Reducing Financial Burden and Financial Risk: Example of Tuberculosis Treatment in India

Dean T. Jamison
University of Washington, Department of Global Health
Harvard Program in Ethics and Health
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Plan for this Talk

• Conceptual background

• Universal public finance of TB treatment of India
TB Treatment in India

Joint work with Stéphane Verguet and Ramanan Laxminarayan
From Cost-Effectiveness Analysis (CEA) to Extended Cost-Effectiveness Analysis (ECEA)

• Traditional economic evaluation focus (CEA)
  Cost-effectiveness of technical health interventions
  (e.g. antiretroviral therapy for HIV/AIDS)

• Policymaking focus (ECEA)
  Resources allocated across different options
  1) Health interventions
  2) Health service delivery platforms
  3) Health policy levers  (e.g. universal public finance)
Specific Consequences of universal public finance (UPF)

• **Health gains** (burden of disease averted)

• **Financial consequences for household expenditures**
  UPF “crowds out” medical expenses privately financed

• **Financial protection benefits**
  UPF provides “insurance” to households from medical impoverishment

• **Distributional consequences** (across income groups)
ECEA Measures of UPF

UPF for an intervention (e.g. TB treatment)

Health gains
(e.g. TB deaths averted)

Household expenditures
(e.g. TB-related costs averted)

“Insurance” benefits
(e.g. financial protection from TB-related costs)

Poorest
2nd Poorest
Middle
2nd Richest
Richest
Tuberculosis in India

• TB epidemiology
  Annual incidence of 170 per 100,000 (WHO 2010)
  4 times higher incidence among the poor (Muniyandi et al. 2007)
  Case fatality rate of 0.25 (Corbett et al. 2003)

• TB treatment (DOTS)
  Cost of $80 per patient
  Effective at 90% (WHO 2010)

• TB treatment demand
  Individuals with:
    - low income do not buy DOTS
    - higher income purchase DOTS (80%)
UPF for TB Treatment Over 1 Year for 1 Million Indians

Treat TB-infected with DOTS

DOTS coverage (~ 80%)

DOTS effectiveness (~ 90%)

TB deaths averted

TB costs averted for households

Financial protection benefits

Poorest

2nd Poorest

Middle

2nd Richest

Richest

TB costs averted for households

Financial protection benefits

Poorest

2nd Poorest

Middle

2nd Richest

Richest

4/25/2013
• Risk aversion

  Individuals value protection from the risk of uncertain adverse events

  \[ y = \text{individual income} \]
  \[ r = \text{coefficient of relative risk aversion} \]

• Approach consistent with recent work


  Smith. Incorporating financial protection into the economic evaluation of health technologies. Health Economics 2012
Financial Protection Benefits Due to UPF (2)

- Money-metric value of insurance provided
  
  Gamble with:
  
  - disease occurs at incidence $p$ (depending on income)
  
  - has treatment cost $c$

- **For 1 individual**, money-metric value of insurance
  
  = expected value - certainty equivalent of gamble
Financial Protection Benefits with UPF for TB Treatment over 1 Year for 1 Million Indians

Money-metric value of financial protection, $ per individual

Monetary value of insurance

Money-metric value of financial protection, $ per individual vs. Income ($ per capita)

Total financial protection value of $10,000
Benefits over 1 Year for 1 Million Indians with UPF for TB Treatment

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Total</th>
<th>Income Quintile I (Poorest)</th>
<th>Income Quintile II (Poorer)</th>
<th>Income Quintile III (Middle)</th>
<th>Income Quintile IV (Richer)</th>
<th>Income Quintile V (Richest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TB deaths averted</td>
<td>150</td>
<td>100</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2 Private expenditures crowded out</td>
<td>$70,000</td>
<td>0</td>
<td>15,000</td>
<td>25,000</td>
<td>20,000</td>
<td>10,000</td>
</tr>
<tr>
<td>3 Money-metric value of insurance</td>
<td>$10,000</td>
<td>0</td>
<td>3,000</td>
<td>4,000</td>
<td>2,000</td>
<td>1,000</td>
</tr>
</tbody>
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Total cost of public program of $130,000
Coping Mechanisms: Borrowing

- Without UPF, when faced with costly treatment, the poor borrow from peers or sell assets.
- 50% of poor households in India borrow money/sell assets at high interest rates (Kruk et al. 2009).
- Assume the poor take a loan over 10 years at annual interest rate of 20% to subsidize TB treatment.
Benefits Over 1 Year for 1 Million Indians with UPF for TB Treatment (with borrowing)

Private expenditures crowded out by UPF

Income Quintile (Poorest to Richest)

Costs ($)
0 25,000 50,000

Insurance value provided by UPF

Monetary value ($) 0 25,000 50,000 75,000 100,000

Income Quintile (Poorest to Richest)
Borrowing: A Substitute to UPF?

• Financial protection could be provided through mechanisms reducing cost of borrowing
  e.g. institutional arrangements to allow improved borrowing interest rate

• Effective substitute for UPF in averting TB deaths

• Lowers costs to the public sector

But burdens the poor with heavy debt
• ECEAs
  – incorporate equity & financial protection, two important objectives of health systems (Murray & Frenk 2000)

• Case study: UPF of TB treatment in India
  – health gains concentrated among poor
  – financial protection benefits concentrated among poor, effectively replacing coping mechanisms
  – crowding out of bad treatment options = enhances quality
Conclusions (2):
ECEA Output

Health & financial risk protection benefits afforded, per $100,000 spent

Number of poverty cases averted

Number of deaths averted

- RV vaccine
- PCV vaccine
- MCV vaccine
- Diarrhea treatment
- Pneumonia treatment
- Malaria treatment
- C-section
- TB treatment
- High blood pressure treatment
Thank you

Contact Information:
Djamison@uw.edu