

PATTERNS AND TRENDS IN FOODBORNE ILLNESS

CASA's 101st Annual Educational and Training Seminar

Saratoga Springs, New York

May 3, 2017

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OVERVIEW

- Acknowledgements
- Foodborne disease surveillance
- Sporadic case trends
- Outbreak trends
- Trends in investigation and response

ACKNOWLEDGEMENTS

- State, local, tribal and territorial government agencies
- Federal government agencies particularly CDC
- NoroCore
- PubMed

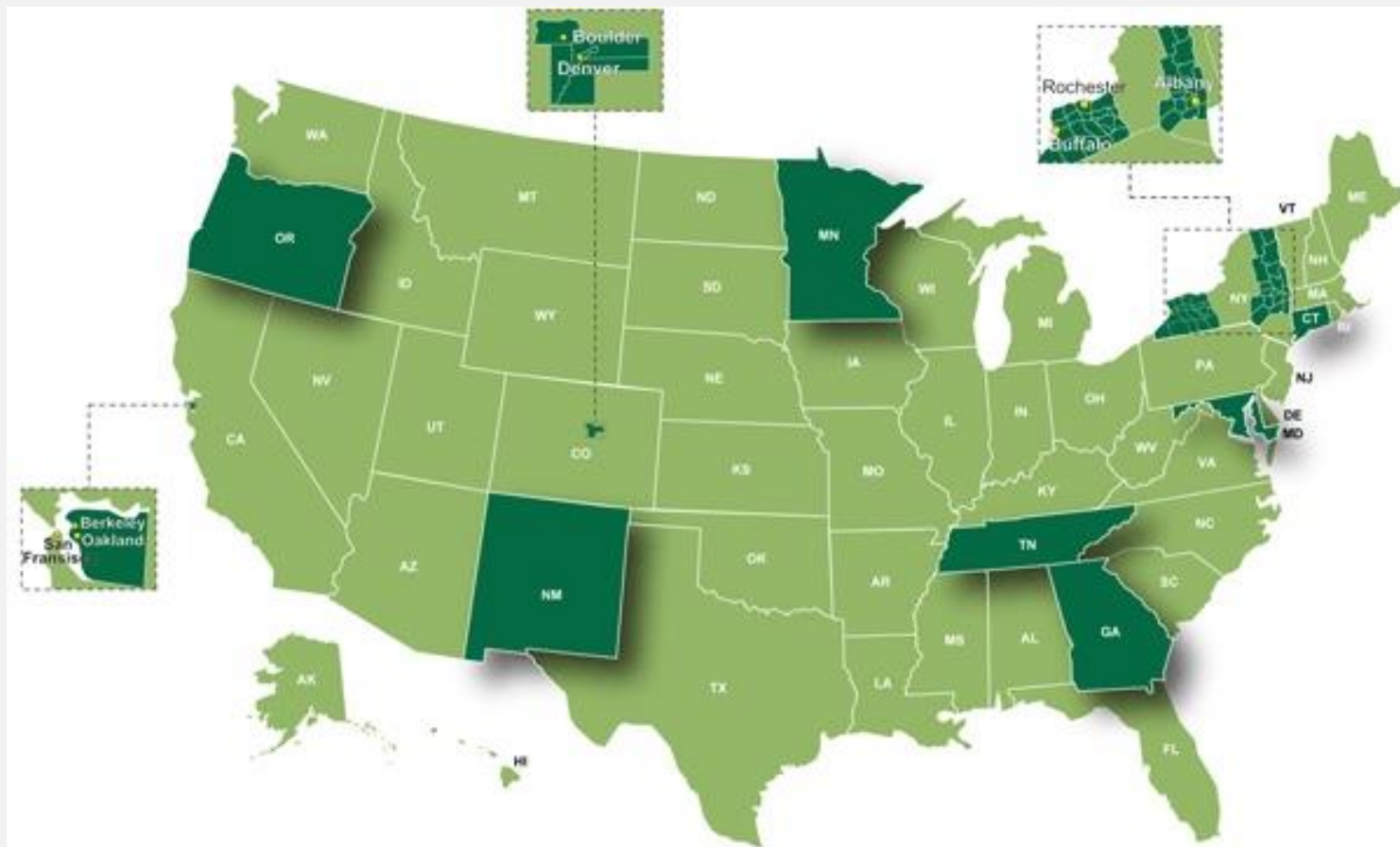
FOODBORNE DISEASE SURVEILLANCE

STATE AND LOCAL ROLES

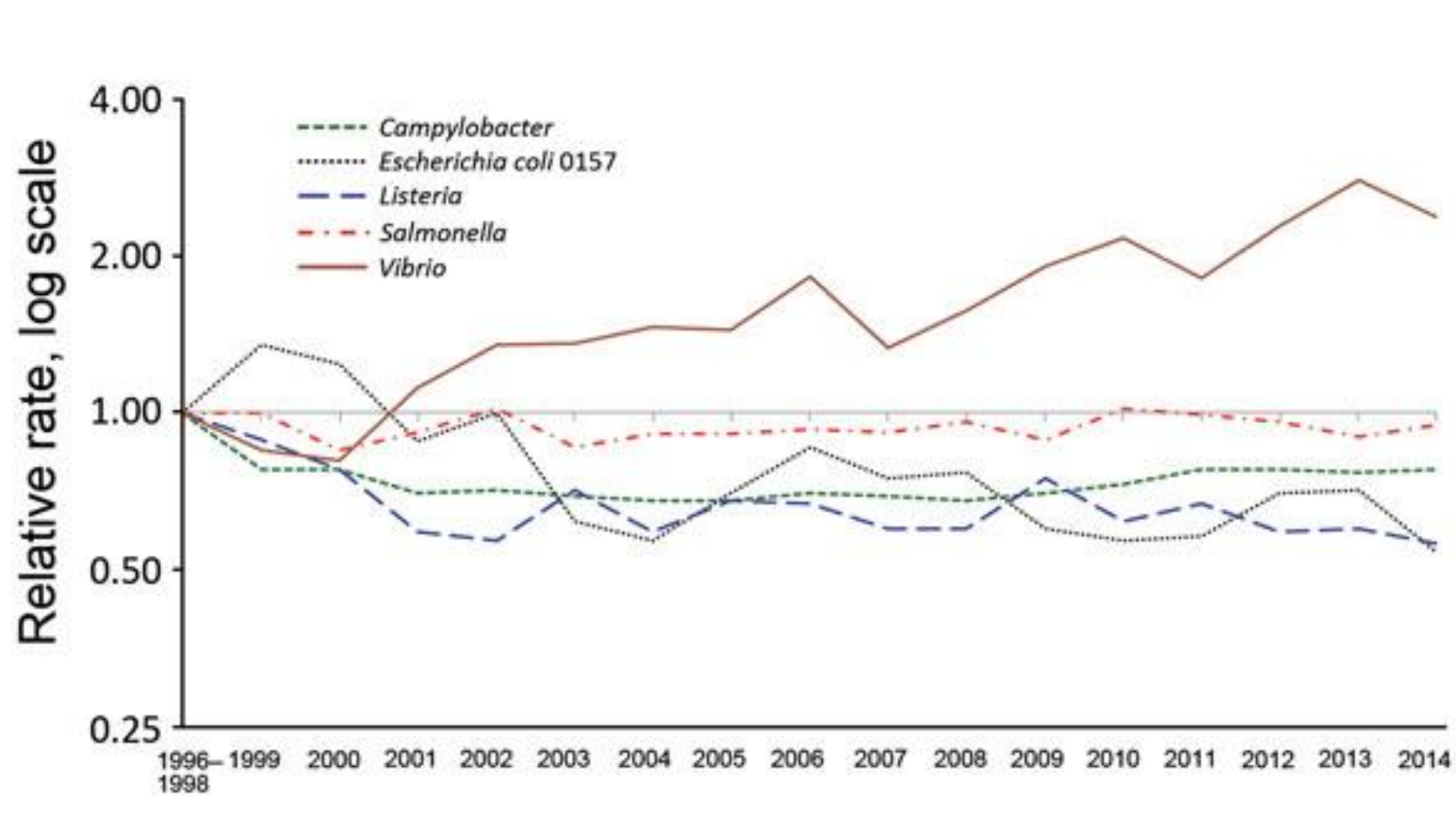
- Surveillance:
 - laboratory
 - epidemiology
 - complaints
- Detection
- Investigation
- Response
- Most outbreaks are detected, investigated and reported by state and local agencies

