Economic Burden of influenza-associated illness in Bangladesh, 2010

Mejbah Uddin Bhuiyan
Research Investigator
Respiratory Viruses Research Group
Centre for Communicable Diseases, icddr,b

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Burden of acute respiratory infections

- Acute respiratory infections are the leading cause of death among children under five in Bangladesh.

- Surveillance has identified significant contribution of influenza viruses to acute respiratory infections.

- In 2010, the incidence of influenza-associated SARI:
  - 6.5/1000 person-years among patients <5 years
  - 1.3/10,000 person-years among patients ≥ 5 years

- In 2010, the incidence of influenza-associated ILI:
  - 17/100 person-years
Economic burden of respiratory illness

• Cost of treatment of a hospitalized child with pneumonia:
  • US$94 per illness episode
  • 75% of families had to spend >50% of their monthly expenditure

• During 2009 pandemic H1N1 period:
  • US$6 for treatment of an influenza-like-illness episode

• Treatment of respiratory illness is expensive for people in Bangladesh:
  • Per capita income is US$700
  • Nearly 50% live below poverty line
Objective

• To determine the economic burden of influenza-associated illness in Bangladesh
Methodology

• **Study settings**
  
  • National hospital based influenza surveillance sentinel sites with defined catchment areas
  
  • Collaborative project between GoB and icddr,b
  
  • Four tertiary level hospitals: 3 govt. public hospitals, one private hospital
  
  • The majority of the catchment areas were rural

• **Study duration:** May to October 2010
Methodology

• **Identification and enrollment of study respondents**
  
  • We identified hospitalized and ambulatory patients who tested positive for Influenza A, B by rRT-PCR during routine surveillance activities

• Research assistants visited case-patient’s residence

• Collected information using structured questionnaire:
  
  • Direct cost = Registration/consultation fee + medicine cost + diagnosis test cost + Hospital bed rent + Transportation cost + Cost of food

  • Indirect cost = Lost income during illness period

  • Out-of-pocket cost and hospital subsidy
• Estimation of annual national economic burden of influenza:
  - As a function of annual number of influenza-associated illness and median cost of each illness episode
  - Monte Carlo simulation to estimate annual economic burden with its confidence interval
# Respondents’ profile

<table>
<thead>
<tr>
<th>Category</th>
<th>Hospitalized patient</th>
<th>Outpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrolled case-patients</td>
<td>41</td>
<td>132</td>
</tr>
<tr>
<td>Enrolled from public hospital, n (%)</td>
<td>25 (61)</td>
<td>111 (84)</td>
</tr>
<tr>
<td>Enrolled from private hospital, n (%)</td>
<td>16 (39)</td>
<td>21 (16)</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>23 (56)</td>
<td>69 (52)</td>
</tr>
<tr>
<td>Age distribution, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;15 years</td>
<td>13 (32)</td>
<td>82 (62)</td>
</tr>
<tr>
<td>15-49 years</td>
<td>14 (34)</td>
<td>46 (35)</td>
</tr>
<tr>
<td>≥50 years</td>
<td>15 (34)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Household income (US$), median (IQR)</td>
<td>136 (100–186)</td>
<td>129 (86–176)</td>
</tr>
<tr>
<td>Days between symptom onset to hospital visit, mean (range)</td>
<td>3 (2–5)</td>
<td>3 (2–5)</td>
</tr>
<tr>
<td>Hospital stay in days, median (IQR)</td>
<td>3 (3–4)</td>
<td>N/A</td>
</tr>
</tbody>
</table>
## Cost of influenza associated illness, US$

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Hospitalized patient</th>
<th>Outpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Median (US$)</td>
</tr>
<tr>
<td><strong>Direct cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicine cost</td>
<td>41</td>
<td>18</td>
</tr>
<tr>
<td>Diagnostic cost</td>
<td>34</td>
<td>12</td>
</tr>
<tr>
<td>Transportation cost</td>
<td>41</td>
<td>4</td>
</tr>
<tr>
<td>Food cost</td>
<td>36</td>
<td>3</td>
</tr>
<tr>
<td>Hospital bed charge</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total direct cost</strong></td>
<td>41</td>
<td><strong>45</strong></td>
</tr>
<tr>
<td><strong>Indirect cost (US$)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Productivity loss of patient</td>
<td>20</td>
<td>21</td>
</tr>
<tr>
<td>Productivity loss of caregiver (s)</td>
<td>38</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total indirect cost</strong></td>
<td>40</td>
<td><strong>22</strong></td>
</tr>
<tr>
<td><strong>Cost of influenza illness/episode</strong></td>
<td>41</td>
<td><strong>65</strong></td>
</tr>
</tbody>
</table>
Estimates of national economic burden

• National annual economic burden of influenza-associated hospitalization in 2010:
  - US$ 8.3 million
  - Direct cost US$ 5.6 million (95%CI: 5.4–5.8)
  - Indirect cost US$ 2.8 million (95% CI: 2.6–2.8)

• National annual economic burden of ambulatory influenza-associated illness in 2010:
  - US$ 125 million
  - Direct cost US$ 80 million (95%CI: 73–89)
  - Indirect cost US$ 46 million (95% CI: 41–49)
Coping strategies

• Cost of ambulatory influenza illness had limited impact on household expenditure

• Influenza-associated hospitalization cause severe financial burden:
  • 50% families spent >50% of their monthly income
  • 86% of monthly income for families in lowest wealth quintile
  • 61% families took loan with a mean monthly interest of 77%
  • 63% families had to cut down food expenditure
Key findings

• Cost of ambulatory influenza illness -- >90% of annual economic burden

• Cost per episode of ambulatory influenza illness is relatively low

• Influenza-associated hospitalization resulted in significant financial hardship to families in Bangladesh
  • High out-of-pocket expenditure
Policy implications

• Universal vaccination may not currently be cost-effective for Bangladesh
  • Low treatment cost of ambulatory influenza illness compared to vaccine cost

• Areas to investigate:
  • Understand the impact and cost-effectiveness of immunizing high-risk groups
  • Availability of lower-cost influenza vaccine
  • Potential ways to cover hospitalization cost to mitigate financial hardship for families (health care financing)
Acknowledgement

• Study participants and field research assistants

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