



The Individual and Annual Health Costs of Foodborne Illness in the United States

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Food Safety: Costs in the United States and Global Consequences
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Overview

- Economic welfare-based method to estimate the health costs associated with foodborne illness (FBI)
 - Consists of known viruses, bacteria, parasites, allergens, two marine biotoxins, and unspecified illnesses
 - Present both lost QALYs and dollars
- Accounts for reductions in well-being from both functional disability and physical symptoms
 - Primary illness, secondary effects, and premature mortality; as well as the direct medical costs

Main Findings

- Other studies have estimated the annual burden of FBI in the US totals between \$9-\$152 Billion
- We estimate an annual burden of \$29.6 billion
 - Average identified illness reduce QALDs by 0.96
 - Monetizing and adding in direct medical costs corresponds to a loss of \$2,981

Methodology

- Cost of foodborne illness (CFI_i) is represented by:

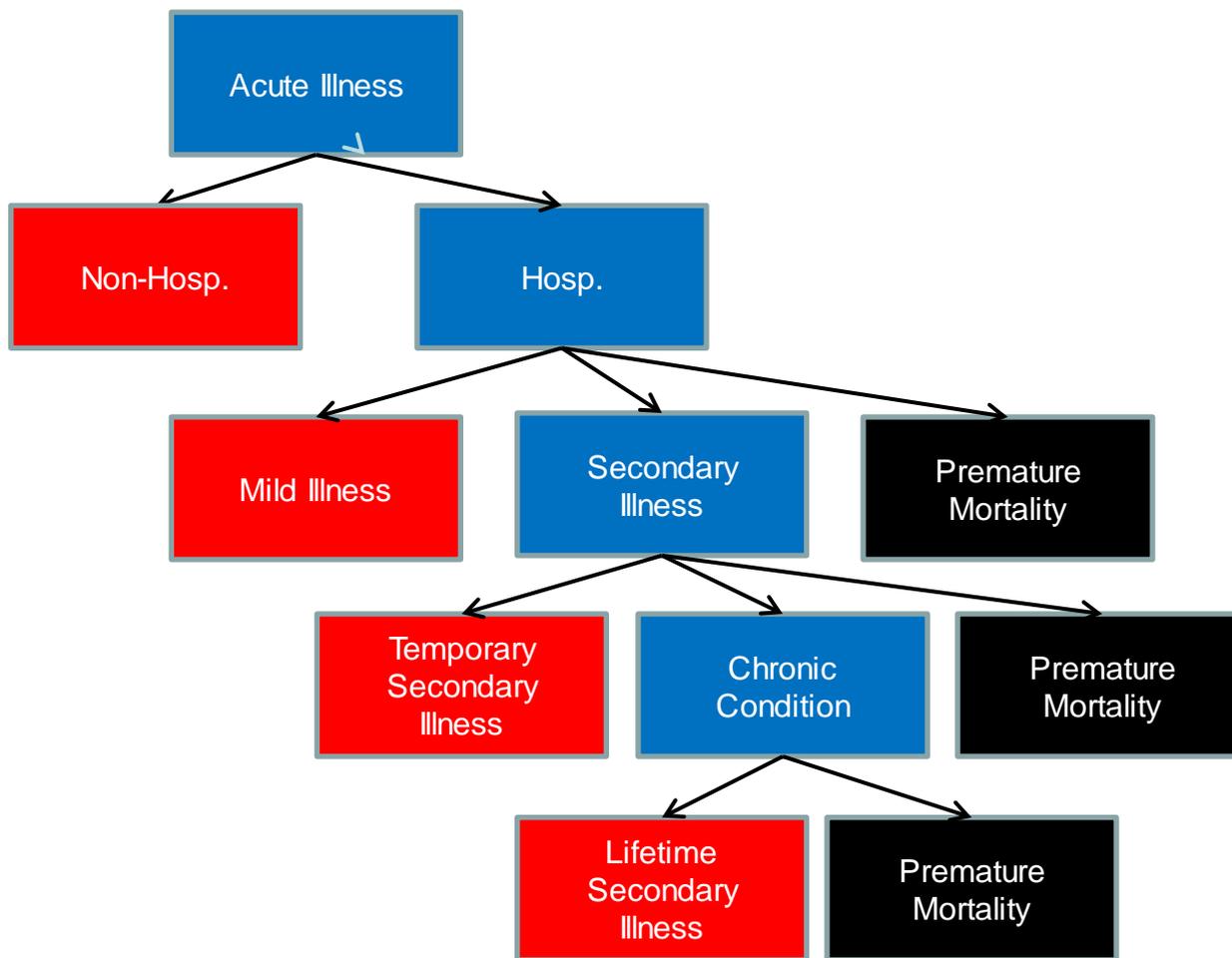
$$CFI_i = (AHL_i + SHL_i + PM_i)VSLY + AMC_i + SMC_i$$