SPORADIC CASE SURVEILLANCE

FOODNET



FOODBORNE DISEASES ACTIVE SURVEILLANCE NETWORK—2 DECADES OF ACHIEVEMENTS, 1996–2015



ANNUAL ILLNESS ESTIMATES – DOMESTICALLY-ACQUIRED¹

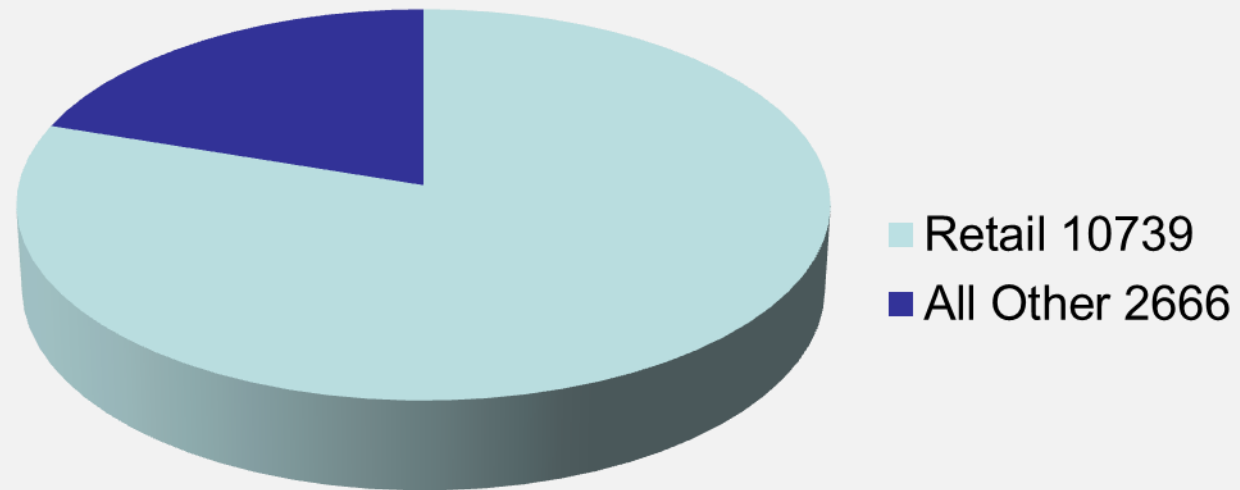
Agent	Illnesses	Deaths
Norovirus	5,462,000	149
<i>Salmonella</i>	1,026,000	378
<i>Cl. perfringens</i>	966,000	26
<i>Campylobacter</i>	845,000	76
<i>Staph aureus</i>	241,000	6
<i>Shigella</i>	131,000	10
STEC non-O157	113,000	0

