

FOOD PRACTICES AND DIARRHEAL DISEASES: VOX POPULI

WITH THE HOLIDAY season upon us, and visions of groaning sideboards become reality, our thoughts naturally turn to nausea, diarrhea, and other manifestations of foodborne illness. It would be an understatement to say that gastroenteritis has many causes. Even if we restrict ourselves to enteric infections, dozens of viruses, parasites, and bacteria readily come to mind, and with better reference materials than memory, the list seems almost endless. Official surveillance statistics (see figure, for example) grossly underestimate the burden of these diseases. For an illness to be counted, the afflicted must become sick enough to seek medical advice; the practitioner must request a specimen; the patient must produce it and submit it properly; the lab must choose a test appropriate for the pathogen and must get a positive culture or other identification; and someone* must inform the patient's local health department—assuming, of course, that the disease is one of the handful that are reportable.

An unknown proportion of gastroenteritis is foodborne. Many enteric infections can be transmitted via food, often (but by no means exclusively) via fecal contamination of foodstuffs that are then insufficiently processed to kill these pathogens or inactivate their toxins. In addition to ingestion directly on food, many pathogens can be acquired parapratically—the result of cross-contamination of fomites, fingers, and the like.

While the whole truth is complicated, certain foods have clearly become associated with certain illnesses in the minds of both epidemiologists and many consumers. Take the test: “hamburger is to *Escherichia coli* O157:H7 as raw eggs are to <blank>.” “Poultry is to *Campylobacter* as oysters are to <blank>.” But this kind of “knowledge” often reflects an imperfect understanding of the issues at hand. Not everyone has the time or inclination

to become an expert in the transmission of foodborne disease, but almost everyone can benefit from some knowledge of which foods are high-risk (and why) and some familiarity with basic safe food-handling practices. But how can we spread the word? Who will hear it, and who will heed it? Would we be able to tell if the problem of foodborne illness gets better—or worse?

By now you may be wondering if this article is going to have a point. OK, Mr. Don't-Bury-the-Lead, let's get to it.

The Foodborne Diseases Active Surveillance Network (aka FoodNet) is a collaborative effort among the Oregon, California, Connecticut, Georgia, and Minnesota state health departments and the CDC, with major funding support provided by American taxpayers through the USDA and FDA.† The goals of FoodNet include determining more precisely the burden of foodborne diseases and the proportion of these diseases attributable to certain foods and food-handling practices. To that end, FoodNet surveyed the populations of the 5 states involved.

METHODS

We phoned a random sample of non-institutionalized adults in a rolling survey from July 1, 1996, through June 30, 1997. We asked the usual demographic questions. We inquired about the numbers of meals eaten at home and away. We queried about the numbers of meals that the respondents prepared. We pried into food preferences, food handling practices, and food consumption in the 5 days before the interview. We demanded information about diarrheal illness in the month before the ~~interrogation~~ interview, and about reasons for seeking medical care. We excluded persons reporting chronic diarrhea, who might not have been able to sit through our entire interview. Since not everyone is equally likely to answer the phone, we weighted responses to reflect

the age, sex, and racial distributions of participating states. The associations to be discussed (*infra*) were statistically significant ($p < 0.05$).

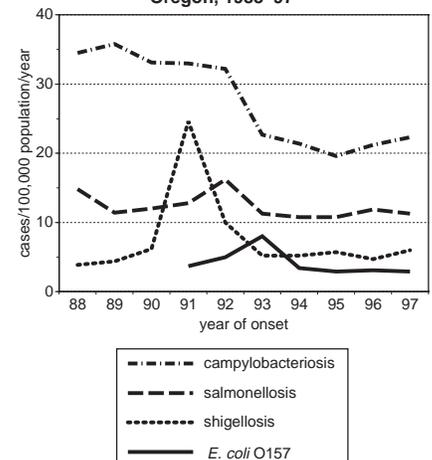
RESULTS: ILLNESS

Of the respondents, 11% reported having diarrhea within the 4 weeks prior to the interview. This translates to an average of 1.4 episodes of diarrhea per person per year, or over 3,300,000 episodes among adult Oregonians alone. Eight percent of these diarrheal episodes reportedly led to a health-care visit. Among these patients, 23% reported being asked to provide a stool specimen; 94% of these said they did so. If these numbers are accurate, then, about 1.6% of adult episodes of diarrhea resulted in the collection of a stool specimen for diagnostic testing.

