




How the CDC uses 2 way-tables to discover Foodborne Outbreaks

Ashley Clody & Michelle Mikes

This presentation is adapted from:
Ralph Cordell, PhD
Team Leader, Career Paths to Public Health
CDC
(originally from Ms. Trudi Bothma, student intern)

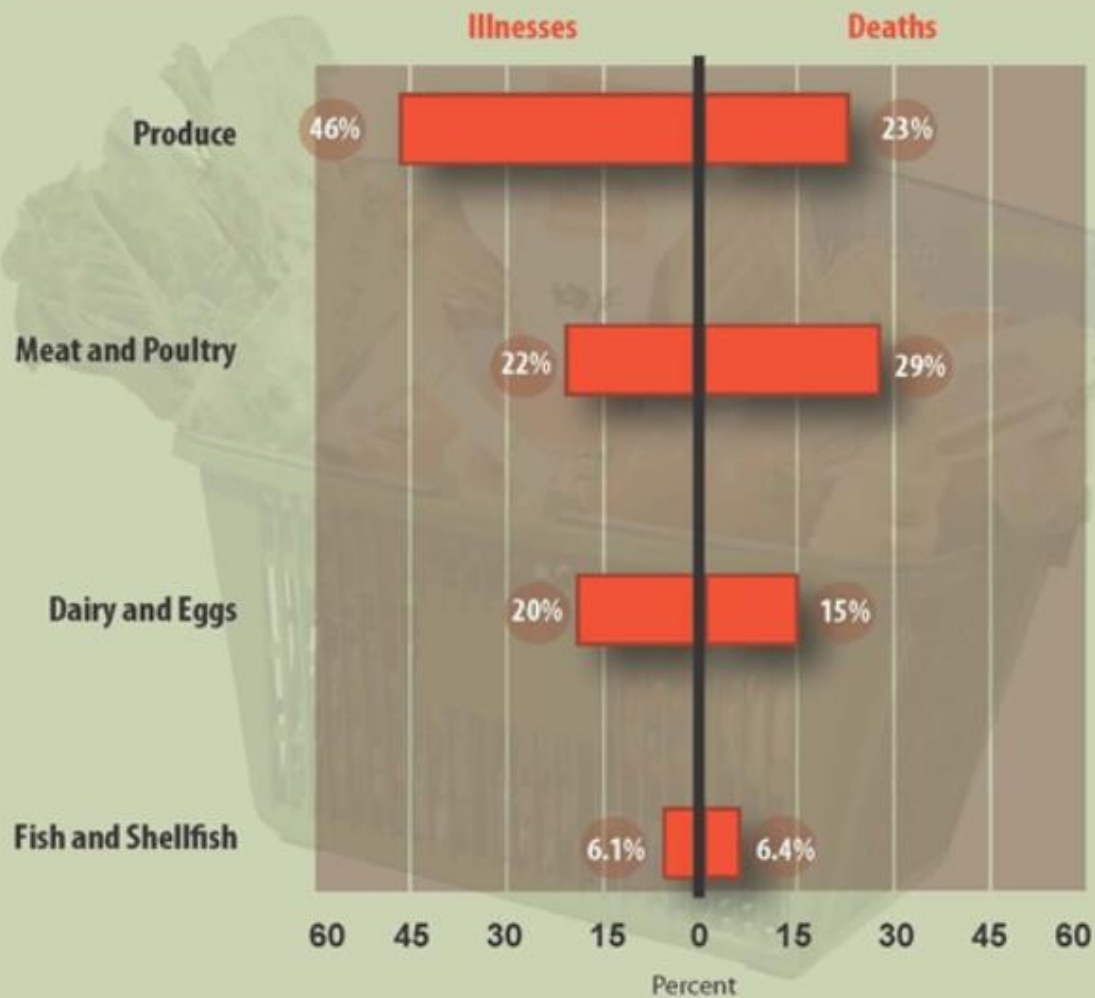


Generally, food poisoning causes some combination of nausea, vomiting, and diarrhea that may or may not be bloody, sometimes with other symptoms.

Have you ever had food poisoning?

