



Find the full report at www.ers.usda.gov/publications/err-economic-research-report/err193

How Much Does It Matter How Sick You Get? Consumers' Responses to Foodborne Disease Outbreaks of Different Severities

Fred Kuchler

What Is the Issue?

When Federal health and safety officials recall a food product and warn consumers that the safety of that food has been compromised, do consumers understand that not all risks are alike? Or do all warnings induce the same market response because consumers cannot discriminate among pathogens and the associated risk? This case study suggests that consumers make some distinctions among pathogens and health risks. That is, larger health risks induce larger market responses.

If public health officials cannot communicate the difference between large and small food-related health risks to consumers, then public health agencies may have to focus on the larger risks, issuing more and bigger recalls and generating more publicity about specific hazards. And if consumers routinely overestimate small risks, fleeing from relatively harmless foods, public health officials might have to choose between releasing information that would protect specific subpopulations and withholding such information to avoid needless financial harm to all the businesses along the supply chain.

A unique situation provided an opportunity to empirically address whether consumers make systematic choices that take into account different health risks. Federal health and safety officials warned consumers away from cantaloupes in 2011 and again in 2012. The warnings occurred under similar market conditions, but the contaminants were different. The first recall was due to *Listeria monocytogenes* and the second from two *Salmonella* serotypes. Both cause gastrointestinal illnesses, but health outcomes from the two illnesses are very different. The Centers for Disease Control and Prevention estimates that *Salmonella* is the cause of 1 million illnesses in the United States, with 19,000 hospitalizations and 380 deaths every year. Most persons recover without treatment. In contrast, CDC estimates that approximately 1,600 illnesses and 260 deaths due to listeriosis occur annually in the United States. The *Listeria* outbreak in 2011 caused 147 illnesses, 33 deaths, and a 99-percent hospitalization rate among those who fell ill. It mostly afflicted the elderly, with 78 the median age of those who fell ill. In effect, the two foodborne health risks were entirely different. Any difference in response is likely the result of consumers treating the risks as different.

What Did the Study Find?

Empirical evidence points to consumers reacting after the 2011 recall. Consumers temporarily reduced purchases of cantaloupes, even after accounting for the influence of prices and income. Expenditures on cantaloupe were \$3.9 million (6-7 percent) lower than normal, and cantaloupe purchases were 6.2 million pounds lower over a 4-week period. Evidence from retail market transactions indicates that consumers generally understood the message and knew that other

ERS is a primary source of economic research and analysis from the U.S. Department of Agriculture, providing timely information on economic and policy issues related to agriculture, food, the environment, and rural America.

melons were safe: in the weeks after cantaloupe were implicated, purchases of watermelon increased 1.0 million pounds and purchases of honeydew increased 3.7 million pounds, leaving total expenditures on melons largely unchanged.

A year later, when Federal health and safety officials again recalled some cantaloupe, this time for *Salmonella* contamination, consumer response was more muted. Intensity of news media coverage appears to be associated with the differing consumer responses: the *Listeria* outbreak received substantially more coverage than the *Salmonella* one.

The differing retail market responses point to consumers recognizing that *Listeria monocytogenes* poses more profound risks than do the identified *Salmonella* serotypes. The listeriosis fatality rate is extraordinarily high among the elderly. Shifting melon demand indicates that some consumers took defensive actions to protect themselves. *Salmonella* did not pose as great a risk of death, and the *Salmonella* warning did not induce a measurable market response. As such, there is evidence that consumers were informed about these relative risks. As long as consumers are concerned about the various foodborne illness risks they face and are informed about the severity of those risks, it would follow that observed market responses can be attributed to news about changes in risks.

How Was the Study Conducted?

It is possible to empirically test whether consumers make reasoned choices when they find out that safety of a food has been compromised. Examining retail demand before and after information is released is a vehicle for doing so. When consumers are made aware that food safety has been compromised, a reasonable expectation is that demand will fall—quantity demanded falls even with prices unchanged. If consumers are making reasoned choices about the risk they find acceptable or unacceptable, the bigger risk ought to induce a bigger shift in retail demand. Separating out the weeks immediately after the first news about the *Listeria* and *Salmonella* outbreaks yields a quantitative measure of consumers' responses to the two outbreaks and can reveal whether and to what extent consumers' responses differed. Finding similar responses would suggest that consumers do not make reasoned decisions about risks. Finding a larger response to *Listeria* news would suggest that the higher lethality of *Listeria* matters to consumers and the news provided the information consumers rely on to make choices over risks they face.

The paired comparison of warnings about cantaloupe is ideal for determining how much relative foodborne illness risks matter to consumers. The two outbreaks occurred within a year's time under conditions that minimize the problems caused by confounding variables. Although the two farms identified as supplying contaminated melons were in different States, the market conditions under which the warnings were issued were similar. Further, the market conditions prevailing at the time of the warnings ensure that any direct impacts (the recalls) or indirect impacts (increased liability concerns) the warnings might have had on the supply chain were relatively small. Thus, the main differences between the market impacts of the two outbreaks were driven by changes on the demand side of the retail cantaloupe market.

To compare consumers' responses to the two warnings, a model of the retail demand for melons was estimated. The model takes the (linear approximate) Almost Ideal Demand System form. Treating the warnings as external shocks to retail demand, it is possible to estimate how much demand for major varieties of melons shifted following each warning. The two measured shifts were compared, given the different risk posed by *Salmonella* and by *Listeria*.

Proprietary data on food purchases from IRI, denoted InfoScan, were used to estimate retail demand for melons. Retail establishments across the United States and Puerto Rico provide IRI weekly records of all transactions (dollar expenditures and quantity), with a separate line for each item that crossed a store's scanner. The stores reporting include grocery stores, supermarkets, supercenters, convenience stores, drug stores, and liquor stores. Data were tallied on a weekly basis over 2009-2012, with 209 observations for each type of melon: cantaloupe, watermelon, mini seedless watermelon (including Mickey Lee/Sugarbaby), honeydew, and all others.