- Where acute health (ahl_i) loss:

$$ahl_i = [(q_n - q_i)/q_n]t_i$$

$$AHL_i = \alpha_{m,i}ahl_{m,i} + (1 - \alpha_{m,i})ahl_{h,i}$$

Foodborne Illness Modeling



Data

- Foodborne Illness Acquired in the United States-Major Pathogens & Unspecified Agents (Scallan et al., 2011)
- Publicly available data on the pathogens not covered by Scallan, et al., as well as duration and incidence estimates from a variety of peer-reviewed, public sources



SELECTED LOSS PER FOODBORNE ILLNESS

		Average Per Case Loss		
Bacteria		QALD		Monetary
	Campylobacter spp.	2.41		\$2,780
	Clostridium botulinum	33.87		\$1,472,147
	E. coli O157:H7	5.27		\$8,510
	Listeria monocytogenes	26.79		\$1,410,385
	Salmonella spp. (non-typhoidal)	1.88		\$4,717
	Vibrio vulnificus	30.44		\$3,786,336
Parasites				
	Toxoplasma gondii	6.15		\$38,915
Viruses				
	Hepatitis A virus	3.64		\$40,714
	Norovirus	0.32		\$270
Marine toxins				
	Ciguatoxin	12.72		\$22,547
	Scombrototoxin	0.14		\$1,252
Food Allergic Reaction				
	unspecified agent	0.23		\$2,373
		0.31		\$248
	WEIGHTED AVERAGE	0.45		\$613
	W.A. Excluding unidentified	0.96		\$2,981



SELECTED ANNUAL LOSS PER FOODBORNE ILLNESS

	Average Annual Loss	
	QALD	Monetary (in \$1,000s)
Bacteria		
Campylobacter spp.	2,036,017	\$2,349,053
Clostridium botulinum	1,863	\$80,968
E. coli O157:H7	332,877	\$537,444
Listeria monocytogenes	42,628	\$2,243,923
Salmonella spp. (non-typhoidal)	1,927,518	\$4,846,653
Vibrio vulnificus	2,922	\$363,488
Parasites		
Toxoplasma gondii	532,968	\$3,373,378
Viruses		
Hepatitis A virus	5,700	\$63,758
Norovirus	1,751,158	\$1,476,079
Marine toxins		
Ciguatoxin	1,157,146	\$2,051,471
Scombrototoxin	3,333	\$30,190
Food Allergic Reaction	96,378	\$978,611
unspecified agent	12,030,782	\$9,506,865
TOTAL Annual Loss of all Foodborne Pathogens	21,584,720	\$29,555,540

Conclusions

- In addition to the 31 identified pathogens from Scallan et al., we also present costs for one additional pathogen (*Cronobacter* spp.), two marine biotoxins (Ciguatoxin and Scombrototoxin), foodborne allergic reactions, and unspecified agent illnesses.
- Costs include both WTP to avoid illness and complications, as well as the direct medical costs that are likely to occur as a result of contracting a particular FBI
- The inclusion of all these factors makes this analysis the most comprehensive look at the economic consequences of FBI to date.

Conclusions (cont.)

- Can be used to analyze an incredibly broad spectrum of food safety policies
 - Including those that address a wide variety of FBIs, such as the Food Safety Modernization Act's Preventive Controls and Produce rules
 - As well as more broad regulations where a specific pathogen may not be readily implicated
- Can be updated easily as new info on the individual pathogens becomes available, and changes to the methodology can be incorporated as future studies emerge