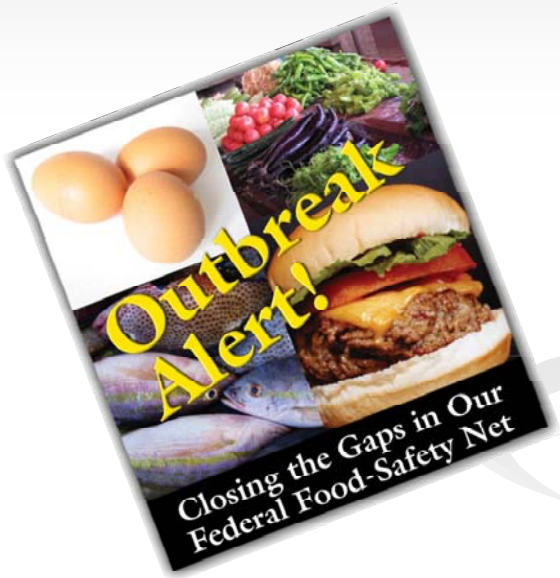
Outbreak Alert!:

The Role of Outbreak Data in Risk Attribution



Caroline Smith DeWaal

USDA Food Risk Analysis Meeting

April 5, 2007

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Outbreak Alert

- CSPI started collecting data on FBI outbreaks in 1997 and organizing it by regulatory agency.
- Data from CDC were not available without a FOIA. With our continued requests, CDC started posting yearly line-listings on the internet.
- In 1999, CSPI published the first line-listing of FBI outbreaks organized by food category and by regulatory agency.
- CSPI's methodology for data compilation is published in the July 2006 edition of Food Protection Trends.

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Outbreak Alert Methodology

- The CSPI database contains 5,000 FBI outbreaks and covers 15 years of data.
- The database is maintained in Microsoft Access by trained CSPI staff.
- Outbreak Data Selection
  - Meets CDC's outbreak definition: event where 2+ people acquire the same illness after consuming the same contaminated food.
  - Has an identified food and pathogen.
- Ensuring Data Integrity
  - Outbreak data must come from a reliable source, such as the CDC, scientific articles, health department postings, etc.
  - Discrepancies in outbreak reports are clarified by state or local public health officials.

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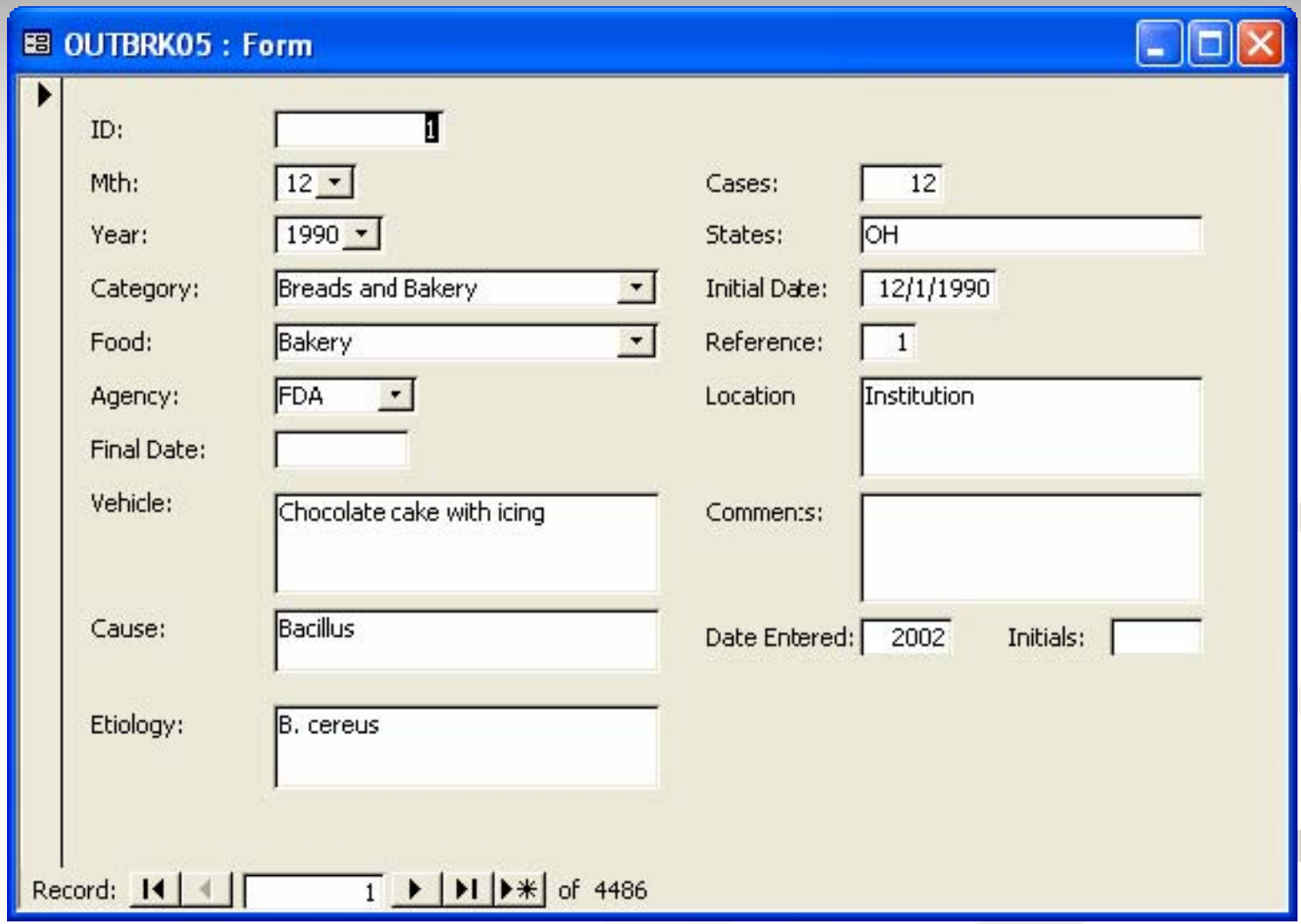
Outbreak Alert!