1. Scallan E. *EID* 2011, 17(1):7-15

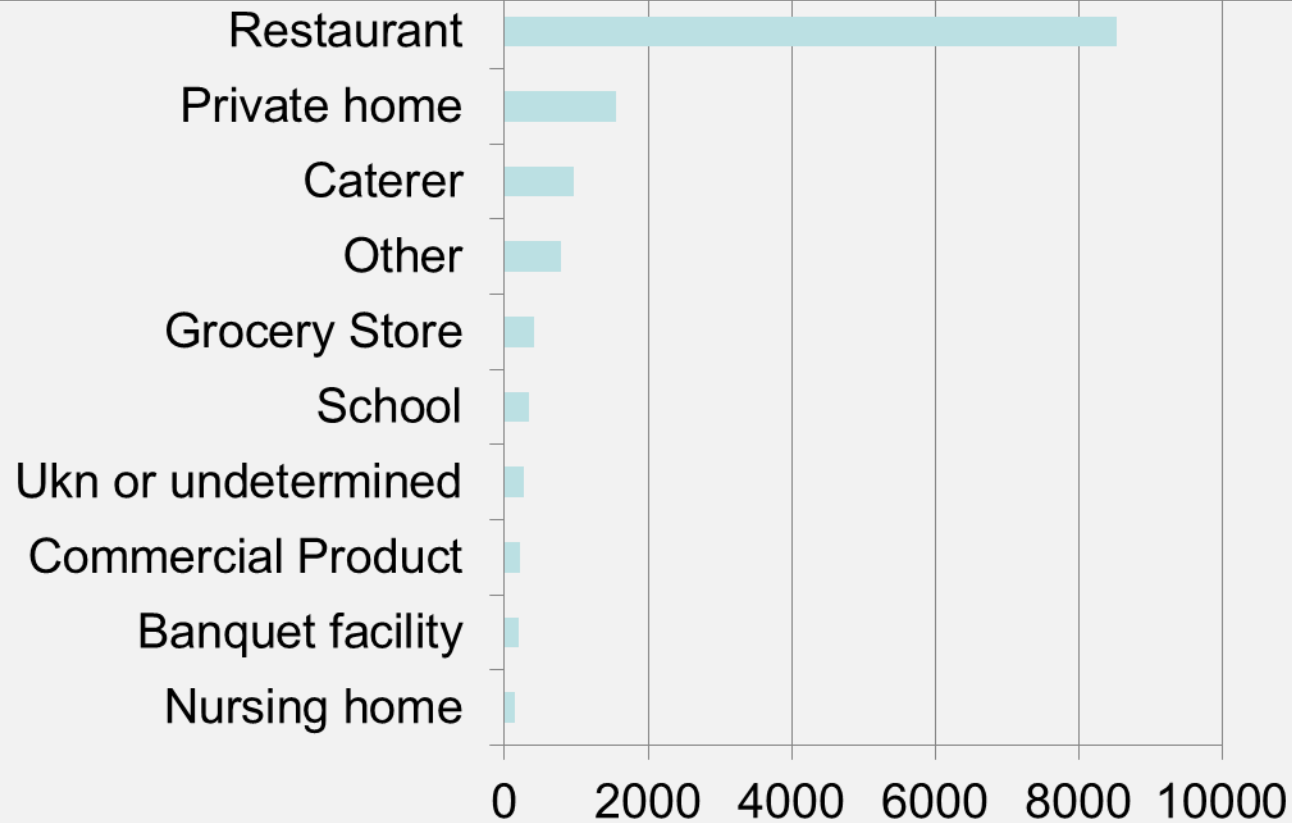
OUTBREAK SURVEILLANCE

RESTAURANT ASSOCIATED OUTBREAKS

NUMBER OF OUTBREAKS RETAIL OUTBREAKS
AND TOTAL OUTBREAKS, 1998 - 2008



TOP 10 FOOD LOCATION OF PREPARATION SETTINGS*, 1998–2008

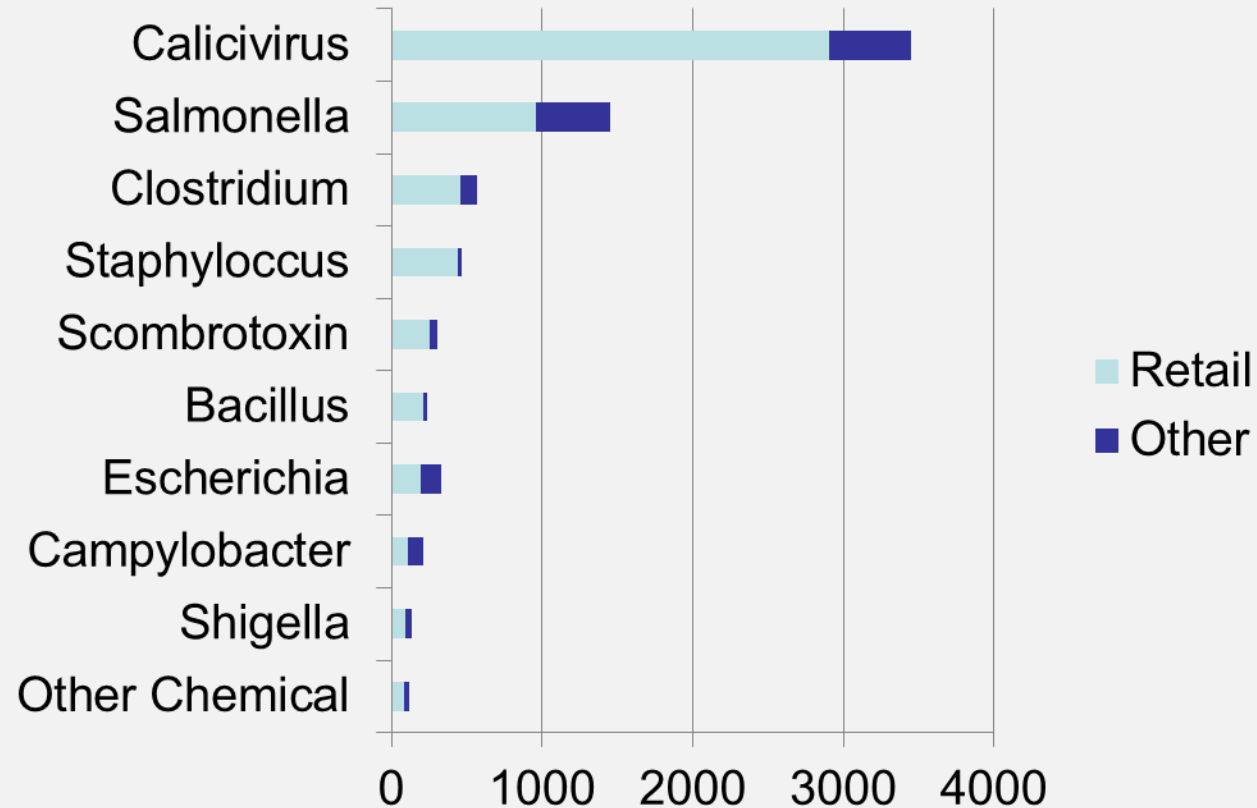


**Outbreaks may be counted more than once due to multiple preparation settings listed*

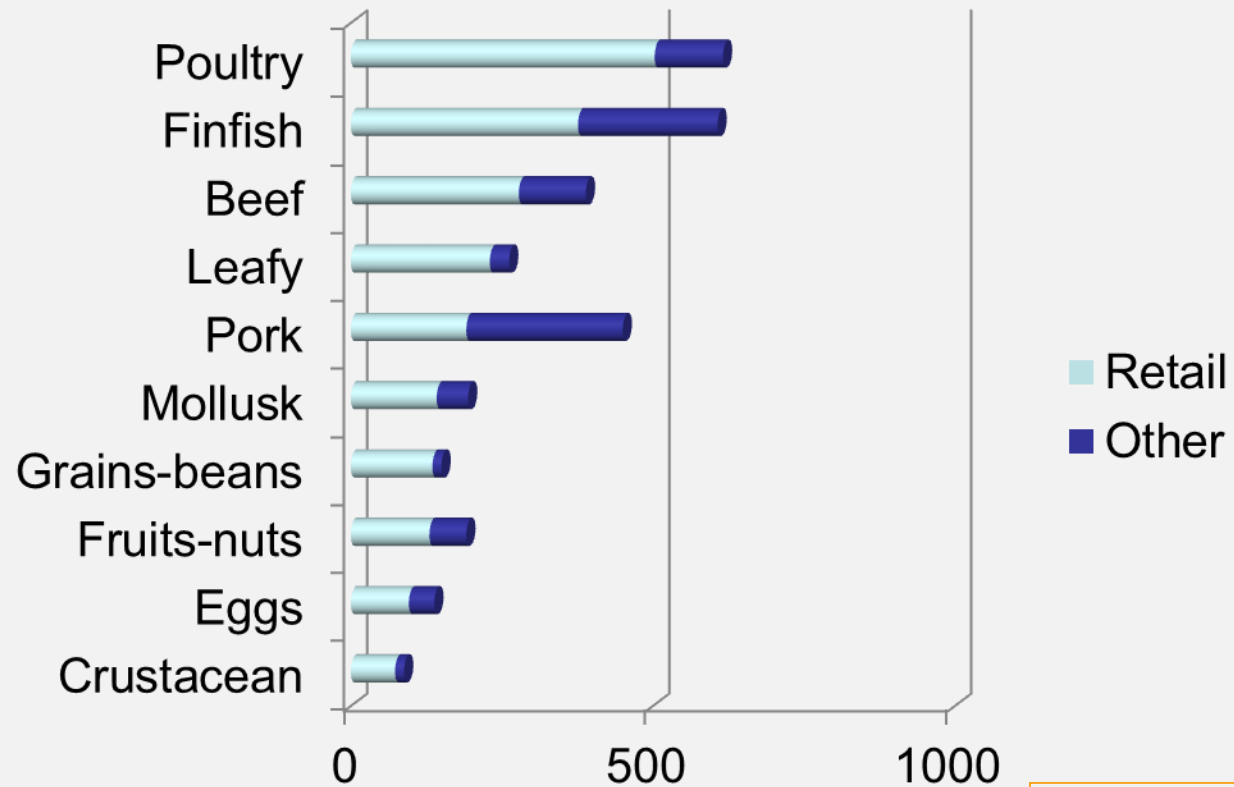
Total Number of Outbreaks 1998-2008 With At Least One Preparation Location Listed: 12,903

Total Number of Outbreaks 1998-2008 With Retail-Setting Location Listed: 10,739

TOP 10 SINGLE ETIOLOGIES, RETAIL OUTBREAKS 1998–2008

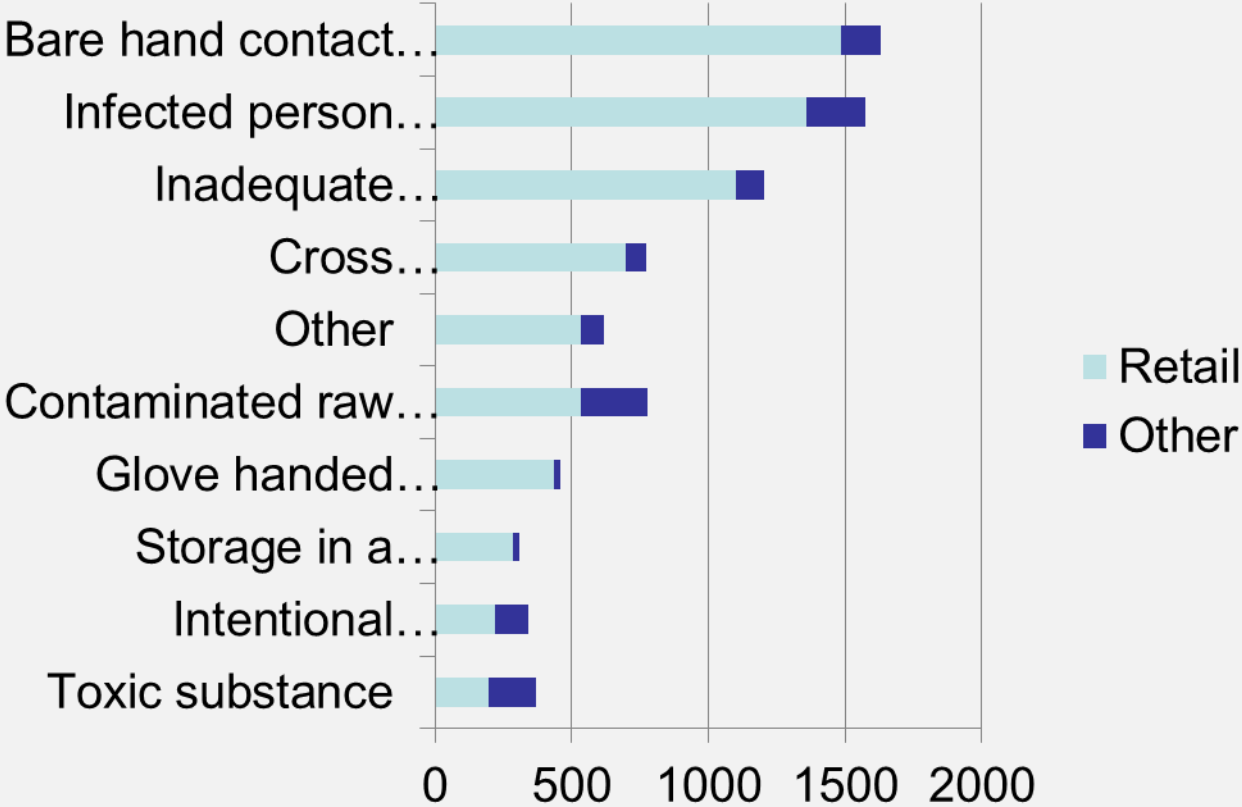


TOP 10 SINGLE FOOD COMMODITIES, RETAIL OUTBREAKS 1998–2008



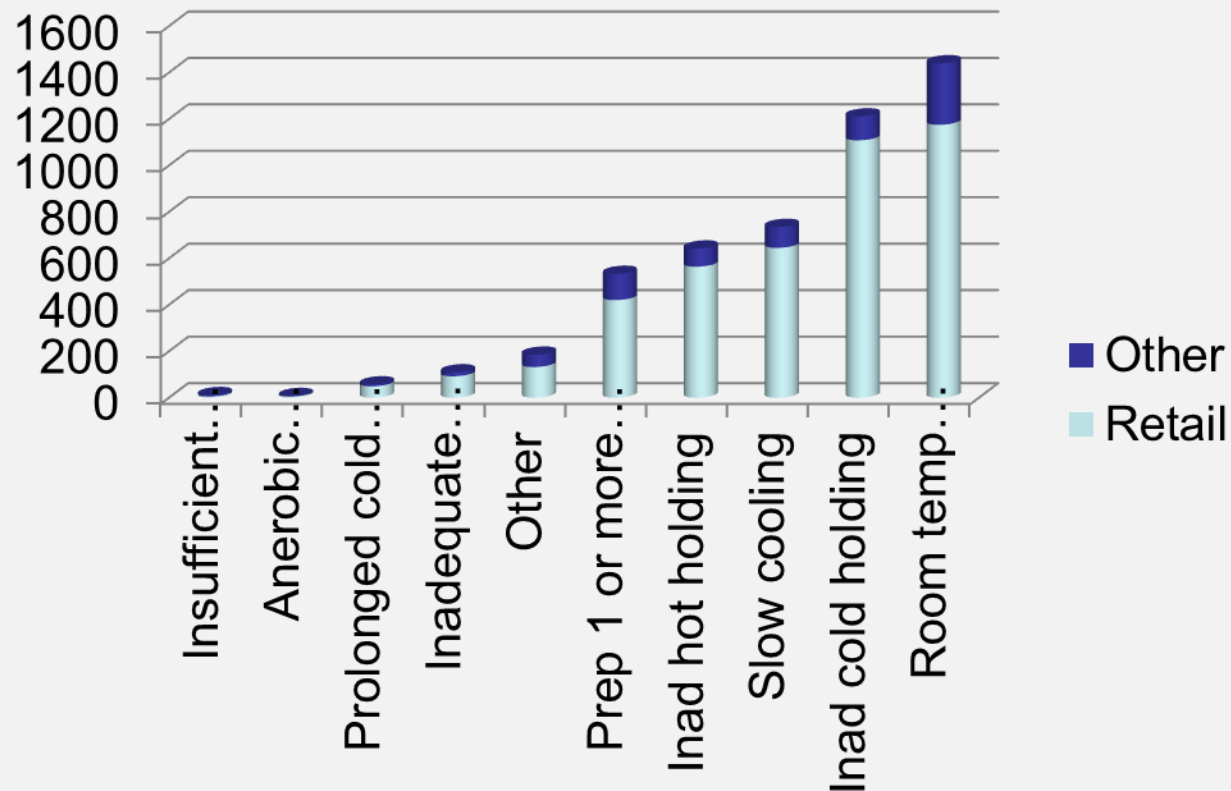
Complex food 2161/2561
Undetermined 1157/1355

