Assessing productivity loss associated with immunization in LMICs
iHEA Immunization Economics Pre-Congress

Gatien de Broucker
Libby Watts
Outline

1. Indirect costs: Productivity loss and activities foregone
   - Methods of estimating indirect costs
2. Primary data collection from the DOVE Field Studies
   Bottom-up approach
3. Approach in the DOVE economic benefits models
   Large-scale modeling
4. Discussion
WHO framework for expanding Universal Health Coverage (UHC)

- What is missing from this framework?
- Apart from direct medical costs, what are other economic barriers to accessing healthcare?

Source: https://www.who.int/health_financing/strategy/dimensions/en
Methods for Estimating Productivity Loss

Human capital approach
Counts all lost hours worked due to health-related conditions or treatments without considering substitute workers

Friction cost approach
Lost hours included in productivity loss estimate is limited to the time until another worker has fully replaced the individual who is absent due to an illness
Framework for estimating productivity loss

- How do we **identify** and **measure** productivity loss?
- How should we **value** productive time lost due to caregiving or illness?
- How should we **communicate** our findings to the audience?

The Decade Of Vaccine Economics field study

- Assessed the **cost** of pneumonia, diarrhea and measles (in children <5) for households, the healthcare system and society
- Indirect costs estimated through the human capital approach
- Caregivers surveyed about:
  - Medical and non-medical expenses for current episode of illness
  - Wage-earners in the household (including themselves), their relationship to them and the child, their occupation and their income
  - Time spent by the caregiver and/or any other household member caring for the sick child **prior, during and after** the facility visit

**PI:** Dr. Bryan Patenaude

http://immunizationeconomics.org/dove
Challenges in estimating indirect costs

- Difficult to estimate the income loss related to **casual work**
  - No contract for work: it’s up to the **respondent’s best judgement to predict wage loss**
  - Agricultural workers, construction workers, vendors, etc. see their **income vary by season**
  - There are **coping mechanisms** that caregivers use to moderate their loss of income, which are difficult to capture (usually post-survey)

- Difficult to estimate the value of **unpaid work**
Example survey questions

### Wage-earner’s income

- Information on wage-earner

### Continuum of care

- Time spent at previous facilities
- Time spent at current healthcare facility
- Time spent traveling to/from facilities
- Time spent providing care prior to visit

### Information on missed activity

---

**Wage-earner’s role in the household, education, occupation and income.**

**Pathway to access healthcare & time spent**

**Continuum of care**

- Time spent per healthcare service

---

I will now ask you about healthcare you sought for the sick child for the current illness before coming to this facility and about care you received at this facility.

<table>
<thead>
<tr>
<th>A</th>
<th>Health facility type</th>
<th>B</th>
<th>Have you sought care at any of these facilities? [Y/N] [Mark all that apply and include the current facility]</th>
<th>C</th>
<th>In what order did you seek care? [Rank order]</th>
<th>D</th>
<th>Was this a public or private facility? (Y/N)</th>
<th>E</th>
<th>Were you admitted overnight at this facility? (Y/N)</th>
<th>F</th>
<th>How long did you stay at this facility? (days, hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td></td>
<td>Days</td>
<td>Hrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health Center III-IV</td>
<td></td>
<td>Days</td>
<td>Hrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During this health facility visit, where has the child spent his/her time?

- Waiting room
- Outpatient area
- Pediatric ward/inpatient bed
- Intensive care unit
- Emergency room

**Time spent per healthcare service**
DOVE Economic Benefits Models

94 Countries (73 Gavi, 21 non-Gavi)

### Ten Antigens
- Measles
- Yellow fever
- *Haemophilus influenzae* type b
- Japanese encephalitis
- Hepatitis B
- *Neisseria Meningitidis* serogroup A
- Rubella
- *Streptococcus pneumoniae*
- Human papillomavirus
- Rotavirus

### Three Decades

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Six Regions
- AFRO
- AMRO
- EMRO
- EURO
- SEARO
- WPRO

Historical Decade
(2001-2010)

Decade of Vaccines
(2011-2020)

Future Decade
(2021-2030)

© DOVE HAVEL, MERR, MATH, MG UG, NEW® IVAC®. TRAVELER'S ENCEPHALITIS, MALARIA®
## Productivity loss in the DOVE Economic Benefits models

<table>
<thead>
<tr>
<th>CAREGIVER</th>
<th>IDENTIFYING PRODUCTIVE TIME</th>
<th>MEASURING PRODUCTIVE TIME</th>
<th>VALUING PRODUCTIVE TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time spent taking sick child (under age 15) to a health facility</td>
<td>½ day for outpatient visit 1 day per inpatient day times length of stay</td>
<td>Daily minimum wage</td>
</tr>
</tbody>
</table>

*Economic Benefits*<br>
<1% of Economic Benefits
Methods explored in sensitivity analysis (vaccinated individuals)*

1. Account for growth in labor productivity
2. Value productivity at minimum wage
3. Include productivity loss beyond age 64
4. Country-specific labor force participation

Discount to year vacc.
Impact of assumptions on productivity loss estimates (94 countries, 2021-2030)

More conservative

$435 B
Value productivity at minimum wage

$465 B
Apply labor force participation rate

Less conservative

$812 B
Baseline

$865 B
Include ages >64

$1995 B
Include growth rate for value of labor

*For full results, see poster EE12 at iHEA congress.*
Discussion

• How do we account for household or caregiver coping mechanisms in primary data collection?
  • Should we account for coping mechanisms in modeling studies?
• How might gender roles impact how we conceptualize productivity loss?
• Lost earnings due to premature death is not commonly included in economic evaluations—should it be included when assessing the impact of vaccination?
• Should indirect costs be included in economic evaluations of UHC?
Takeaways

• Methods for *identifying, measuring, valuing* productivity should be transparent and explainable
• Alternative assumptions should be explored in sensitivity or scenario analysis
• Discussions on how to include indirect costs in economic evaluations should continue!

Thank you!
Contact Information

• For more information on how productivity loss is estimated in the DOVE project, please email Gatien (gdebroucker@jhu.edu) or Libby (ewatts13@jhu.edu)