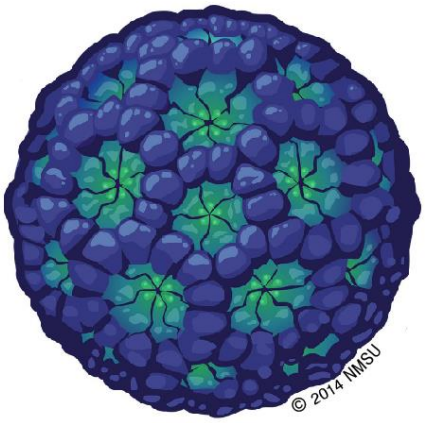
The Nightmare Buffet: A Traceback Investigation Lab

Background information:

Noroviruses are the most common cause of foodborne illness worldwide. In most people it causes an acute gastroenteritis, usually in the form of vomiting and diarrhea. The virus can be transmitted person-to-person, through contaminated food, water, or in the environment, such as if someone with the virus on their hands touches a door handle that other people use. In the case of foodborne norovirus, outbreaks of the disease are usually associated with foods that are served raw and/or have been prepared with contaminated hands.



Public Enemy #1: Norovirus

In this lab, students select foods from a mock buffet, and a portion of them "get sick" with what is believed to be norovirus. The goal is for the students to ask questions and ultimately determine which food(s) were at fault, as well as figure out when and where the food became contaminated. Along the way, the instructor and students will calculate some odds ratios to support their hypotheses.

Objectives:

- Review some of the food types commonly associated with norovirus outbreaks
- Understand some of the process and people involved in an outbreak investigation
- Calculate and interpret odds ratios
- Understand how a single contamination event can lead to numerous cases of disease, and why preventing contamination of food is important

What is a traceback investigation?

It is important to remember that food can become contaminated with viruses, bacteria, or other pathogens anywhere on their journey from the farm to the table. Traceback investigations are as their name sounds: investigators take something that sick people were exposed to, usually a food, and follow that item back towards its source to learn where it may have been contaminated. This can be a long, complicated process, as foods are often made of multiple ingredients, and most of our foods have several steps and stops in their production chain.

Most outbreaks of disease are first noticed at the local level, when an above average number of cases are seen for a particular area. As an outbreak gets larger, higher-level authorities often become involved. For example, an outbreak found to span several counties will get attention from the state health department, and if an outbreak occurs in several states, or across national borders, federal and international agencies usually become involved.

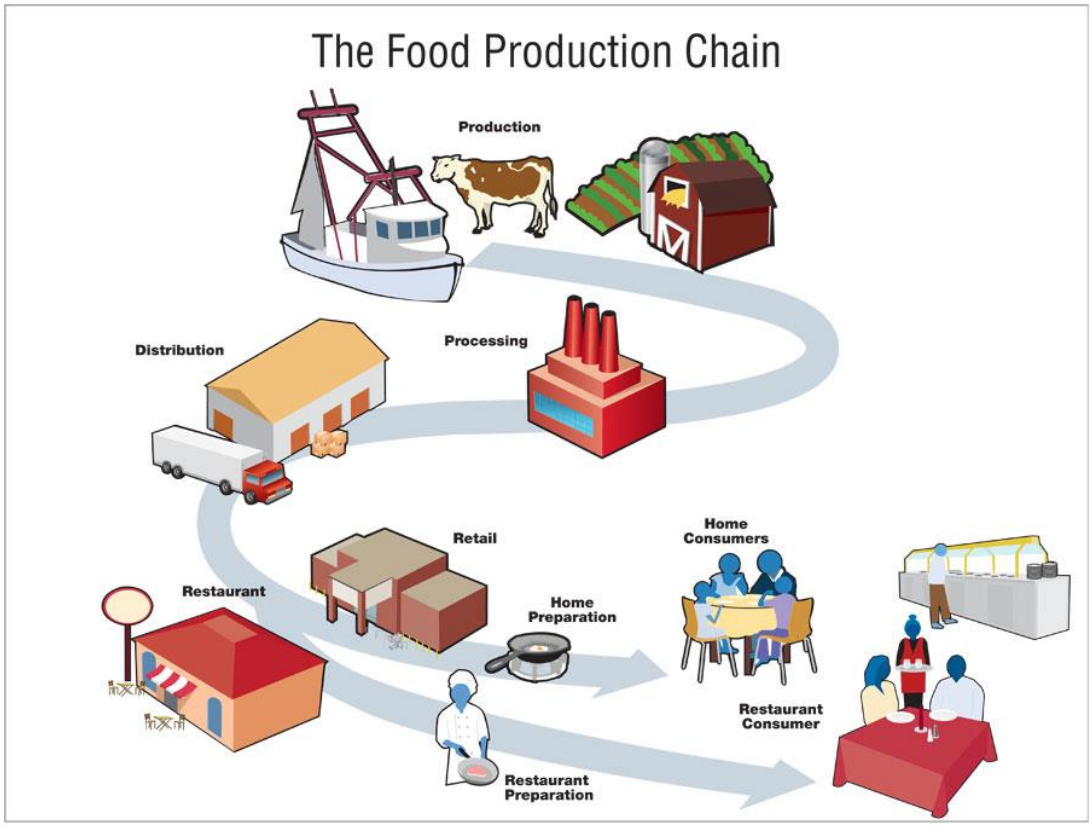


Image by the Centers for Disease Control and Prevention

What is an odds ratio?

Looking at exposures and outcomes is exactly what epidemiologists do when they investigate a foodborne outbreak, by calculating something called an odds ratio. An odds ratio is the odds of disease in the exposed group, compared to the odds of disease in the unexposed group. In this lab, the exposure is whether or not the students ate a certain food item.

In this lab there will be two groups of students: those who got sick, and those who did not. These become the two groups that fill the disease columns in the 2x2 table below. These two groups get further divided into people who had the exposure (ate the food item) and who did not have the exposure (did not eat the food item).

	Disease	
Exposure	Yes	No
Yes	A	B
No	C	D

Odds ratio = (A/C) ÷ (B/D), which can also be written as (AD) ÷ (BC)

In this lab, the table can also be written this way:

	Got sick?	
Ate __X_?	Yes	No
Yes		
No		

The result of an odds ratio calculation is a number, and in this case it is saying that *"People who got sick were _____ times as likely to have eaten __X__ than people who did not get sick."*

An odds ratio may be more than, less than, or equal to 1. A value of 1 means there is no relationship between the exposure and the outcome. In other words, eating a food had no impact on whether or not someone became sick. A value greater than one means there is an

increased risk of disease among the exposed, and a value less than one means there is a decreased risk among the exposed. In an outbreak investigation, odds ratios may be calculated for single ingredients, or even an entire restaurant menu, to determine what food may have been the source of the disease.

Example calculation:

	Got sick?	
Ate ice cream?	Yes	No
Yes	6	2
No	1	12

Odds ratio: (6/1) ÷ (2/12) = 36

Interpretation: *People who got sick were 36 times as likely to have eaten ice cream than people who did not get sick.*

Name: _____

End-of-Laboratory Questions

1. What is an odds ratio?

2. What do the following odds ratios mean?

1.0 _____

35.0 _____

3. Name two ways someone can come into contact with norovirus.

1.

2.

4. In the lab, what ingredient was contaminated with norovirus? _____

5. How did that ingredient become contaminated with norovirus? In other words, what was found in the traceback investigation?

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