TOP 10 **CONTAMINATION FACTORS**, RETAIL OUTBREAKS~, 1998–2008



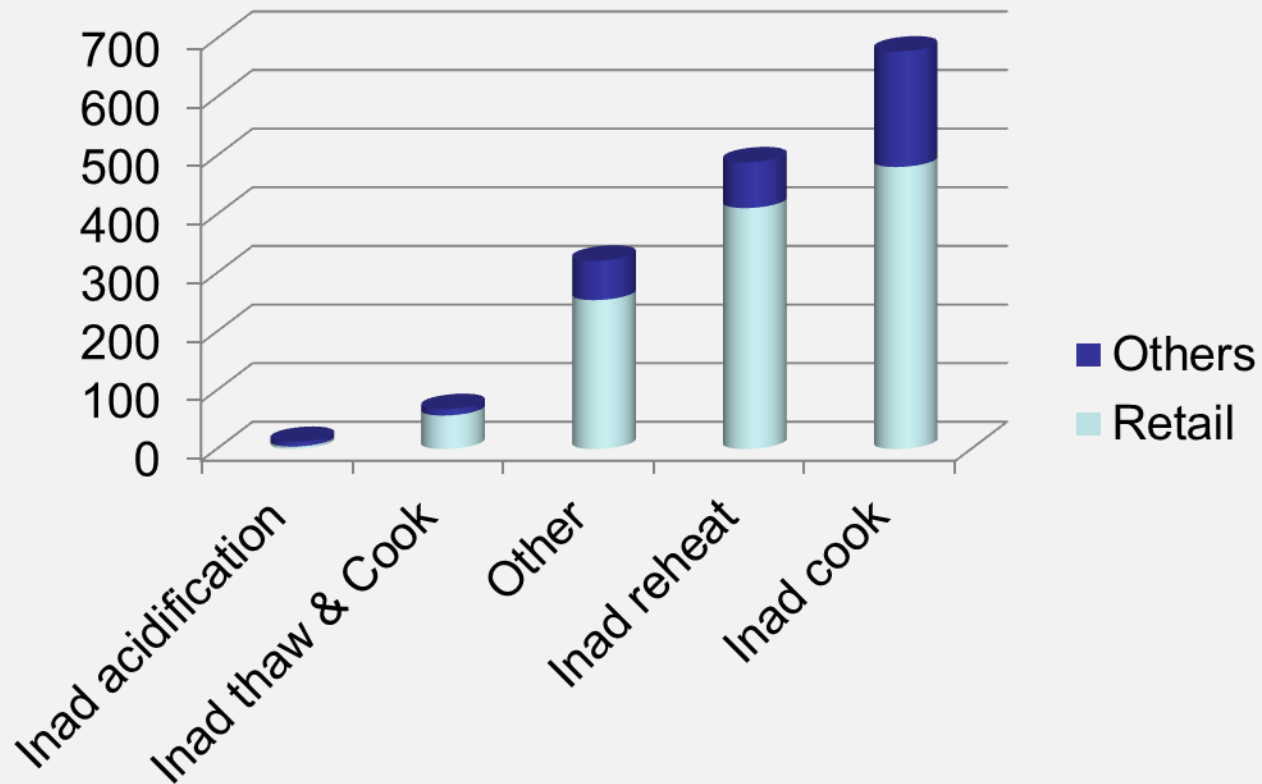
~ Outbreaks may be counted more than once due to multiple contamination factors

TOP 10 PROLIFERATION FACTORS, RETAIL OUTBREAKS, 1998–2008



-Outbreaks may be counted more than once due to multiple contamination factors

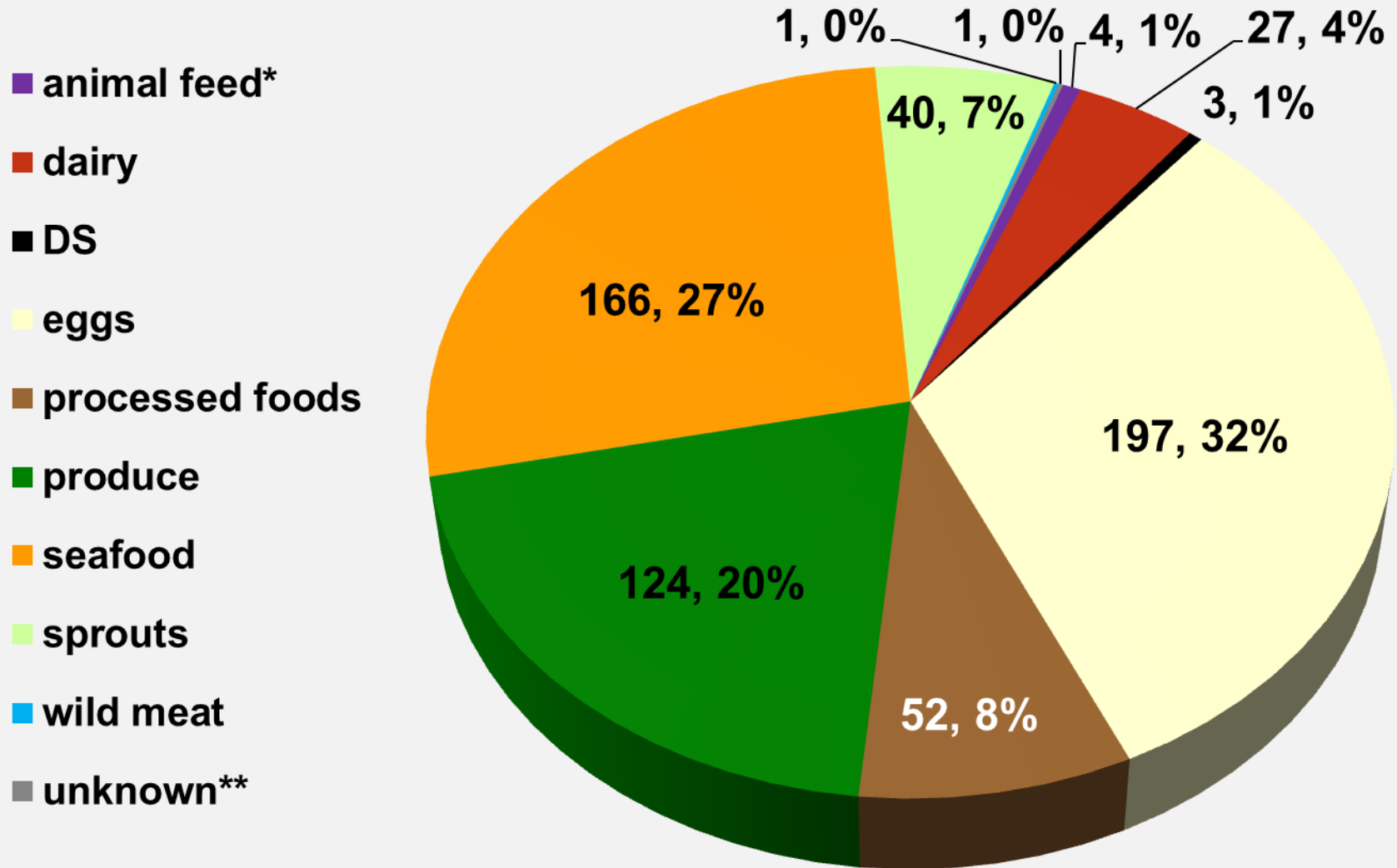
TOP 5 SURVIVAL FACTORS, RETAIL OUTBREAKS, 1998–2008



