

United States Department of Agriculture

ERS Cost of Foodborne Illness Data Product

Sandra Hoffmann (ERS) Bryan Maculloch (FSIS)



Builds on a decade plus of research on cost of foodborne illness at ERS

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Economic cost of Guillain-Barré syndrome in the United States



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Address correspondence and reprint requests to Dr. Frenzen, Economic Research Service, US Department of Agriculture, 1800 M Street, N.W., Washington, DC 20036-5831 pfrenzen@ers usda gov

doi: 10.1212/01.wnl.0000316393.54258.d1 Neurology July 1. 2008 vol. 71 no. 1.21-27



Based on More Recent Publications by Hoffmann, Batz and Morris

FOODBORNE PATHOGENS AND DISEASE Volume 11, Number 5, 2014 © Mary Ann Liebert, Inc. DOI: 10.1089/fpd.2013.1658

> Disease-Outcome Trees, EQ-5D Scores, and Estimated Annual Losses of Quality-Adjusted Life Years (QALYs) for 14 Foodborne Pathogens in the United States

> > Michael Batz,1 Sandra Hoffmann,2 and J. Glenn Morris, Jr.1

Journal of Food Protection, Vol. 75, No. 7, 2012, Pages 1278–1291 doi:10.4315/0362-028XJFP-11-418

Ranking the Disease Burden of 14 Pathogens in Food Sources in the United States Using Attribution Data from Outbreak Investigations and Expert Elicitation[†]

MICHAEL B. BATZ,¹* SANDRA HOFFMANN,^{2,3} and J. GLENN MORRIS, JR.¹

Journal of Food Protection, Vol. 75, No. 7, 2012, Pages 1292–1302 doi:10.4315/0362-028XJFP-11-417

Annual Cost of Illness and Quality-Adjusted Life Year Losses in the United States Due to 14 Foodborne Pathogens[†]

SANDRA HOFFMANN,¹* MICHAEL B. BATZ,² and J. GLENN MORRIS, JR.²

¹U.S. Department of Agriculture, Economic Research Service, 355 E Street S.W., Washington, D.C. 20024; and ²Emerging Pathogens Institute, University of Florida, P.O. Box 100009, Gainesville, Florida 32610-0009, USA

MS 11-417: Received 17 September 2011/Accepted 12 January 2012

Designed to Extend ERS Col Calculator

- Expands Scope
 - 4 pathogens \rightarrow 15 pathogens
- Updates with New CDC Incidence Estimates
 - − Mead et al. 1999 \rightarrow Scallan et al. 2011
 - Updates for Economic Growth
 - − 2009 dollars \rightarrow 2013 dollars



Based on More Recent Publications by Hoffmann, Batz and Morris, slide 2

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Designed to Extend ERS Col Calculator

- Provides more health outcomes
 - Prior estimates at FSIS would adjust case incidences to fit the ERS calculators health outcomes
- Updates the VSL estimates to be more in line with current methodologies and regulatory Agency estimates
 - VSL changing with age → VSL held constant and includes WTP estimates

Health outcomes now include costs in Excel spreadsheets with more chronic conditions



FSIS can use the Cost of Illness Figures to Calculate Benefits for Rule Making

Public Health Benefits found in the Poultry Slaughter Rule ERS cost of illness figures 2010 with [2013] ERS COI.

| | Primary Estimate \$mil (Annual Averted Illnesses) | Low Estimate \$mil (Annual Averted Illnesses) | High Estimate \$mil (Annual Averted Illnesses) |
|---|--|--|---|
| Annual Salmonella Cost Savings and Averted Illnesses: | \$9.64 million [\$14.2 million] (3,980 illnesses averted) | \$3.66 million [\$5.39 million] (1,510 illnesses averted) | \$16.86 million [\$24.84 million] (6,960 illnesses averted). |
| Annual <i>Campylobacter</i> Cost Savings and Averted Illnesses: | \$1.74 million [\$1.92] (840 illnesses averted) | \$0.21 million [\$.23 million] (100 illnesses averted) | \$3.84 million [\$4.25 million] (1,860 illnesses averted) |
| Total Cost Savings | \$11.38 million [\$16.12 million] | \$3.87 million [\$5.62 million] | \$20.71 million [\$29.08 million] |



ERS Cost of Illness Data Product Overview



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USDA Website: Data Product Overview

Cost Estimates of Foodborne Illnesses

| - | | | | | |
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Documentation

