Burden of foodborne disease in Ethiopia

Estimates of Pull-Push project to inform national food safety management

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What is burden of foodborne disease?

- Health burden of foodborne disease
  - Cases, deaths, Disability-Adjusted Life Years (1 DALY = 1 healthy life year lost, summary measure of population health)

- Economic costs of foodborne disease
  - Willingness to pay (WTP) to reduce risk of death
  - WTP to reduce risk of pain and suffering
  - Productivity losses
  - Medical treatment costs
  - (Individual expenditures on illness prevention)
Global burden of foodborne disease in 2010

- WHO: Foodborne Disease Burden Epidemiology Reference Group (FERG)
- Global and regional cases, deaths and DALYs for 31 foodborne hazards in 2010

http://www.who.int/foodsafety/areas_work/foodborne-diseases/ferg/en/
Global burden of foodborne disease in 2010

- All hazards: 600M illnesses; 420k deaths; 33M DALY
- Diarrheal hazards: 550M illnesses; 230k deaths; 18M DALY

Health burden foodborne disease in Ethiopia 2017

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Incidence (× 1,000)</th>
<th>Incidence per 100,000</th>
<th>Mortality</th>
<th>Mortality per 100,000</th>
<th>DALY (× 1,000)</th>
<th>DALY per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campylobacter spp.</td>
<td>2,800 (310–8,600)</td>
<td>2,640 (300–8,100)</td>
<td>704 (320–1,160)</td>
<td>0.66 (0.30–1.09)</td>
<td>62.6 (28.6–102)</td>
<td>58.8 (26.9–95.9)</td>
</tr>
<tr>
<td>Enterotoxigenic E. coli</td>
<td>1,070 (140–2,680)</td>
<td>1,000 (130–2,510)</td>
<td>1,170 (180–2,440)</td>
<td>1.09 (0.16–2.30)</td>
<td>91.3 (13.8–193)</td>
<td>85.8 (13.0–181)</td>
</tr>
<tr>
<td>Non-typhoidal S. enterica</td>
<td>1,110 (100–3,290)</td>
<td>1,050 (100–3,090)</td>
<td>1,420 (320–2,450)</td>
<td>1.33 (0.30–2.30)</td>
<td>101 (22–175)</td>
<td>95.1 (20.8–165)</td>
</tr>
</tbody>
</table>

^Mean (95% uncertainty interval).

- ~5 million cases (1 of 20 people got sick), ~3.3k deaths, ~255k healthy life years lost (0.2% total healthy life expectancy)
- Total health burden of foodborne disease at least twice as high
- Children under 5 (15% of population) bear 49% of health burden of *Salmonella* and 63% of health burden of *Campylobacter* and ETEC
Attribution to food products

- Large uncertainty, quantified by structured expert elicitation
- Food groups (e.g., vegetables), food types (e.g., tomatoes), food products (e.g., tomatoes consumed raw)
- 12 experts, performance-based weighting

Cost of foodborne disease in Ethiopia in 2017

- Three pathogens, all foods: 723 million Int$2017
- 0.9% of Gross National Income in 2017
- Productivity losses 513 million Int$2017 (71%)
- WTP death 192 million Int$2017 (27%)
- WTP pain/suffering 18 million Int$2017 (2%)

Burkina Faso: ~835k cases, ~1.9k deaths, ~132k DALY, 391 million Int$2017, 3.0% of GNI

Hospital study medical costs 144 million Int$2020

Van Wagenberg CPA, Havelaar AH. Economic costs related to foodborne disease in Burkina Faso and Ethiopia in 2017. Front Sustain Food Syst (2023) 7: 1227430

Cost of foodborne disease in 2017 by pathogen and product

- Salmonella 288 million Int$2017 (40%), ETEC 253 million (35%), Campylobacter 181 million (25%)
- Costs of chicken meat 8 times costs of tomatoes
Cost of foodborne disease in 2017 by age group

Children under 5 years are
- 15% of population
- but bear
  - 40-50% of Salmonella costs
  - 40-70% of Campylobacter costs
  - 50-70% of ETEC costs
Conclusions

- The disease burden and economic costs of foodborne disease are substantial in Ethiopia and Burkina Faso
- Children under 5 years of age bear disproportionally large part of the disease burden and economic costs
- Increased efforts to reduce foodborne illness will improve public health and the economy
- Attribution to pathogen and food group can aid in designing targeted effective and efficient policies and policy interventions
Acknowledgement Pul-Push Project

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- Economic costs: Tadesse Guadu Delele, Arie Havelaar
- Attribution: Arie Havelaar, Amanda Sapp, Mirna Amaya, Tina Nane, 12 experts from or working in Ethiopia
References


