State of the Art and Case Studies of Economic Analysis for Policy Action on NCDs

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An economics & policy discussion in 3 parts

Part 1: What is DCPN?

Part 2: Salt reduction in South Africa

Part 3: Tobacco taxation in China
Launch of the report by The Lancet Commission on Investing in Health Global Health 2035: A World Converging within a Generation

On December 3, The Lancet will publish Global Health 2035: A World Converging within a Generation, a major new report by the Commission on Investing in Health. The Commission is chaired by Lawrence H. Summers, President Emeritus and Charles W. Eliot University Professor of Harvard University and co-chaired by Dean T. Jamison, Professor at the University of Washington. The report is being released on the 20th anniversary of the 1993 World Development Report. The Commission, composed of 23 distinguished commissioners, revisits the case for
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<td>Disease Control Priorities in Developing Countries</td>
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<td>Reproductive, Maternal, Newborn and Child Health</td>
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<td>AIDS, STIs, TB and Malaria</td>
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<td>Mental, Neurological and Substance Use Disorders</td>
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Objectives of DCP3

- Inform allocation of resources across interventions and health service delivery platforms.
- Provide a comprehensive review of the efficacy and effectiveness of priority health interventions.
- Advance knowledge and practice of analytical methods for economic evaluation of health interventions.
Health system objectives

• Improving health and the distribution of health in the population

• Prevention of medical impoverishment

• Fairness in the financial contribution toward health

The World Health Report 2000

Health Systems: Improving Performance
Overview of Economic Analysis for Health

Background

- Health spending decisions are about packages, platforms, policies
- Need to broaden the results of economic evaluation
- CEA ..........ECEA..........CBA

Multiple Health System Outcomes

- Equity
  - Definitions
- Financial risk protection
  - Definitions

Examples

- Salt reduction policy in South Africa
- Tobacco taxation in China

29 April 2014 -- Aruba
Measures of equity

- Fairness in the distribution of health coverage (ex: measles vaccine coverage)

- Fairness in the distribution of health outcomes (ex: measles deaths)

Measles vaccine coverage

Measles deaths per 1,000,000 births

29 April 2014 -- Aruba
Measures of medical impoverishment

• When confronted with medical expenditures and inadequate financial protection, people can face high out-of-pocket (OOP) payments and fall into poverty
  – Threshold-base approach
  – Poverty cases averted
  – Forced Borrowing and Asset Sales
  – Money-metric value of insurance
Mechanisms of financial risk protection

• Moving from out-of-pocket payments to prepayment mechanisms reduces catastrophic expenditures
  (Xu et al. 2007; cross-country study)

• Public finance & social insurance packages bring significant risk reductions
  México’s Seguro Popular in 2004 (Knaul et al. 2006)
  Medicare in the US (Finkelstein and McKnight 2008)
From CEA to ECEA

Cost Effectiveness Analysis (CEA)

Extended Cost Effectiveness Analysis (ECEA)

(1) Distributional consequences across wealth strata of populations
(2) Financial risk protection benefits for households

Economic Evaluation of Salt Reduction in South Africa

- Burden of heart disease and stroke is increasing in low- and middle-income countries, due in part to spread of “Western” dietary habits (e.g., salty foods)
- South Africa is developing legislation to curb salt intake by regulating content in certain processed foods and educating public about discretionary salt use
- Policy will not only have health impacts, but financial and distributional effects
- Economic analysis is necessary to provide insight into how the policy will function in the context of the South African healthcare system
Lower salt intake means lower BP

(By inference, this means a lower risk of long-term CVD)

Extended Cost-Effectiveness Analysis (ECEA) Outcomes

Effects of Salt Reduction Policy

• Health gains (burden of disease averted)

• Financial consequences for household expenditures
  – Reduced private expenditures on health
  – Financial protection from lower catastrophic expenditures or greater cases of poverty averted

• Where applicable, reduced public sector spending

• Distributional consequences (across income groups)
Salt reduction ECEA in South Africa: Methods

Baseline Salt Consumption, Blood Pressure
- Hypothetical cohort with diet, health, and income status from literature and National Income Dynamics Survey (NiDS)

Impact of Salt Reduction on Blood Pressure
- Linear relationship between lower salt consumption and lower blood pressure, based on recent meta-analysis, estimated at the individual level and aggregated by income group

Impact of Reduced Blood Pressure on CVD
- Published hazard ratios describe the impact of lower blood pressure on mortality from stroke and ischemic heart disease (CVD)

Impact of Reduced CVD on Treatment Costs
- Calculated the amount of reduced expenditures on CVD hospitalization and chronic care

Disaggregation of Results by Income Group

The South African health system structure influences cost of treatment

<table>
<thead>
<tr>
<th></th>
<th>Stroke</th>
<th>IHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC H0</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>PUBLIC H1</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>PUBLIC H2</td>
<td>356</td>
<td>512</td>
</tr>
<tr>
<td>PUBLIC H3</td>
<td>1996</td>
<td>2184</td>
</tr>
<tr>
<td>PRIVATE INSURED</td>
<td>831</td>
<td>1161</td>
</tr>
<tr>
<td>PRIVATE UNINSURED</td>
<td>5775</td>
<td>7946</td>
</tr>
</tbody>
</table>

Average out-of-pocket costs on acute CVD events (2012 USD)
Salt reduction ECEA in South Africa: Results