How to Read a Worksheet

Glossary

Topics

Animal Products

Crops

Farm Economy

Farm Practices & Management

Food & Nutrition Assistance

Overview

The Cost Estimates of Foodborne Illnesses data product provides detailed data about the costs of major foodborne illnesses in the United States. This data set includes 1) detailed identification of specific disease outcomes for foodborne infections caused by 15 major pathogens in the U.S.; 2) associated outpatient and inpatient expenditures on medical care; 3) associated lost wages; and 4) estimates of consumers' willingness to pay to reduce mortality resulting from these foodborne illnesses in the U.S. population. Disease outcomes include both acute illness and chronic disease that sometimes follows these acute illnesses. These 15 pathogens account for over 95 percent of the illnesses and deaths from foodborne illness in the U.S. for which the U.S. Centers for Disease Control and Prevention (CDC) can identify a pathogen cause. These estimates build on CDC estimates of the incidence of foodborne disease; peer-reviewed synthesis of data on medical costs; economic, medical and epidemiological literature; and publically available data on wages.

This data product provides federal agencies such as the Food Safety Inspection Service (FSIS) with a set of consistent, peer-reviewed estimates of the costs of foodborne illness that can be used in analyzing the impact of federal regulation. It also provides other stakeholders and the general public with a means of understanding the relative impact of different foodborne infections in the U.S. Cost estimates of foodborne illnesses have been used in the past to help inform food safety policy discussions, and these updated cost estimates will provide a foundation for economic analysis of food safety policy.



Excel Spreadsheets Are Accessible through the Overview Page

This product consists of 15 Excel files detailing disease outcomes for each pathogen together with associated costs, technical notes and documentation, and links to associated research projects and publications.

- · Campylobacter all species
- · Clostridium perfringens
- · Cryptosporidium parvum
- Cyclospora cayetanensis
- Escherichia coli O157
- Non-O157 Shiga toxin-producing Escherichia coli
- Listeria monocytogenes
- Norovirus
- · Salmonella (nontyphoidal)
- · Shigella all species
- Toxoplasma gondii
- · Vibrio parahaemolyticus
- Vibrio vulnificus
- · Vibrio all species other
- Yersinia enterocolitica
- Consumer Price Indexes
- Value of Statistical Life Year







Example Spreadsheet File: Cryptosporidium Mean Estimate

Cost of foodborne illness estimates for Cryptosporidium parvum

Mean estimates, 2013

| | Total cases | | | Acute illnesses C zed Hospitalized Post-hospitalization outcomes ed Post- ician; hospitalization vered Hospitalized | | | | | | | | | |
|---|-----------------|---|---|---|---|-----------------------|------------------|--|--|--|--|--|--|
| | | Non-hos | pitalized | Hospitalized | Post-hospitalizat | tion outcomes | | | | | | | |
| Health Outcomes | | Didn't visit physician; recovered | Visited physician; recovered | Hospitalized | Post- hospitalization Recovery | Hospitalized; died | Diarrhea relapse | | | | | | |
| Number of cases | 57,616 | | | | | | | | | | | | |
| Cases by Outcome | | 50,723 | 6,683 | 210 | 206 | 4 | 16,709 | | | | | | |
| Medical Costs Physicians office visits Emergency room visits Outpatient clinic visits Hospitalizations Total medical costs by outcome | | \$0 | \$1,272,125 \$382,918 \$1,320,973 \$0 \$2,976,017 | \$19,986 \$36,095 \$27,671 \$4,717,361 \$4,801,112 | 5 \$28,007 5 \$0 - \$0 - \$0 2 \$28,007 | | | | | | | | |
| Premature death | | | | | | \$34,629,428 | | | | | | | |
| Productivity loss, non-fatal cases | | \$5,734,426 | \$1,570,853 | \$108,361 | \$70,865 | | \$1,894,584 | | | | | | |
| Total costs by outcome | | \$5,734,426 | \$4,546,869 | \$4,909,473 | \$98,872 | \$34,629,428 | \$1,894,584 | | | | | | |
| Total Cost of Illness | \$51,813,651.77 | | | | | | | | | | | | |



