

A Method to Estimate the Burden of Foodborne Illness

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Background

According to the Centers for Disease Control and Prevention, approximately 76 million cases of food-related illness occur in the United States in a typical year. As a first step toward a measure of the direct and indirect health costs associated with these illnesses, FDA-CFSAN has developed a model to estimate the health costs of food-related illnesses caused by known viruses, bacteria, and parasites.

Methods

We estimate the costs of acute foodborne illnesses as the sum of medical expenses plus the implicit monetary costs of reduced functional status and pain and suffering. For those acute illnesses that can lead to chronic complications, we add the implicit costs of those chronic complications. We estimate the effects of an illness as the quality-adjusted life years lost due to the illness. Quality-adjusted life years measure the quality of life as some fraction of 1, which is defined as the value for a year in perfect health. The quality-adjusted measure accounts for reductions in well-being for both functional disability and physical symptoms. For each food-related illness, we calculate the lost welfare per day (using two different methods) by illness severity. We calculate the lost quality-adjusted life years by multiplying the average loss per day by the number of days the illness lasts. If chronic complications can arise after the acute phase of the illness, we add the loss from them. For chronic complications that last beyond one year, we discount the future losses before adding them to the losses from the acute phase of the illness. The outcome of the quality-adjusted life year exercise is an index for each illness, which corresponds to the mean case, with the mean estimated as a weighted (by relative frequency) average of outcomes of different illness severities. We then estimate the implicit monetary values by multiplying the value of a quality-adjusted life year by the number of quality-adjusted life years lost due to the illness. For fatal cases, we estimate the health costs by multiplying the estimated number of deaths by the monetary value of a statistical life.

Results

The model can be used to estimate the total costs for a particular illness, the total costs associated with outbreaks of one or more illnesses, or the total costs of all 14 million food-related illnesses caused by known viruses, bacteria, and parasites. The model is a series of spreadsheets, with one spreadsheet for each food-borne illness. The spreadsheet calculates a range and a best estimate for the average cost of each illness. For example, one spreadsheet is for campylobacteriosis, another for listeriosis, and so on. The model can be used to estimate the total costs for a particular illness, the total costs associated with outbreaks of one or more illnesses, or the total costs of all 14 million food-related illnesses caused by known viruses, bacteria, and parasites.

Future Work

We plan to extend the project to other food-related causes of illness, including natural toxins, marine toxins, chemical hazards, prion diseases, and allergens.