate Parameters for Models

- Models are only as good as the assumptions on which they are based.
- Research is needed to estimate model parameters, such as:
  - Reductions in labour productivity
  - Increases in production costs
  - Effects of interventions
  - Decreases in household savings

Methods for Estimating Indirect Costs

Type of cost	Possible method(s)
Increased leave or absenteeism	• Observe then model difference in leave used by current employees and by employees who died or went on disabiilty due to AIDS or are known to be HIV-positive now.
"Impaired presenteeism" (reduced productivity when at work)	• Survey supervisors of employees who died or went on disability due to AIDS. • Observe then model differences in individual output between employees with HIV/AIDS and employees without.
Supervisor's time required	• Survey supervisors of employees who died or went on disability due to AIDS.
Vacancies	• Take average duration of actual vacancies in past year. • Ask recruiting staff for average duration of vacancies.
Reduced productivity while replacement comes up to speed	• Ask supervisors or training staff about time period and average productivity during that period. • Estimate relationship between years of experience and individual output.

Evidence from South African Companies

Site	Co. A	Co. B	Co. D	Co. E	Co. F	Co. H
Sector	Heavy industry	Agric.	Mining	Retail	Media	Manuf.
Location	South Africa	KwaZulu Natal	KwaZulu Natal	KwaZulu Natal	South Africa	Gauteng
Size of workforce	>25,000	5,000-10,000	500-1,000	<500	1,000-5,000	1,000-5,000
Est. HIV prevalence	9% (1999)	23% (1999)	24% (2001)	8% (2001)	10% (2001)	14% (2002)

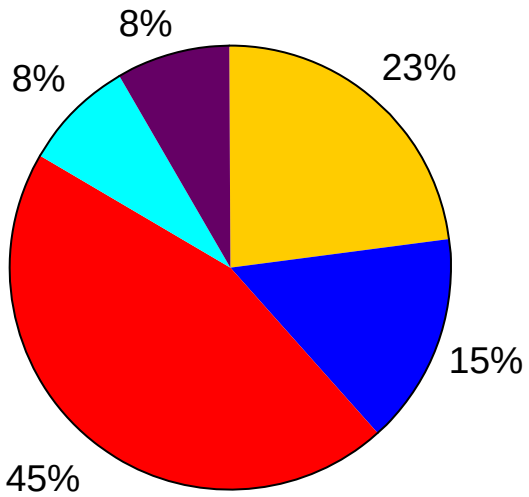
Indirect Cost Parameters (1)

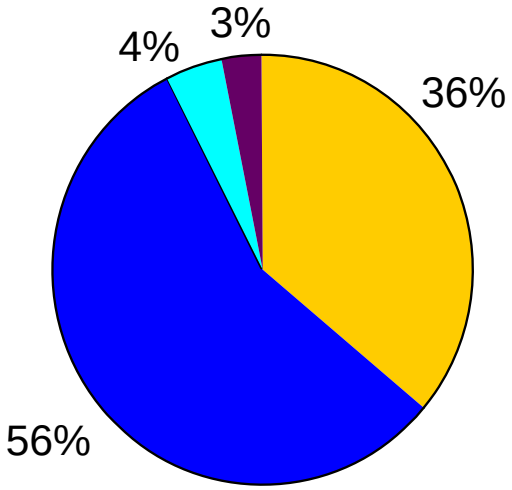
Type of cost	Co A	Co B	Co D	Co E	Co F	Co H	Mean
Sick leave (additional days in last year of service)	49.0	68.4	36.0	25.7	17.1	21.2	36.2
Sick leave (additional days in 2nd to last year of service)	15.3	20.2	14.0	no data	10.4	3.1	12.6
Impaired presenteeism (% of full productivity in last year of service)	29%	42%	63%	22%	36%	no data	38%
Impaired presenteeism (% of full productivity in 2nd to last year of service)	5%	31%	33%	3%	4%	no data	15%
Supervisor's time required (total days)	no data	6.6	24.6	12.7	14.5	no data	14.6

Indirect Cost Parameters (2)

Type of cost	Co A	Co B	Co D	Co E	Co F	Co H	Mean
Vacancy for skilled worker (months)	2.0	0.25	2.0	0.55	2.0	2.0	1.5
Vacancy for manager (months)	3.0	2.0	3.0	0.64	3.0	2.0	2.3
Lost productivity while skilled worker comes up to speed (months lost)	0.9	1.5	0.4	1.1	2.4	0.8	1.2
Time required for manager to come up to speed (months)	1.8	1.5	0.8	1.3	1.2	1.5	1.4

