



Attributing U.S. Campylobacteriosis Cases to Food Sources, Season, and Temperature

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What Is the Issue?

Each year, foodborne pathogens sicken roughly 48 million, or 1 in 6, Americans, causing more than \$15.5 billion (in 2013 dollars) in economic damages. To efficiently manage efforts to prevent this, Government and industry need information about which foods are causing foodborne illnesses, an area of research called “food source attribution.” Food safety and public health authorities have called for development of new methods to create a larger portfolio of approaches to studying food source attribution, which will provide a more reliable picture of the roles different food exposure routes play in foodborne disease. In particular, Federal agencies have emphasized the need for new methods that maximize the use of existing datasets and focus on sporadic illness. Sporadic illnesses are those not associated with wider outbreaks and account for more than 90 percent of foodborne illness in the United States. This study develops a new approach to food source attribution of sporadic campylobacteriosis in the United States using Homescan[®] daily consumer food purchase data. This type of data has not previously been used to study food source attribution. We chose to test this approach on campylobacteriosis because research indicates that sporadic foodborne campylobacteriosis may have different food exposure routes than outbreak cases.

What Did the Study Find?

We show using scanner data on daily consumer purchases can help determine which foods cause specific foodborne illnesses.

- We find that it is possible to estimate associations between campylobacteriosis and foods using data on daily food purchases.
- Different methods of studying the link between consumption of specific foods and foodborne illness can be expected to provide complementary information on outcomes, some confirmatory and others identifying new hypotheses.

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This new food source attribution method confirmed the results of some previous studies and challenged others:

- Chicken prepared at home was not a campylobacteriosis risk factor, according to the results. This finding is consistent with a national case-control study that found consumption of chicken prepared in restaurants increased the risk of sporadic foodborne campylobacteriosis, but chicken prepared at home did not.
- Unlike prior U.S. studies, our results suggest that ground beef and berries purchased for consumption at home may be associated with increased risk of campylobacteriosis.
- Both ambient temperature and seasonality are independently associated with increased risk of sporadic campylobacteriosis in the United States.
- Geographic variation in sporadic campylobacteriosis persists even after controlling for variation in food purchases, ambient temperature, and the influence of seasonality.

How Was the Study Conducted?

We conducted cross-sectional time-series regression analysis of Foodborne Diseases Active Surveillance Network (FoodNet) illness data using household purchases of specific foods from the Nielsen Homescan[®] panel as explanatory variables, together with geographic region, temperature, and annual and seasonal fixed effects. FoodNet is an active surveillance program of the Centers for Disease Control and Prevention (CDC) and 10 State governments representing geographically diverse regions. It is the best available source of data about potentially foodborne sporadic illness in the United States and is widely used in case-control studies of foodborne illness. Homescan[®] collects data on purchases of food for home use from a panel of households located in both urban and rural areas across the United States. We studied foods purchased by consumers in counties that are in both FoodNet and Homescan[®] datasets. All food purchases were categorized based on prior research on foods associated with campylobacteriosis. Results are reported in terms of incidence rate ratios for daily campylobacteriosis incidence.

This study had to be conducted using data from 2000 to 2006 because in 2006, Homescan[®] stopped collecting quantity information on foods, like meat and fresh produce, that are sold by variable weight. The successor of Homescan[®], IRI, now collects data on expenditures on these foods rather than quantities. ERS is working on developing methods to impute the quantity purchased from this expenditure data. Our study is primarily intended to explore how new data sources could be used to help us better understand food safety risks. But the timing of the data means the substantive results of our study are most useful to provide a picture of the recent risk factors for foodborne campylobacteriosis. They do add insights into persistent questions about the relative roles of specific food exposure routes, region, seasonality, and temperature in campylobacteriosis in the United States.