Source: *Outbreak Alert!* Center for Science in the Public Interest, 2005

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Outbreak Categorization:

Outbreaks are grouped by food vehicle, and placed in one of 13 food categories separated by regulatory agency

- **FDA-Regulated**
  - **Beverages**
  - **Breads and Bakery**
  - **Dairy**
  - **Eggs**
  - **Game**
  - **Multi-Ingredient Foods**
  - **Produce**
  - **Seafood**

- **USDA-Regulated**
  - **Beef**
  - **Pork**
  - **Poultry**
  - **Luncheon/Other Meats**

- **Both – Foods Regulated By Both Agencies**

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Outbreak Categorization:

USDA-Regulated Food Categories and Subcategories

- **Beef**
  - Ground Beef
  - Beef Dishes
  - Other Beef
- **Poultry**
  - Chicken
  - Turkey
  - Poultry Dishes
  - Other Poultry
- **Pork**
  - Ham
  - Pork Dishes
  - Other Pork
- **Luncheon/Other Meats**
  - Luncheon
  - Meat Dishes
  - Other Meats

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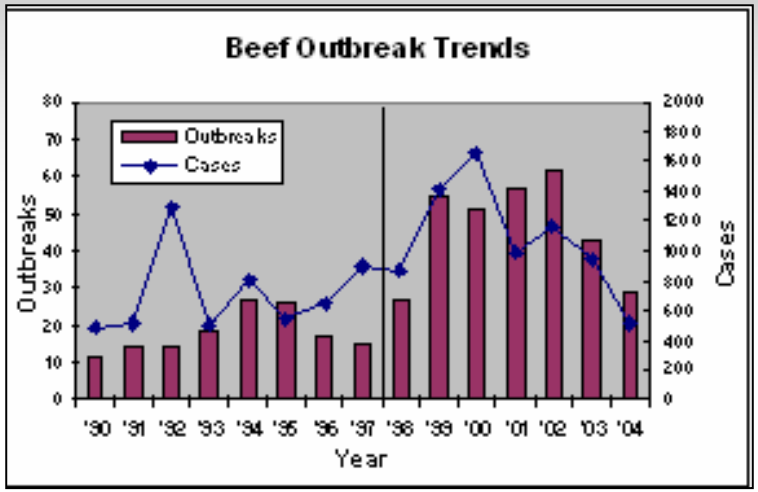
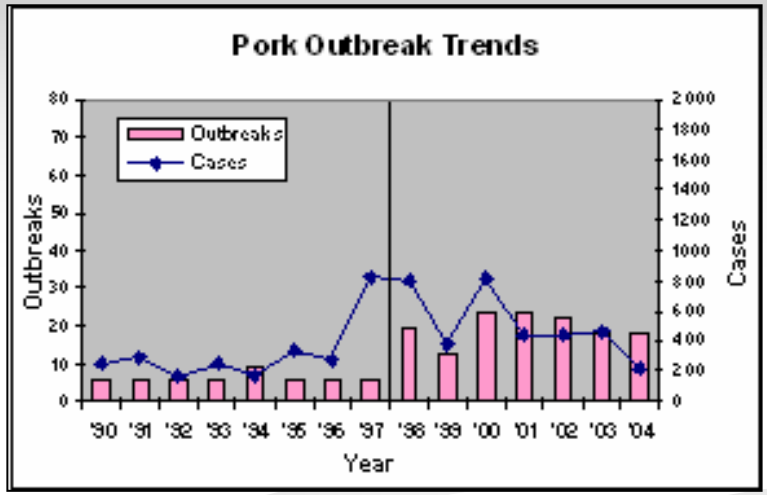
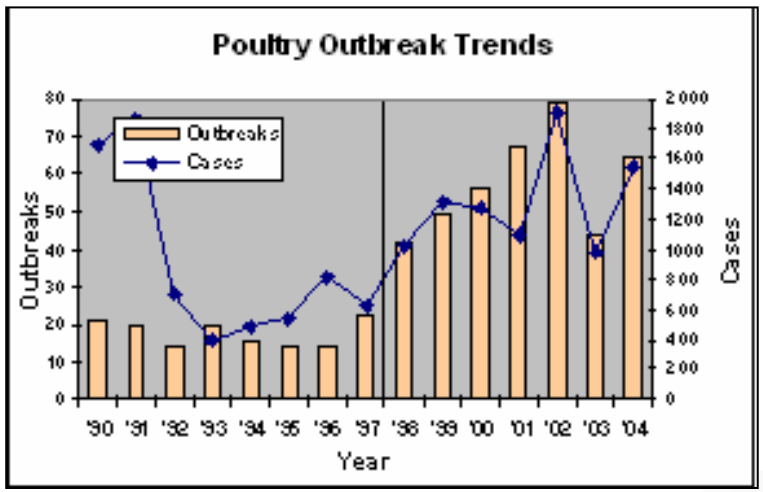
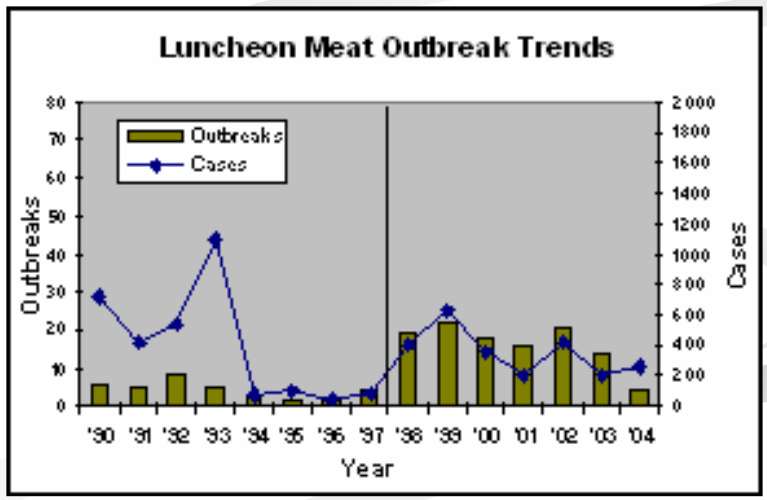
Outbreak Trends:

USDA-Regulated Food Categories and Subcategories





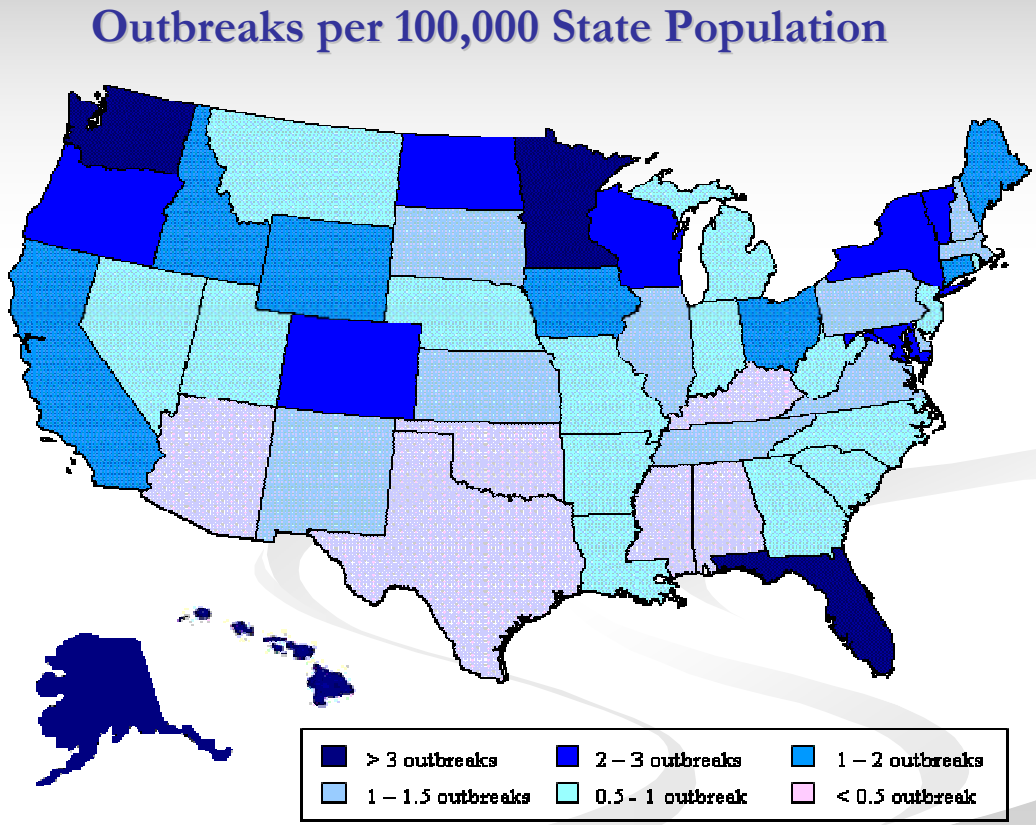




Note: In 1998, CDC began enhanced surveillance efforts to increase FBI reporting.

Population Represented

- Data comes primarily from CDC, which collects data from state and local health departments.
- Data relies on the quality of outbreak investigation and reporting.



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Incomplete Outbreak Data Reporting

- **FBI outbreaks are difficult to investigate, as they require laboratory confirmation of pathogens, timely reporting of illnesses, and thorough follow-up with ill persons to determine common foods and locations.**
- **In the years 1990-2002, the cause of 64% of outbreaks reported to CDC was unknown.**
- **State and local epidemiologists diagnose an average of just 36% of the nation's reported outbreaks.**

Source: Hargrove, T. "A Russian roulette of food poisoning in American States." *Scripps Howard News Service*
Hargrove, T. "States Vary on Diagnosis Rates." *Scripps Howard News Service.*

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Limitations of CSPI's database

- Delays in release of CDC data result in untimely data.
- Does not include deaths or hospitalizations.
- Represents a small percentage of actual FBI.
  - Represents about 25%-30% of reported FBI outbreaks, because it excludes outbreaks with unknown food or pathogen.
  - Sporadic cases of foodborne illnesses are omitted, e.g. *Campylobacter* and *V. vulnificus* are underreported.

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Database Applications

- Outbreak data provides food and pathogen attribution that are critical to conduct a food/hazard analysis for HACCP.

- CSPI's Outbreak Alert database can:
  - Give the source of an outbreak closest to the time of consumption
  - Identify the frequency of food and pathogen outbreaks
  - Assess food types and pathogens causing outbreaks by location, i.e. states, home- vs. restaurant-prepared foods.

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USDA Expert Elicitation

- Panel of 23 experts, mostly from industry, with some experts from academia and federal government.
- Asked experts to rank 24 categories of processed meat and poultry products based on relative risk to human health.
- Did not address severity of illness.
- Lacked boundaries for expert scoring.

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Median Rankings: Low Risk Items

- 1 - RTE meat fully-cooked without subsequent exposure to the environment
- 1 - RTE poultry fully-cooked without subsequent exposure to the environment
- 2 - RTE acidified/fermented meat (without cooking)
- 2 - RTE acidified/fermented poultry (without cooking)
- 2 - RTE dried meat
- 2 - RTE dried poultry
- 2 - RTE salt-cured meat
- 2 - RTE salt-cured poultry
- 3 - RTE fully-cooked meat
- 3 - RTE fully-cooked poultry

Source: USDA Table entitled "Relative Risk of Illness per Serving Among 24 Types of Processed Meat and Poultry Products"

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Median Rankings: Moderate Risk Items

- 4 - Raw intact pork
- 5 - Raw intact beef
- 5 - Raw intact meat - no beef or pork
- 7 - Raw otherwise processed meat
- 7 - Raw otherwise processed poultry