Distribution of the Costs of an Incident Infection





Company A—
38% indirect

Company B—
92% indirect

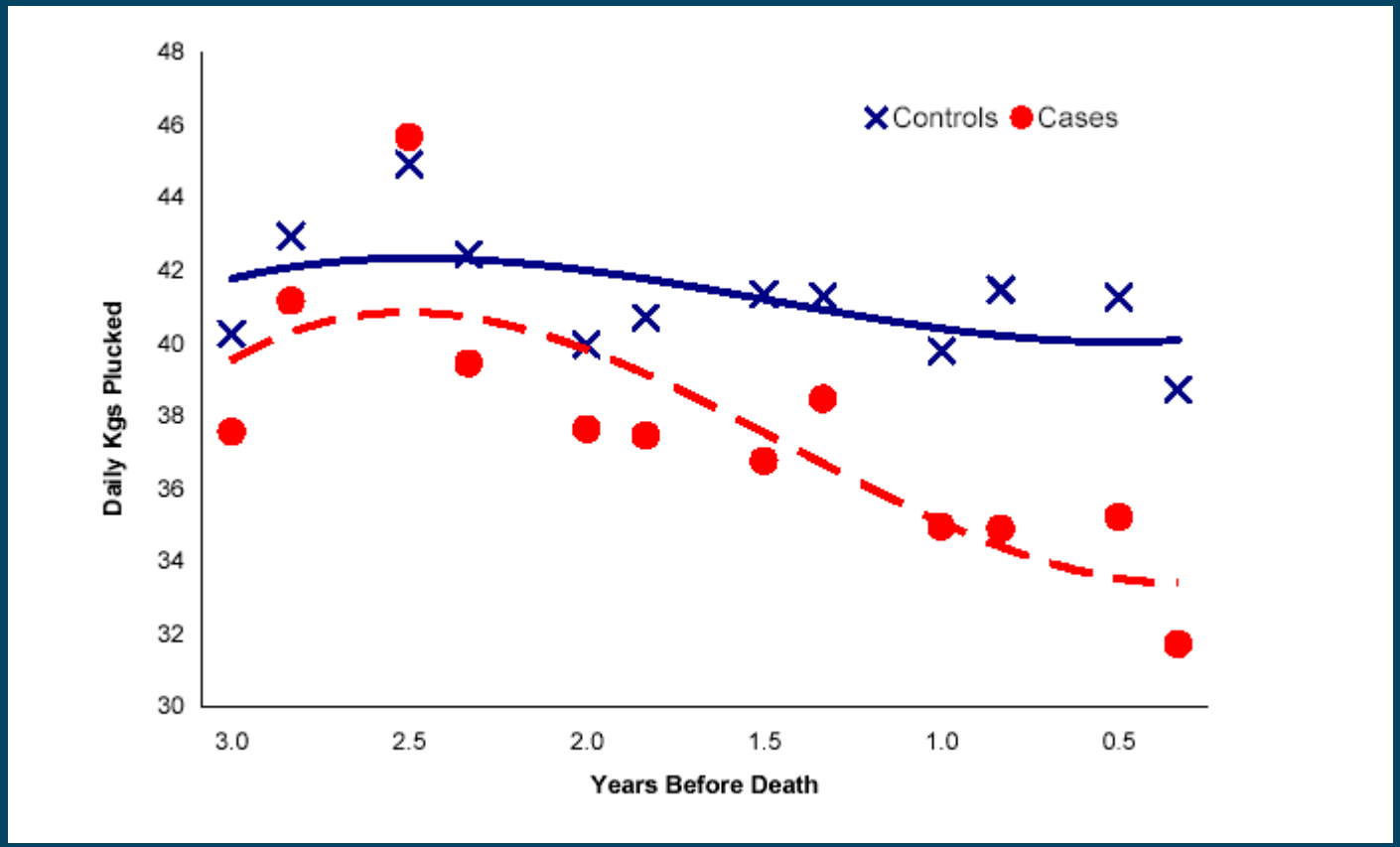
Evidence from Kenyan Tea Estates

- Study of changes in labour productivity and work attendance prior to AIDS-related death among Kenyan tea pluckers.
- Tea pluckers are paid per kilogram of tea harvested; productivity can be observed directly.
- Estate medical facilities record causes of death and medical retirement.