- Food with harmful organisms
- Bacteria, parasites and viruses
- Typically raw meat, chicken, fish and eggs
- Food left out too long
- People not washing their hands

Causes



*Chart does not show 5% of illnesses and 2% of deaths attributed to other commodities. In addition, 1% of illnesses and 25% of deaths were not attributed to commodities; these were caused by pathogens not in the outbreak database, mainly *Toxoplasma* and *Vibrio vulnificus*.



**Early Thoughts about Diseases –
Possession by demon or evil spirit**



**Or, disturbances in
humors or atmosphere**



Or, supernatural/curse



**Or, breaking a taboo or
angering a deity**

- Bacterial
- Viral
- Parasitic

Types of Foodborne Germs

Radio post on June 9, 2014

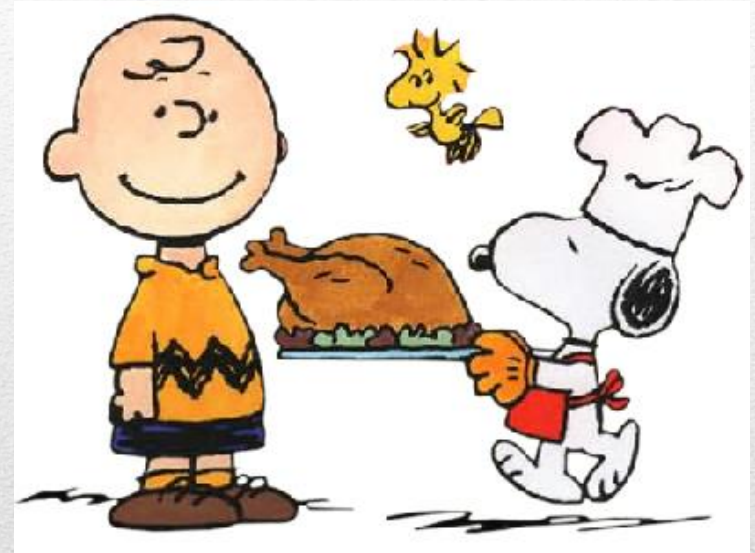
- 2 hrs-limit for food to sit out
- 4 days-limit for leftovers



Dr. Sanjay Gupta

Chief Medical Correspondent for CNN

- Turkey in fridge for 3-4 days
- Stuffing and gravy for 1-2 days



Univ. GA Food Safety

- 7% of imported spices are laced with salmonella and more than 8% of those contain antimicrobial-resistant strains of the bug (drying process exposes to rodents, birds, flies and field pests & their droppings)
- About 80% of spices are imported
- Best bet: heat kills pathogens



Women's Health Magazine
Dec. 2013

Line-listing from an Investigation of an Outbreak of Gastroenteritis, Arafat, Saudi Arabia, 1979

Table 6.8
Selected characteristics of Kuwaiti medical mission members
who ate lunch at Arafat, Saudi Arabia, October 31, 1979

Id #	Age	Sex	Onset of Illness		Foods			Signs and Symptoms*					
			Date	Hour	Rice	Meat	TS*	D	C	BS	N	V	F
31	36	M	Oct. 31	5 p.m.	X	X	X	D	C	BS			
77	28	M	Oct. 31	5 p.m.	X	X		D	C				
81	33	M	Oct. 31	10 p.m.	X	X	X	D	C				
86	29	M	Oct. 31	10 p.m.	X	X	X	D	C				
15	38	M	Oct. 31	10 p.m.		X		D		BS	N		
17	48	M	Oct. 31	10 p.m.	X	X		D	C				
18	35	M	Oct. 31	10 p.m.	X	X	X	D	C				
35	30	M	Oct. 31	11 p.m.	X	X	X	D	C				
88	27	M	Oct. 31	11 p.m.	X	X	X	D	C				
76	29	M	Oct. 31	11 p.m.	X	X	X	D	C	BS			
71	50	M	Oct. 31	12 MN	X	X	X	D					
1	39	F	Nov. 1	1 a.m.	X	X	X	D	C			V	
27	36	M	Nov. 1	1 a.m.	X	X	X	D	C		N		
28	44	M	Nov. 1	1 a.m.	X	X	X	D	C				
29	48	M	Nov. 1	1 a.m.	X	X	X	D	C	BS			