Example per Case Assumption: Cryptosporidium

| | | | | Acute ill | nesses | | Chronic illnesses |
|------------------|----------------------------------|--------------|------------|--------------|----------------------|--------------------|-------------------|
| | | Non-ho | spitalized | Hospitalized | Post-hospital | ization outcomes | |
| | | Didn't visit | Visited | | | | |
| | | physician; | physician; | | Post-hospitalization | | |
| | | recovered | recovered | Hospitalized | recovery | Hospitalized; died | |
| Health | Outcomes | | | | | | |
| Medical Costs | Physicians Office Visits | | | | | | |
| | Average visits per case | | 0 1.4 | 0.7 | ' 1 | | 0 |
| | average cost per visit | \$135.9 | 6 \$135.96 | \$135.96 | 5 \$135.96 | \$0.00 | \$135.96 |
| | Emergency Room Visits | | - , | | , | , | , |
| | Average visits per case | | 0 0.1 | 0.3 | 8 0 | | 0 |
| | Average cost per visit | \$572.9 | 3 \$572.93 | \$572.93 | \$572.93 | | \$572.93 |
| | Outpatient clinic visits | | | | · | | |
| | Average visits per case | | 0 0.3 | 0.2 | 2 0 | | 0 |
| | Average cost per visit | \$658.8 | 3 \$658.83 | \$658.83 | \$658.83 | \$0.00 | \$658.83 |
| | Hospitalizations | | | | | | |
| | Average admissions per case | | 0 0 | 1 | 0 | C | 0 0 |
| | Average cost per hospitalization | \$0.0 | 0 \$0.00 | \$22,463.62 | \$0.00 | \$0.00 | 0 0 |
| | Total medical cost per case | \$0.0 | 0 \$445.28 | \$22,862.44 | \$135.96 | \$0.00 | 0 |
| Produ | ctivity loss, non-fatal cases | | | | | | |
| | Proportion of cases employed | 0.4 | 4 0.46 | 0.43 | 0.43 | | 0.44 |
| | Average number of work days lost | 1.0 | 0 2.00 | 4.56 | 5 3.04 | | 1 |
| | Average daily earnings | \$254.2 | 9 \$256.09 | \$262.73 | \$\$262.73 | \$0.00 | \$257.70 |
| | Total productivity loss per case | \$113.0 | 5 \$235.04 | \$516.00 | \$344.00 | | \$113.39 |
| Prema | ture death | | | | | | |
| | Low value per death | | | | | \$1,574,064.92 | 2 |
| | Mean value per death | | | | | \$8,657,357.03 | 3 |
| | High value per death | | | | | \$15,740,649.15 | 5 |



The Website Provides Information Needed to Update Estimates

- For inflation: Consumer Price Indexes
- For VSL: Time series on VSL estimates
- Instructions on how to use this data to update existing estimates

| Annual CPI component 1 | ERS assumption to be converted | | 2000 | | | | 2013 |
|---|--|--|-------|--|--|--|---------|
| | Average Daily Earnings or total Productivity Loss | | | | | | |
| | Medical and Special education | | | | | | |
| All items | Premature Death | | 172.2 | | | | 232.957 |
| Medical Care | Chronic ESRD | | 260.8 | | | | 425.1 |
| Physician services | Physician office visits | | 244.7 | | | | 354.2 |
| Prescription drugs and medical supplies | Prescription medications | | 285.4 | | | | 442.6 |
| OTC drugs ² | nonprescription drugs or medications | | | | | | 99.4 |
| Inpatient Hosp Services | Hospital Admissions | | 113.8 | | | | 259.7 |
| Outpatient Hospital | Emergency room and other outpatient hosp visits | | 263.8 | | | | 601 7 |



Current Plan for Updating Estimates for Changes in Costs and Science

- Research needs to be conducted to update underlying estimates
 - Hospitalization costs change
 - Underlying scientific research changes and must be reviewed
- ERS plans on doing an update of the underlying estimates every 5 years



Questions to NACMPI relevant to the next 5-year update

- What additional hazards (pathogen and non-pathogen) should ERS consider?
- For hazards for which CDC does not have disease incidence estimates, how would you recommend developing estimates of incidence?
- For any of the pathogens included in the current cost estimates, is NACMPI aware of supporting evidence within the scientific literature on which to base revisions of existing estimates of the percentage of patients that have specific chronic sequelae or that would justify inclusion of additional chronic sequelae?



Questions to NACMPI relevant to the next 5-year update (cont'd)

- For any of additional hazards that NACMPI recommends ERS considers, is NACMPI aware of supporting evidence within the scientific literature that would justify inclusion of chronic outcomes?
- Is NACMPI aware of supporting evidence within the literature that would suggest a change in the type or likelihood of health outcomes associated with pathogens in the current model? For example, have you seen advances in treatments/diagnoses that have led to a change in the percentage of hospitalizations that involve care in ICU or a change in the likelihood of hospitalizations resulting in death?



Contact Information

Sandra Hoffmann USDA Economic Research Service <u>shoffmann@ers.usda.gov</u> (202) 694-5354

Bryan Maculloch USDA Food Safety and Inspection Service <u>Bryan.Maculloch@fsis.usda.gov</u> (301) 504-0892