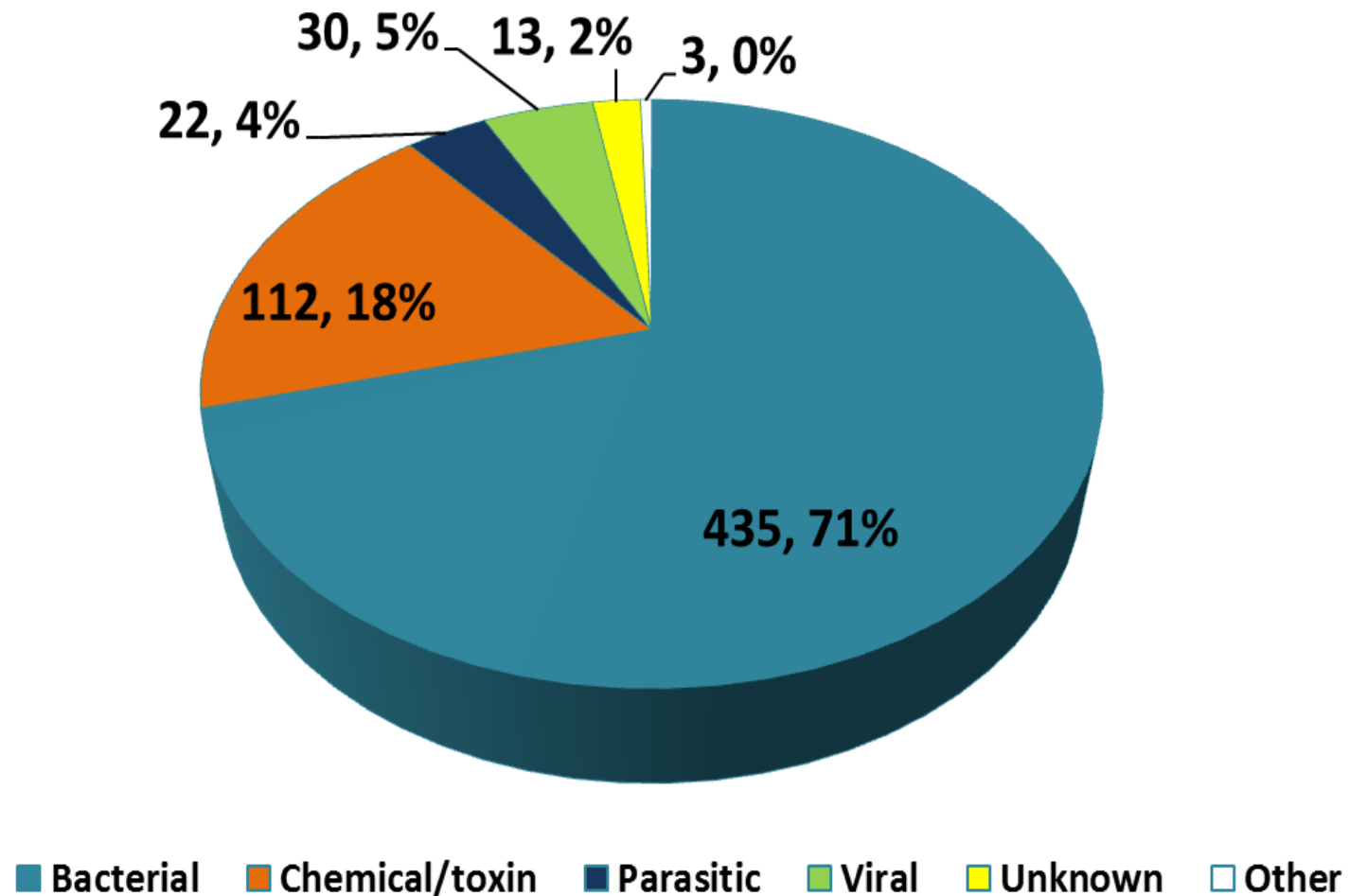
~Outbreaks may be counted more than once due to multiple contamination factors

MANUFACTURED FOODS & PRODUCE

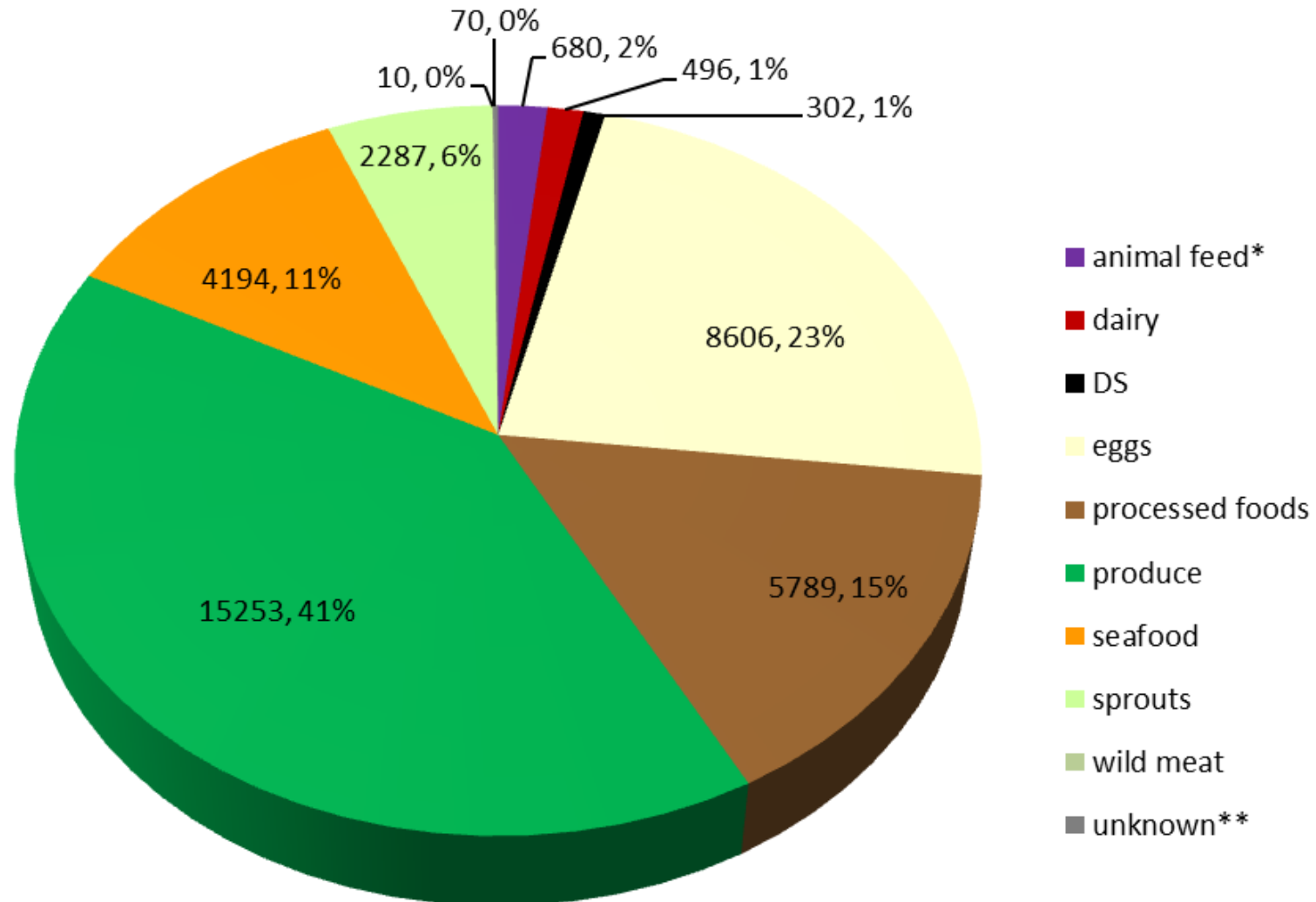
**REPORTED OUTBREAKS LINKED TO FDA-REGULATED FOODS BY VEHICLE, 1996-2013
(N=615 OUTBREAKS)**



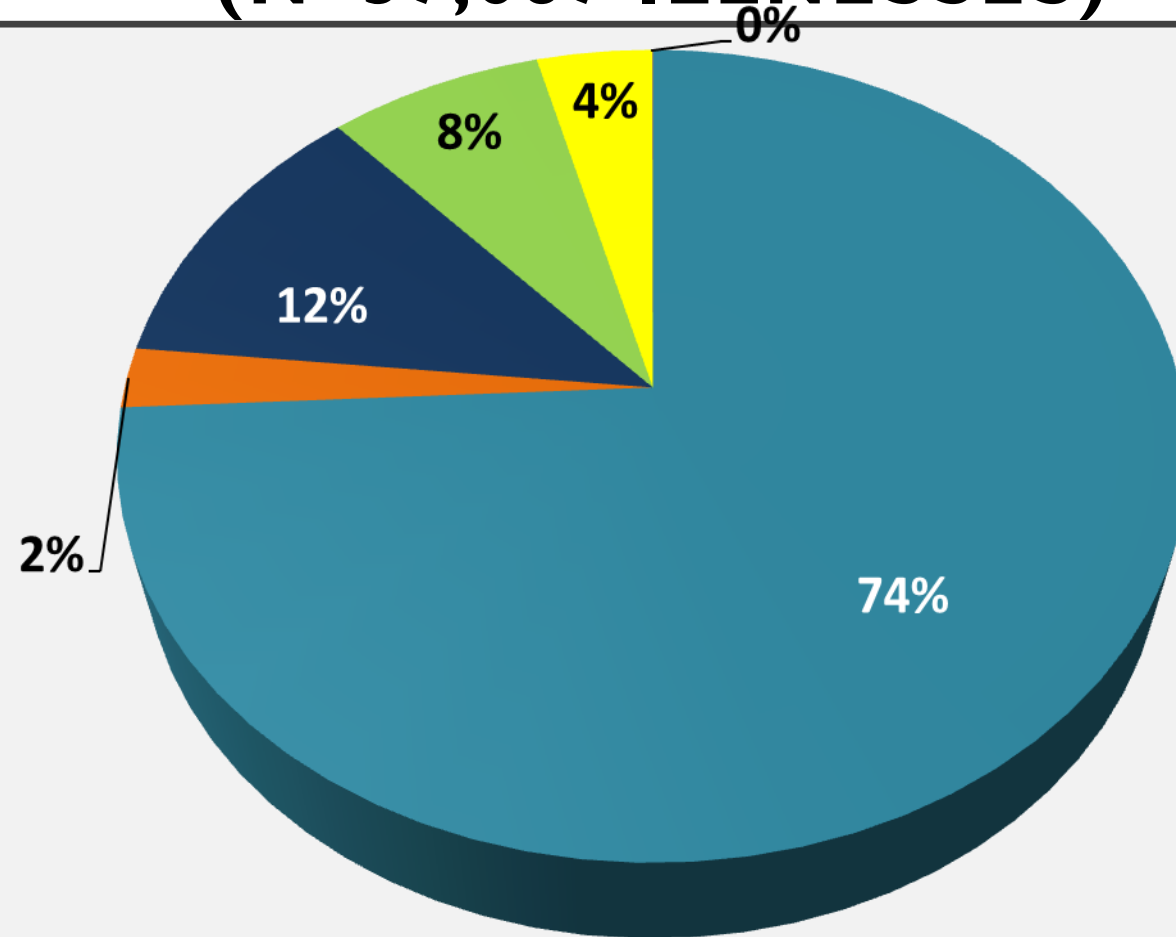
**REPORTED OUTBREAKS LINKED TO FDA-
REGULATED FOODS, BY AGENT, 1996-2013
(N=615 OUTBREAKS)**