Line-listing from an Investigation of an Outbreak of Gastroenteritis, Arafat, Saudi Arabia, 1979

	# persons who ATE specified food				# who DID NOT EAT specified food			
	Ill	Well	Total	Attack Rate	Ill	Well	Total	Attack Rate
Rice	62	31	93	66.7%	2	0	2	100.0%
Meat	63	25	88	71.6 %	1	6	7	14.3%
T.S.	50	26	76	65.8%	14	5	19	73.7%

	AR Exposed	AR Unexp	Relative Risk (RR)
Rice	66.7	100	0.66
Meat	71.6	14.3	5.01
T.S.	65.8	73.7	0.89

Two-Way Table

	Sick	Well	Total	AR
Exposed (ate the food)	A	B	A+B	A/A+B
Not Exposed (did not eat the food)	C	D	C+D	C/C+D

Attack Rate (AR) = Sick/Total

Relative Risk (RR) = Attack Rate in Exposed/Attack Rate in Not Exposed

$$RR = (A/(A+B)) \div (C/(C+D))$$

- 1) Choose 2 foods to “eat”
- 2) Take 1 spoonful from each food (leave the spoons in the cups & do not contaminate the other foods)
- 3) Bring your cups back to your seat & record the foods “eaten” on your notecards

Let's Simulate!



What looks good to you?

- 6 two-way tables have been created to represent the 6 foods
- Those tables with markers, determine one person to be the recorder for the chart next to your table

Making Two-Way Tables

Title of Food

	Sick	Well	Total	AR
Exposed (ate the food)	A	B	A+B	A/A+B
Not Exposed (did not eat the food)	C	D	C+D	C/C+D

Attack Rate (AR) = Sick/Total

Relative Risk (RR) = Attack Rate in Exposed/Attack Rate in Not Exposed

$$RR = (A/(A+B)) \div (C/(C+D))$$

- 1 food was contaminated with baking soda to simulate
- Phenolphthalein
- Turns purple/fuchsia if you are sick
- On your notecards, write if you were “sick” or “not sick” on each food you ate

Who is sick?

- Fill in one of the handouts on your table based on your table data
- We will collect data for each type of food as a whole group on larger paper

Gathering Data

St. Mary's Hospital Outbreak

	Sick	Well	Total
Exposed			
Not Exposed			
Total			

Survey

Attack Rate = Sick ÷ Total
(exposed & not exposed)

Relative Risk (RR) = Attack Rate in
Exposed ÷ Attack Rate in Not Exposed

Determine AR & RR as %



What was the determinant?

Determinant RR:

- Example: $1 \div 0/4$

May we divide by 0?

- Middle School
- High School

**Implications for your
course?**



**Prevent food poisoning
with just one quarter**

What's New?

- Based on new information, CDC is expanding its warning to consumers to cover **all** types of romaine lettuce from the Yuma, Arizona growing region. This warning now includes



What's New?

- Several grocery store and retail locations received recalled bulk packages of International Harvest, Inc. brand Go Smiles Dried Coconut Raw. The recalled bulk dried coconut may have been repackaged into clear, plastic containers with grocery store labeling, or served in bulk bins.
 - The list of locations and cities is available on the [FDA website](#).
 - If you purchased dried coconut from one of these stores, ask the place of purchase if it was recalled.
- On March 29, 2018, Healthy Nut Factory [recalled](#) 7-ounce pouches of Organic Coconut Smiles. The recalled Organic Coconut Smiles have the barcode 8 13449 02099 3 and the expiration date 6/1/2018.
 - This product was distributed and sold at retail stores in New York City and Long Island.



Current Outbreaks - CDC

- www.fightbac.org (the partnership for food safety education)
- www.recallbasics.org
- <https://dph.georgia.gov/food-service>
- www.agr.georgia.gov
- www.fda.gov
- www.usda.gov
- www.cdc.gov

Web Resources

For word documents and PPT email one of us!!!

Ashley Clody

Cobb County, GA Math Professional Learning Specialist
6-12

ashley.clody@cobbk12.org

@mathedashley

Michelle Mikes

Cobb County, GA Math Supervisor K-12

michelle.mikes@cobbk12.org

@CobbMathDept

Stay healthy this summer!
