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Economic Burden of Major Foodborne Illnesses Acquired in the United States

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What Is the Issue?

Each year, one in six people in the United States is sickened by a foodborne illness. Government, industry, and others expend considerable resources in trying to prevent these foodborne illnesses. To best marshal these resources, food industry managers and policy-makers need to know both the value of these efforts to society and how to target use of these resources. Estimates of the economic burden of illness provide a conservative measure of how much people are willing to pay to prevent these illnesses. This report provides an overview of recent estimates of the economic burden imposed annually by 15 leading foodborne pathogens in the United States. It also provides individual pathogen “pamphlets” that include:

- a description of the course of illness that can follow an infection with the pathogen;
- a summary of information about the pathogen’s annual foodborne illness incidence and economic burden relative to other foodborne pathogens;
- a disease-outcome tree showing how many people experience different outcomes from foodborne exposure to the pathogen in the United States each year; and
- a pie chart showing the annual economic burden associated with different health outcomes resulting from infection with the pathogen.

What Did the Study Find?

Foodborne pathogens impose over \$15.5 billion (2013 dollars) in economic burden on the U.S. public each year. Just five pathogens cause 90 percent of this burden. Estimates of economic burden per case vary greatly, ranging from \$202 for *Cyclospora cayetanensis* to \$3.3 million for *Vibrio vulnificus*.

- Fifteen pathogens cause 95 percent or more of the foodborne illnesses, hospitalizations, and deaths in the United States for which a specific pathogen cause can be identified. They are *Campylobacter* spp., *Clostridium perfringens*, *Cryptosporidium* spp., *Cyclospora cayetanensis*, *Listeria monocytogenes*, Norovirus, *Salmonella* non-typhoidal species, *Shigella* spp., STEC O157, STEC non-O157, *Toxoplasma gondii*, *Vibrio vulnificus*, *Vibrio parahaemolyticus*, *Vibrio* other non-cholera species, and *Yersinia enterocolitica*.
- Eighty-four percent of the economic burden from these 15 pathogens is due to deaths. This reflects both the importance the public places on preventing deaths and the fact that the measure of economic burden used for nonfatal illnesses (medical costs + productivity loss) is a conservative measure of willingness to pay to prevent nonfatal illness.

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- Pathogens' rankings by total economic burden generally follow their rankings by economic burden due to pathogen-related deaths, with notable exceptions. *Campylobacter* causes slightly more deaths per year than Norovirus, yet because of the very large number of nonfatal cases caused by Norovirus, its economic burden is higher than that of *Campylobacter*. The high medical costs and productivity losses caused by *Clostridium perfringens* contribute to its total economic burden exceeding those of three other pathogens with higher economic burden due to deaths (*Vibrio vulnificus*, *Yersinia enterocolitica*, and STEC O157).
- Estimates of the incidence of foodborne disease acquired in the United States, and therefore economic burden estimates, are very uncertain. The U.S. Centers for Disease Control and Prevention (CDC) estimates that the foodborne disease incidence from these 15 pathogens could range from 4.6 million to 15.5 million cases in a typical year. Based on this range of incidence estimates, economic burden could range from \$4.8 billion to \$36.6 billion (2013 dollars).

How Was the Study Conducted?

This report provides estimates of the costs of foodborne illnesses based on recently published journal articles. The estimates from that research, updated for inflation and income growth to 2013 values, are available in ERS's Cost-of-Illness Estimates for Major Foodborne Illnesses in the U.S. data product at <http://www.ers.usda.gov/data-products/cost-estimates-of-foodborne-illnesses.aspx>.

This report summarizes the findings from the ERS data product and provides additional educational materials based on the data product and journal articles targeted to a broad audience. The data product website allows users to explore the sensitivity of economic burden estimates to modelling assumptions. The data product also provides the information needed to update estimates for inflation and income growth over time.

The estimates underlying this report extend and update prior ERS cost-of-illness estimates by adding 11 pathogens and updating cost estimates for 4 other pathogens. These new estimates combine a cost-of-illness measure of economic burden for nonfatal illnesses and a willingness-to-pay measure for deaths. The estimates for new pathogens are based on a synthesis of data sources, including National Inpatient Sample data on hospitalization costs, and existing scientific literature. Estimates for all pathogens use 2011 CDC estimates of the incidence of foodborne illnesses acquired in the United States and associated hospitalizations and deaths. In modeling the likelihood of other health outcomes, the estimates rely on FoodNet data and reviews of scientific literature. In modeling the duration of illnesses and severity of health outcomes, the estimates rely on a review of clinical medical literature.