Estimates for a cohort of 1,000,000 South Africans over the age of 40

<table>
<thead>
<tr>
<th></th>
<th>Quintile I</th>
<th>Quintile II</th>
<th>Quintile III</th>
<th>Quintile IV</th>
<th>Quintile V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths Averted</td>
<td>39</td>
<td>60</td>
<td>65</td>
<td>54</td>
<td>61</td>
</tr>
<tr>
<td># Cases of Catastrophic Expenditures Averted</td>
<td>3</td>
<td>6</td>
<td>17</td>
<td>40</td>
<td>26</td>
</tr>
</tbody>
</table>
Findings

- Health gains relatively evenly distributed across income groups
- Because of South Africa’s dual public-private healthcare system, Quintiles I-III receive less financial protection; private expenditures averted are concentrated in the uninsured and underinsured in Quintiles IV-V
- Reduction in catastrophic expenditures skews toward the wealthy

- For the entire SA population, during each year of the policy:
  - 3696 deaths averted
  - $11.45 million in govt subsidies and $5.57 million in private expenditures averted
  - 3038 cases of poverty and 750 cases of catastrophic health expenditure averted
Case study
Tobacco taxation in China: an extended cost-effectiveness analysis*

Important policy issue with tobacco tax: equity

Tobacco taxation is often regarded as regressive.

Though most assessments to date assume individuals with different income to be responsive to tax increase in the same way!

Objective: use ECEA to examine regressivity of tobacco tax
Background: tobacco in China

- **Tobacco consumption prevalence (males) (GATS 2010):**
  - 34% (15-24 year-olds); 59% (25-44); 63% (45-64); 40% (above 65)

- **Cigarette consumption (GATS 2010):**
  - About 15 cigarettes per day

- **Tobacco-related mortality:**
  - 1M annual deaths (out of 6M globally)

- **Distribution of tobacco-related disease mortality, per cause (%):**
  - COPD (11%); stroke (46%); heart disease (23%); neoplasm (20%)

- **Price of cigarette /pack:** $0.74

- **Out-of-pocket expenditures (Yip et al. 2012):**
  - Only 50% of inpatient healthcare costs (e.g. cancer, stroke treatment) reimbursed by insurance schemes
50% increase in tobacco price in China

Policy instrument: increase of price of cigarette pack of 50% through taxation
Follow-up of Chinese male population (current and newborns) over 50 years

- Tobacco deaths averted
- Generation of financial revenues
- Tobacco-related disease treatment costs averted by households
- Financial risk protection benefits

Poorest
2nd Poorest
Middle
2nd Richest
Richest
Tax hike scenario

• **50% price increase in cigarette pack:**
  - From $0.74 to $1.11

• **Price elasticity of cigarette consumption** (Hu et al. 2010):
  - About - 0.4
  - Assume variation from - 0.6 (poorest) to - 0.1 (richest)
  - Assume < 25 year-olds are twice as price elastic (Jha et al. 2012)

• **Tobacco-related disease treatment costs** (Le et al. 2012; Lee et al. 2005; Wei et al. 2010; Ma et al. 2010):
  - COPD = $2,000, stroke = $2,000, heart disease = $11,000, neoplasm = $14,000

• **Average annual individual income** (by income quintile):
  - Q1 < $1,600 < Q2 < $3,100 < Q3 < $4,900 < Q4 < $7,600 < Q5
Before and after tax hike

1. Before tax hike:
   - Price of cigarette pack = $0.74

2. After tax hike:
   - Price of cigarette pack = $1.11

1. Decrease of number of smokers = life years saved depending on age at quitting (10 years at 15-24; 3 years above 65) (Doll et al. 2004; Jha et al. 2014)
2. Decrease in cigarette expenditures
3. Decrease in tobacco-related disease expenditures
4. Generation of financial revenues for the government
Years of life gained after 50% tobacco price increase

- Poorest
- Poorer
- Middle
- Richer
- Richest

Years after tax increase

Years of life gained (millions)
Additional tax revenues gained

Tax revenue gains after 50% tobacco price increase

$ billions

0 100 200 300 400 500 600 700

Years after tax increase

1 4 7 10 14 18 22 26 30 34 38 42 46 50

Poorest
Poorer
Middle
Richer
Richest
## Summary of the ECEA findings

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Total</th>
<th>Quintile I</th>
<th>Quintile II</th>
<th>Quintile III</th>
<th>Quintile IV</th>
<th>Quintile V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of life gained (millions)</td>
<td>231</td>
<td>79</td>
<td>63</td>
<td>47</td>
<td>31</td>
<td>11</td>
</tr>
<tr>
<td>Revenues raised ($ billion)</td>
<td>703</td>
<td>98</td>
<td>134</td>
<td>152</td>
<td>170</td>
<td>149</td>
</tr>
<tr>
<td>Change in tobacco expenditures</td>
<td>376</td>
<td>-21</td>
<td>40</td>
<td>89</td>
<td>132</td>
<td>135</td>
</tr>
<tr>
<td>Expenditures on tobacco-disease averted ($ billion)</td>
<td>24</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Financial risk protection ($ billion)</td>
<td>1.8</td>
<td>1.3</td>
<td>0.3</td>
<td>0.1</td>
<td>0.1</td>
<td>&lt;0.1</td>
</tr>
</tbody>
</table>
Goal: Design basic insurance packages, taking into account burden, costs, equity, medical impoverishment

FRP = financial risk protection (prevention of medical impoverishment)
Summative observations

- Comparable quantitative measures are very powerful
- Precarious tension between complex contextualized model and generalized analysis
- Difficult to get data sufficiently broadly across disease/health topics, levels of health system, and population characteristics in a given country
- Importance of working with people who know their health systems, population, and policy priorities
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