**REPORTED ILLNESSES LINKED TO FDA-
REGULATED FOODS, BY VEHICLE, 1996-2013
(N=37,687 ILLNESSES)**

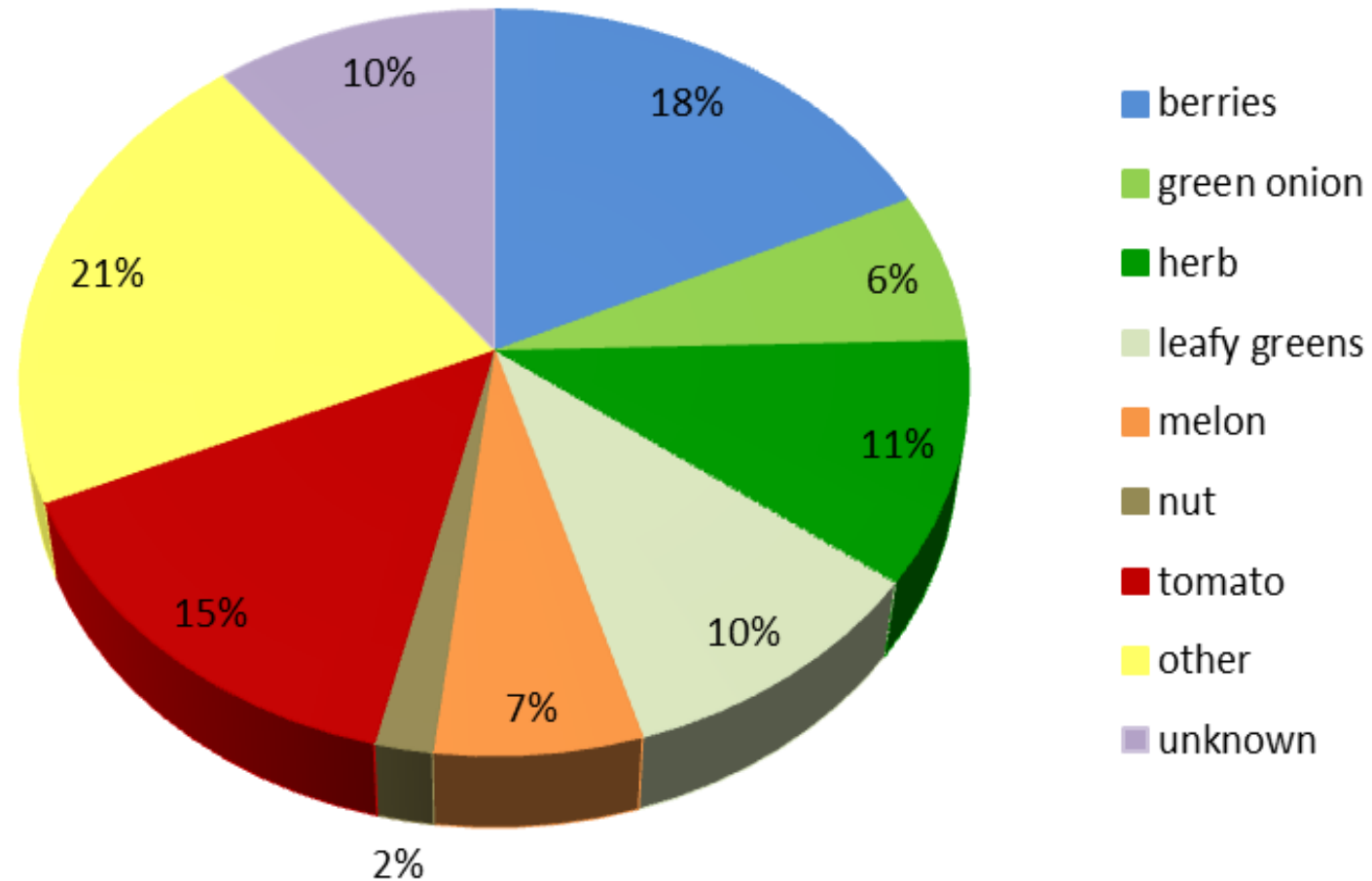


**REPORTED ILLNESSES LINKED TO FDA-
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(N=37,687 ILLNESSES)**

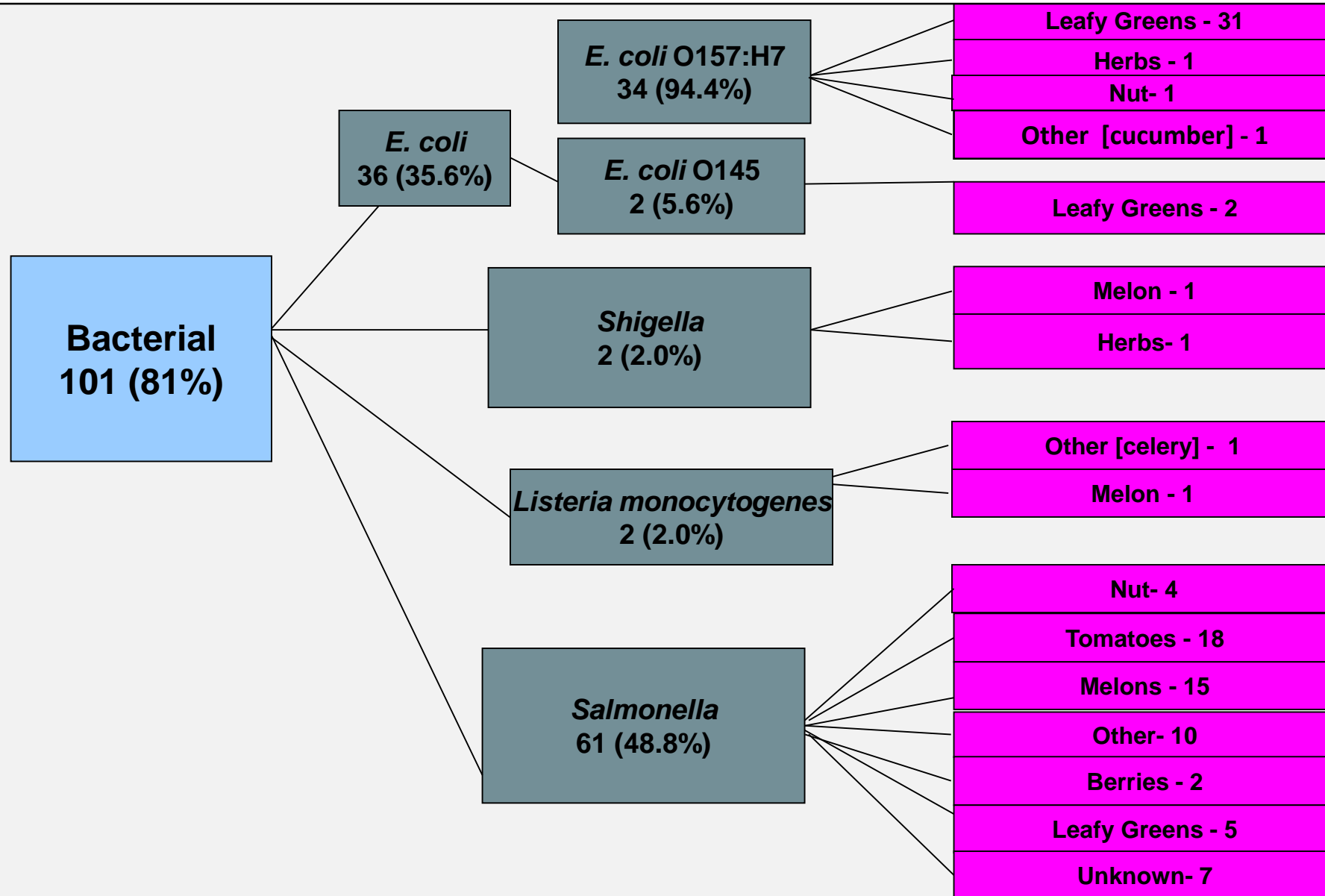


■ Bacterial ■ Chemical / toxin ■ Parasitic ■ Viral ■ Unknown ■ Other