RESULTS: FOOD HANDLING

Only 50% of the respondents said they noticed the required safe food-handling label on meat and poultry; of those, 87% said they actually read the label. (We didn't have the stomach to ask what they remembered it said.) Seven percent of the respondents said they don't always wash their hands after handling raw meat or poultry, and 7% also said they don't always wash their cutting boards after cutting raw chicken. (We are not vouching for the veracity of these responses.)

Reported Incidence of Selected Enteric Infections Oregon, 1988–97



* viz., you, gentle reader

† Space precludes us from spelling out these acronyms. Suffice to say a variety of feds.

Eighteen percent of respondents confessed to eating runny eggs, and 7.6% ate alfalfa sprouts in the 5 days prior to the interview. Ten percent said they consumed undercooked hamburger during this interval. A smaller proportion admitted consuming raw milk or raw shellfish in the five days before the interview (1.5% and 1.9%, respectively).

Consumption of undercooked hamburger was reported more often by men, and more often by those with annual incomes >\$100,000. Black respondents were significantly less likely to report consumption of undercooked hamburger than others. Young adults, men, Asians, persons with income >\$100,000/year, and those who lived in rural areas or on farms were less likely to report noticing the labels on meat and poultry. Young adults, men, those with less education, and those with lower incomes were more likely to say they don't always wash their hands after handling raw meat. Young adults, men and those with high income were more likely to say they don't always wash their cutting boards after dismembering poultry.

Consumption of high-risk food varied significantly by state. People in Connecticut had the highest consumption of raw shellfish (3.2%) and the highest preference for undercooked hamburger compared to other states (43%).* Consumption of alfalfa sprouts was highest in California and Oregon (10.6% and 10.1%, respectively), and 23% of Oregonians admitted to eating runny eggs during the previous 5 days, compared to only 17% of residents of the other 4 states.

* perhaps explaining why theirs is the Constitution State.

(Not enough people regularly read the *CD Summary*, apparently.)

DISCUSSION

The incidence of diarrheal illness estimated from this population survey (1.4 episodes/adult/year) is similar to estimates from studies conducted in the 1960s and 70s in Ohio and Michigan (1.2–1.5/person/year).^{1,2} Those estimated >3,300,000 episodes of diarrhea weigh heavily against the <3,000 cases of diarrheal diseases that are reported in Oregon surveillance statistics each year.[†] While tallying only a tiny and non-representative fraction of the diarrhea suffered by Oregonians, our reportable disease data do help us to identify trends, spot some outbreaks, and highlight some risky foods. Diarrheal disease in general and foodborne illness in particular remain a great burden in the United States in terms of morbidity, expense, lost productivity, and, sometimes, mortality. And, while not discussed in this article, it should be obvious that enteric disease is a much more profound and intractable problem in underdeveloped parts of the world.

The survey results also suggest that many consumers remain either ignorant of food safety information or at least insufficiently concerned about their risk to act upon it. In general, younger adults (18-25 years old) and males are more likely to eat high-risk foods and to engage in unsafe food-handling practices. Does this reflect lesser experience with food preparation? Different attitudes about food safety?

[†] This being the sum total of reported *Campylobacter*, *Salmonella*, *Shigella*, *Giardia*, *Yersinia*, *Cryptosporidium*, and *E. coli* O157:H7 infections.

While high socioeconomic status is often associated with indices of better health, we found that richer people were more likely to prefer undercooked hamburger, less likely to report washing cutting boards after preparing poultry, and more likely to eat raw shellfish. These findings are consistent with other studies,^{3,4} although explanations remain speculative.

This study generated self-reported, unvalidated responses to questions where the politically correct answers were often obvious. In other words, some of the answers may not reflect reality. Therefore, we should be cautious in interpreting the results. Imperfect as they may be, however, the FoodNet data are the best estimate of the incidence of gastrointestinal illness in the adult population of this country. While it is difficult to estimate what proportion of these illnesses have anything to do with food, other survey results indicate that there remains a tremendous need for food safety education. If any demographic group needs to be singled out, it would be young men, but there is no shortage of educational opportunities for all demographic groups. We anticipate that foodborne illness will keep both clinicians and epidemiologists occupied well into the next millennium.

REFERENCES

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