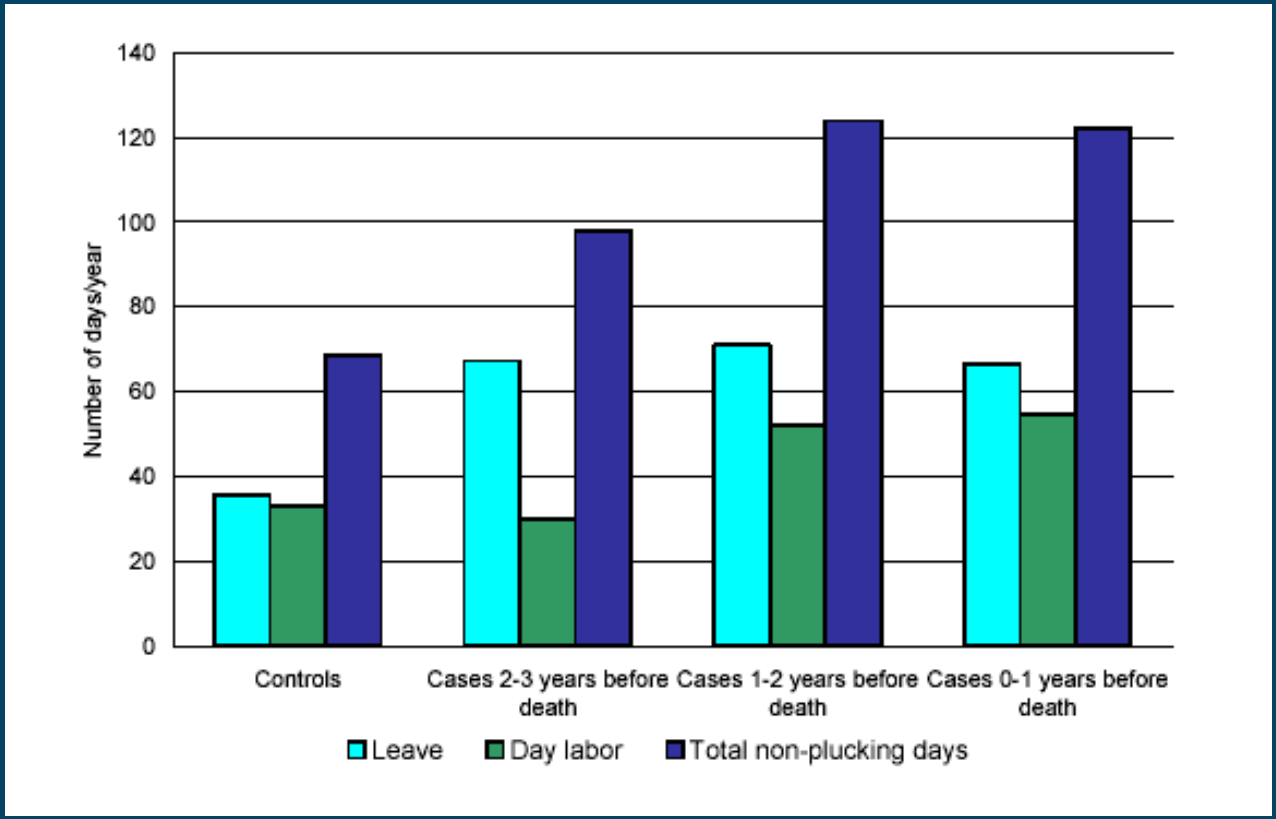
Modeling Strategy

- Retrospective cohort analysis of tea pluckers who died of AIDS v. pluckers still in workforce.
- Goal: explain differences in individual daily output, job assignment, and attendance on the basis of HIV status, controlling for known predictors of productivity.
- Controlled for environmental factors by selecting comparisons from same work units as cases.
- Possible explanations for differences included years of service, work unit (matched group), age, sex, season, time, and case or comparison status.

Differences in Quantity of Tea Plucked on Days Spent in the Fields (Impaired Presenteeism)



Differences in Attendance at Work and Type of Work



Summary: In Their Last Year of Service, Tea Pluckers Who Die of AIDS-Related Causes:

- Are absent from work 31 days more often (87% increase).
- Spend 22 more days on light duty (66% increase).
- Produce 7.1 kg less tea leaf per day (17% decrease).
- Produce 35% less tea over course of year.
- Earn 18% less (from $2.37 to $1.95/day).

3. Research Agenda

	Direct Costs	Indirect Costs
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→ **Total Costs of HIV/AIDS to an Employer**

Research Issues (1): Individual-Level Productivity

- Impact of illness and intervention:
  - Improve measurement and valuation of impact of illness on individual labour productivity.
  - Evaluate effectiveness of antiretroviral therapy and other interventions in restoring and maintaining productivity.
- Labour substitution:
  - Develop methods for measuring labour substitution within household or work unit.
  - Assess role of labour substitution in offsetting the individual productivity loss caused by AIDS.
  - Identify the opportunity costs of health-related labour substitution (e.g. loss of child schooling, workforce fatigue).

Research Issues (2): Organization-Level Productivity

- Methods:
  - Develop methods for measuring and modeling team-level productivity (threshold effects, critical paths, labour substitution).
  - Develop methods for measuring productivity in public sector agencies.
- Issues:
  - Relationship between work experience (individual and team) and productivity.
  - Effect of HIV/AIDS on “unmeasured” costs (morale, discipline, etc.).

Research Issues (3): Other Important Questions

- Treatment delivery models:
  - Does the location or mode of treatment delivery affect the labour productivity outcomes of treatment? (E.g. transport or queuing time.)
  - Does treatment provided by the employer have different benefits and costs than treatment obtained privately or in the public sector?
- Incentives:
  - Are there perverse incentives or outcomes associated with the provision of treatment? (E.g. adverse selection into jobs.)
  - Does treatment alter the incentives of employers to "shift the burden"?