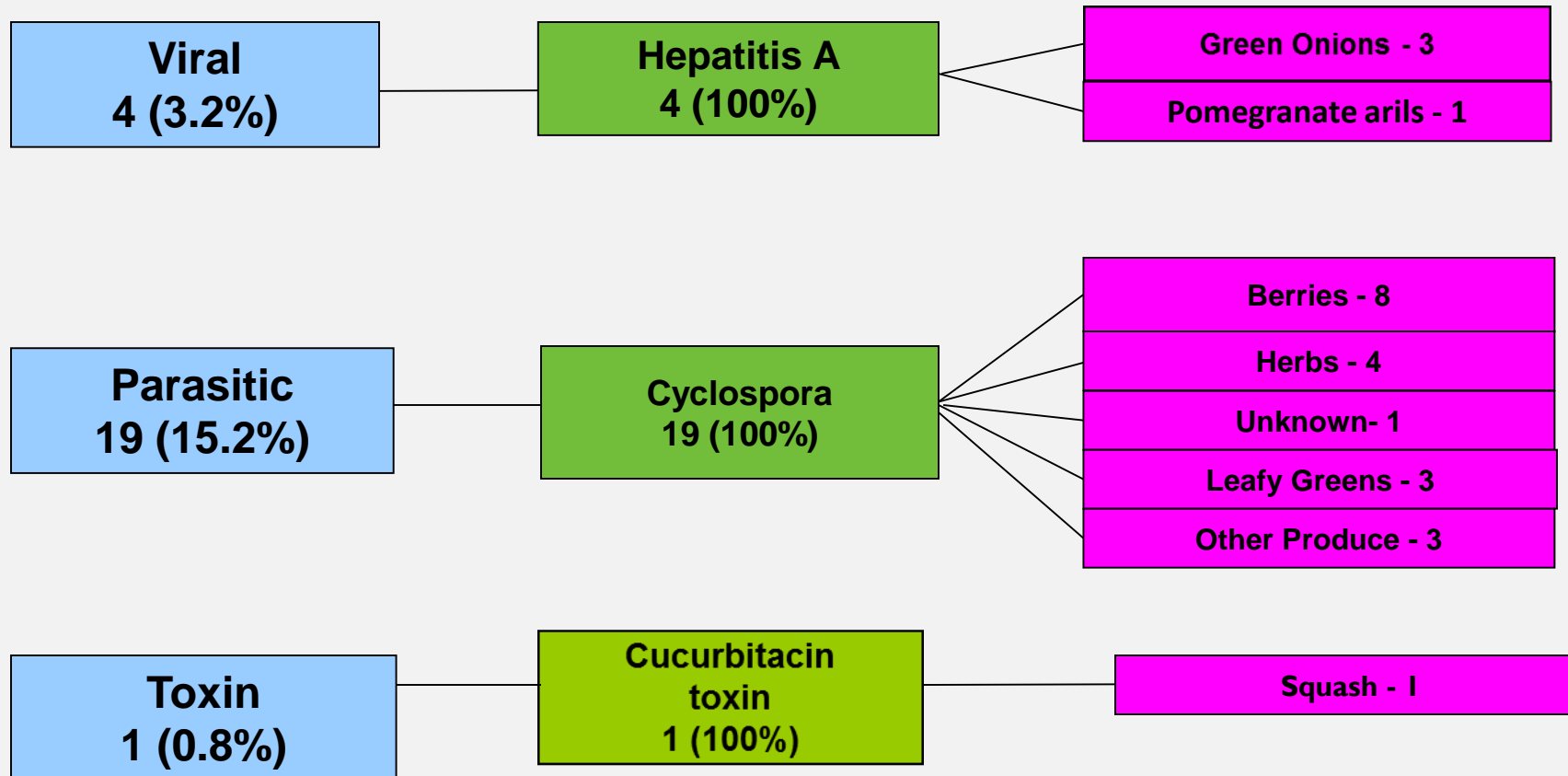
**TYPES OF PRODUCE ASSOCIATED WITH
ILLNESSES,
1996-2013 (N=15,253)**



Agents associated with produce outbreaks 1996-2013 (n=125)



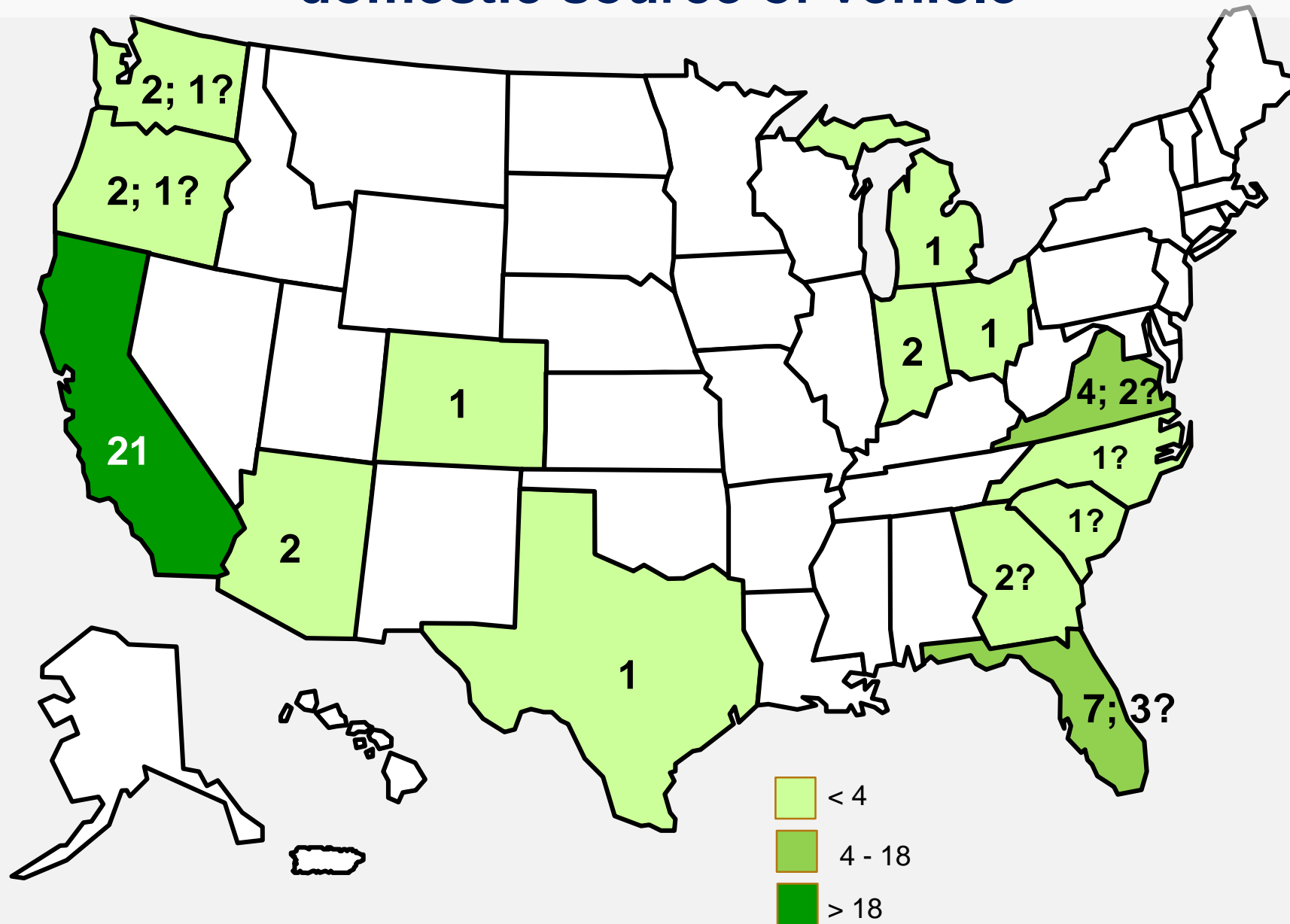
Agents associated with *produce outbreaks*, 1996-2013 (n=125); continued



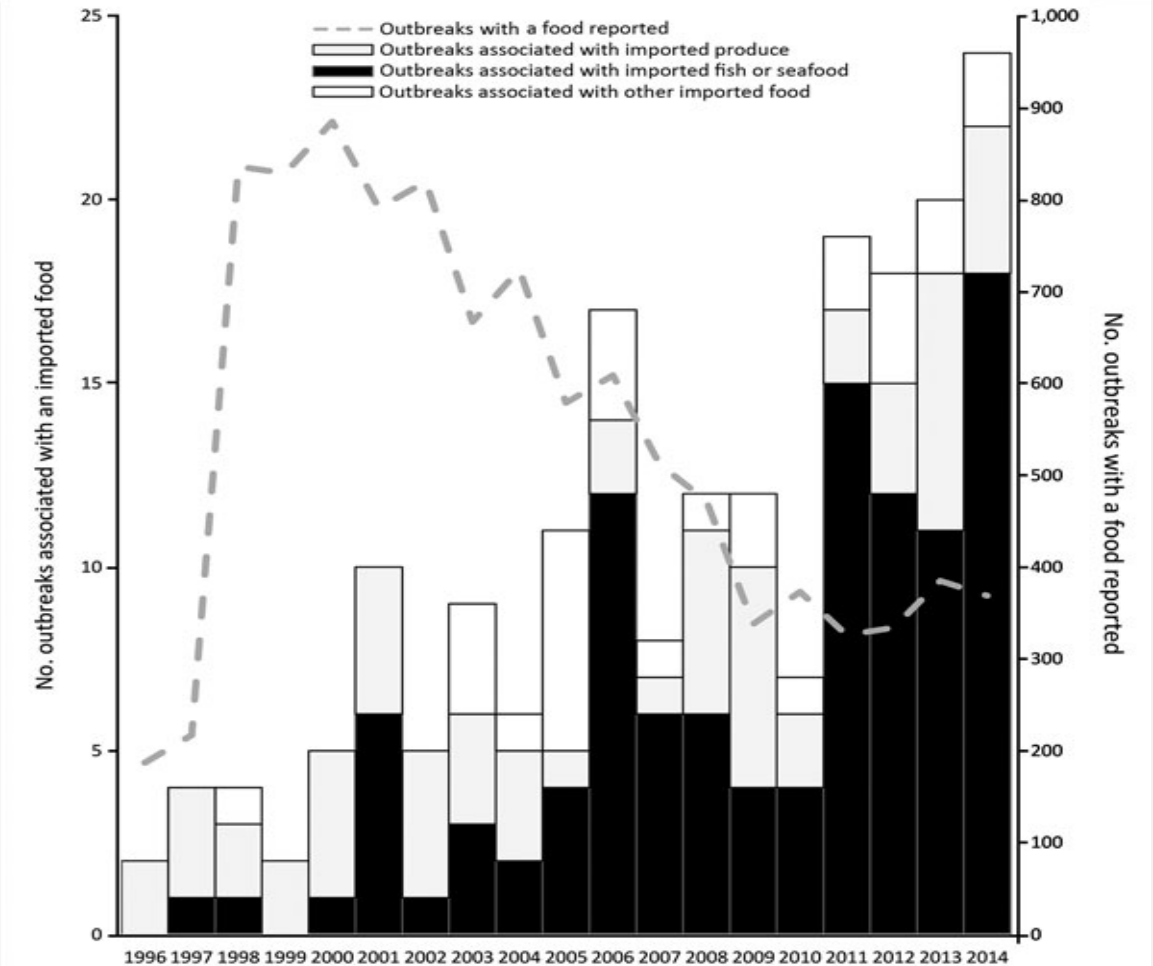
PRODUCE ASSOCIATED OUTBREAKS, 1996-2013 (N=125)