Source: USDA Table entitled “Relative Risk of Illness per Serving Among 24 Types of Processed Meat and Poultry Products”

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Median Rankings: High Risk Items

- 8 - Raw intact chicken
- 8 - Raw intact poultry - no chicken or turkey
- 8 - Raw ground or otherwise non-intact pork
- 9 - Raw intact turkey
- 9.7 - Raw ground or otherwise non-intact meat - no beef or pork
- 10 - Raw ground or otherwise non-intact beef
- 10 - Raw ground or otherwise non-intact chicken
- 10 - Raw ground or otherwise non-intact turkey
- 10 - Raw ground or otherwise non-intact poultry - no chicken or turkey

Source: USDA Table entitled "Relative Risk of Illness per Serving Among 24 Types of Processed Meat and Poultry Products"

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Relative Risk of Illness

CSPI's Review of the Expert Elicitation

- **Due to the lack of uniformity between outbreak data reporting and the USDA risk categories, CSPI grouped the risk categories into 3 broad groups.**
  - **Lowest Risk (Median Ranking 1-3)**
    - **Ready-to-eat (RTE) meats**
  - **Moderate Risk (Median Ranking 4-7)**
    - **Raw, intact meats**
  - **High Risk (Median Ranking 8-10)**
    - **All unprocessed poultry; all ground meats and poultry**

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How Does Outbreak Data Align with the USDA Risk Rankings?

- **Low Risk: Ready-to-eat meats**
  - Outbreaks: 91, Illnesses: 2,172
  - Examples: Jerky, Chicken Nuggets, Hot Dogs, Deli Meat
- **Moderate Risk: Raw, intact meat (not poultry)**
  - Outbreaks: 324, Illnesses: 11,121
  - Examples: Steak, Prime Rib, Ham, Veal, Goat
- **High Risk: Ground meat; Unprocessed poultry**
  - Outbreaks: 497, Illnesses: 14,809
  - Examples: Ground Beef, Chicken, Turkey, Taco Meat

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Pathogen Breakdowns by Category

High Risk Meats			
	Pathogen	Outbreaks	Illnesses
1	*Salmonella*	*146*	*5404*
2	*Escherichia*	*122*	*2317*
3	Clostridium	76	4166
4	Norovirus	44	698
5	Staphylococcus	43	701
6	Bacillus	27	695
7	*Campylobacter*	*20*	*139*
8	Other Virus	6	394
9	Shigella	4	101
10	Other Chemicals	3	116

Moderate Risk Meats			
	Pathogen	Outbreaks	Illnesses
1	Clostridium	103	3496
2	*Salmonella*	*77*	*3427*
3	Staphylococcus	69	1888
4	*Escherichia*	*22*	*1310*
5	Norovirus	20	448
6	Bacillus	13	311
7	Yersinia	9	97
8	*Campylobacter*	*6*	*85*
9	Trichinella	3	19
10	Streptococcus	1	37

Low Risk Meats			
	Pathogen	Outbreaks	Illnesses
1	*Salmonella*	*24*	*651*
2	Norovirus	21	495
3	Staphylococcus	11	110
4	Clostridium	8	400
5	*Listeria*	*7*	*199*
6	Bacillus	4	40
7	Other Virus	4	43
8	Trichinella	4	112
9	*Escherichia*	*3*	*79*
10	Shigella	2	4

Consideration of Frequency & Severity

Pathogen	FoodNet*	Mead Estimates		
		Illnesses*	Hospitalizations	Deaths
Salmonella	14.55	1.3	16,430	553
Campylobacter	12.72	2.0	10,539	99
STEC (all)	1.39	0.06	1,843	52
Shigella	4.67	0.09	1,246	14
Listeria	0.30	0.002	2,298	499

***per 100,000**

Sources:

- Preliminary FoodNet Data on the Incidence of Infection with Pathogens Transmitted Commonly Through Food --- 10 Sites, United States, 2005; MMWR 2006; 55(14);392-396
- Mead PS, et al. Food-related illness and death in the United States. EID 1999;5:607-25.

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Conclusion

- Outbreak data alone can not be used to rank food risks. Experts should also look at sporadic cases and product testing.
- To determine severity, hospitalizations and deaths from outbreaks and sporadic cases must also be considered.
- Outbreak data rely on thorough investigations and reporting of outbreaks. Foods involved in outbreaks are not reported in terms consistent with USDA's specific risk categories.
- Future outbreak data reporting could be improved with more specifics on implicated foods to contribute to a better understanding of food risk attribution.

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