- **Of the 125 produce-associated outbreaks, the source of the produce included:**
 - **Imported product (29; 23.2%)**
 - 55.2% was a product from Mexico
 - 34.5% were from Central and South America
 - 3.4% was from Canada
 - 6.9% was from Turkey
 - **Unknown (29; 23.2%)**
 - **Inconclusive (18; 14.4%)**
 - **Domestic (49; 39.2%)**

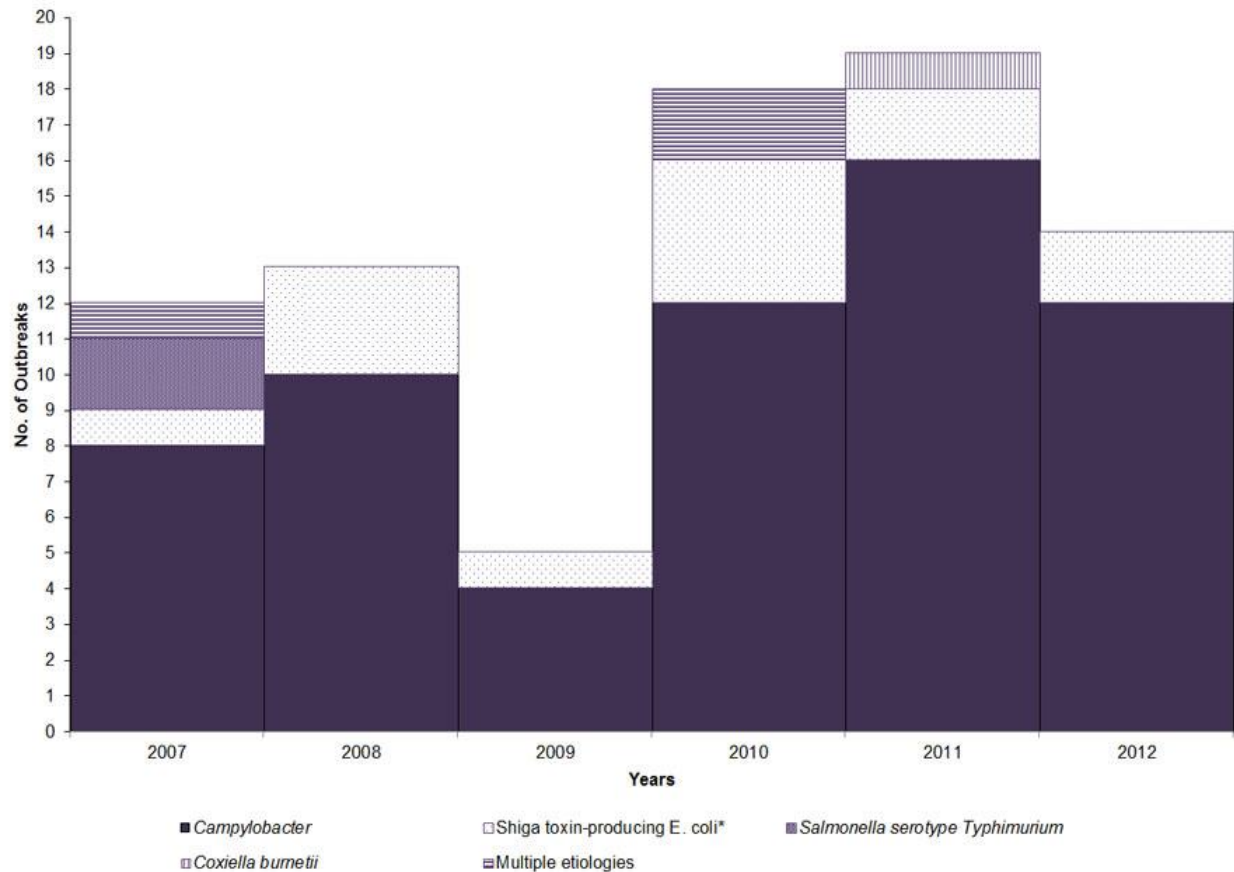
Produce-associated outbreaks, 1996 – 2013; domestic source of vehicle



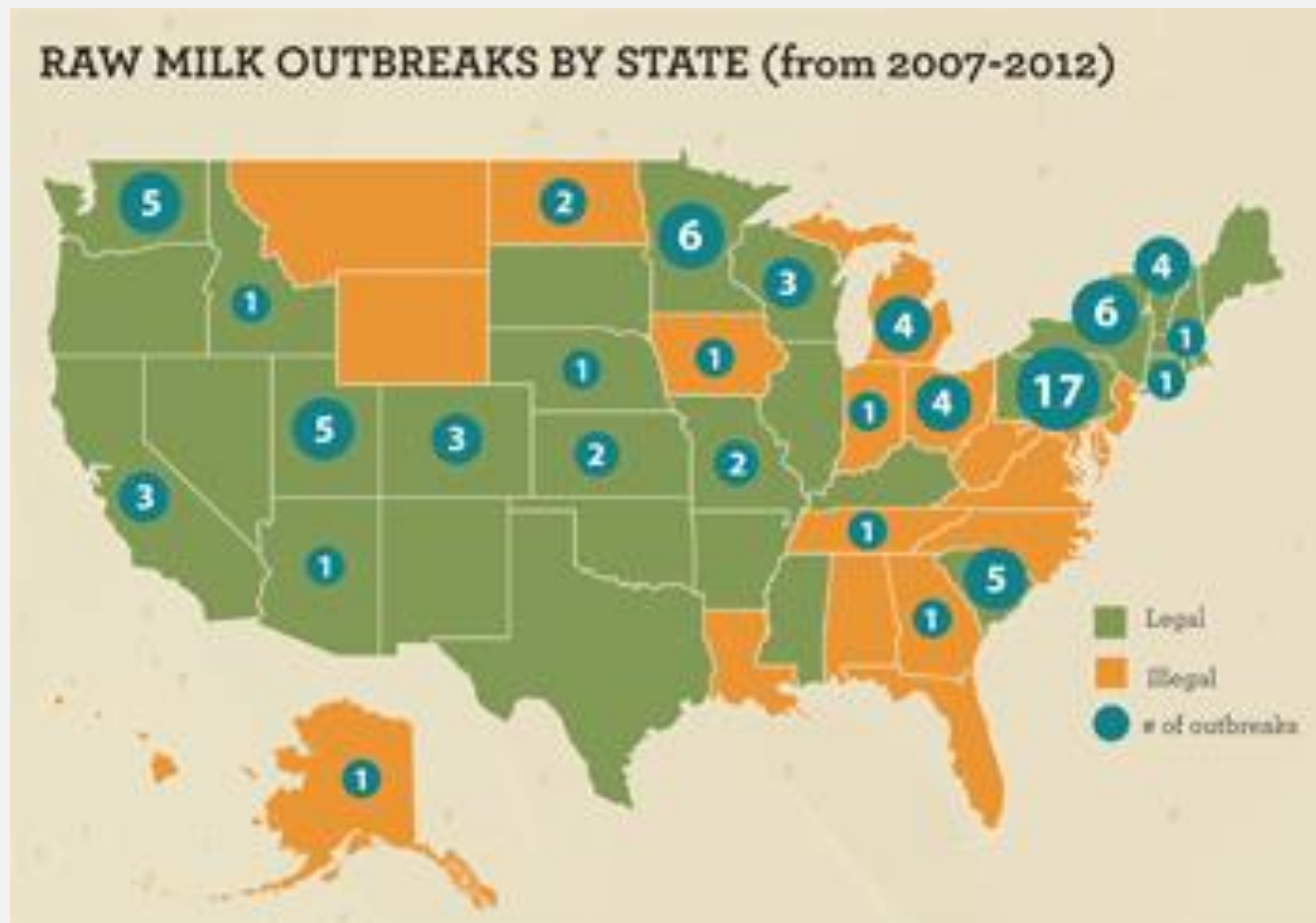
OUTBREAKS OF DISEASE ASSOCIATED WITH FOOD IMPORTED INTO THE UNITED STATES, 1996–2014



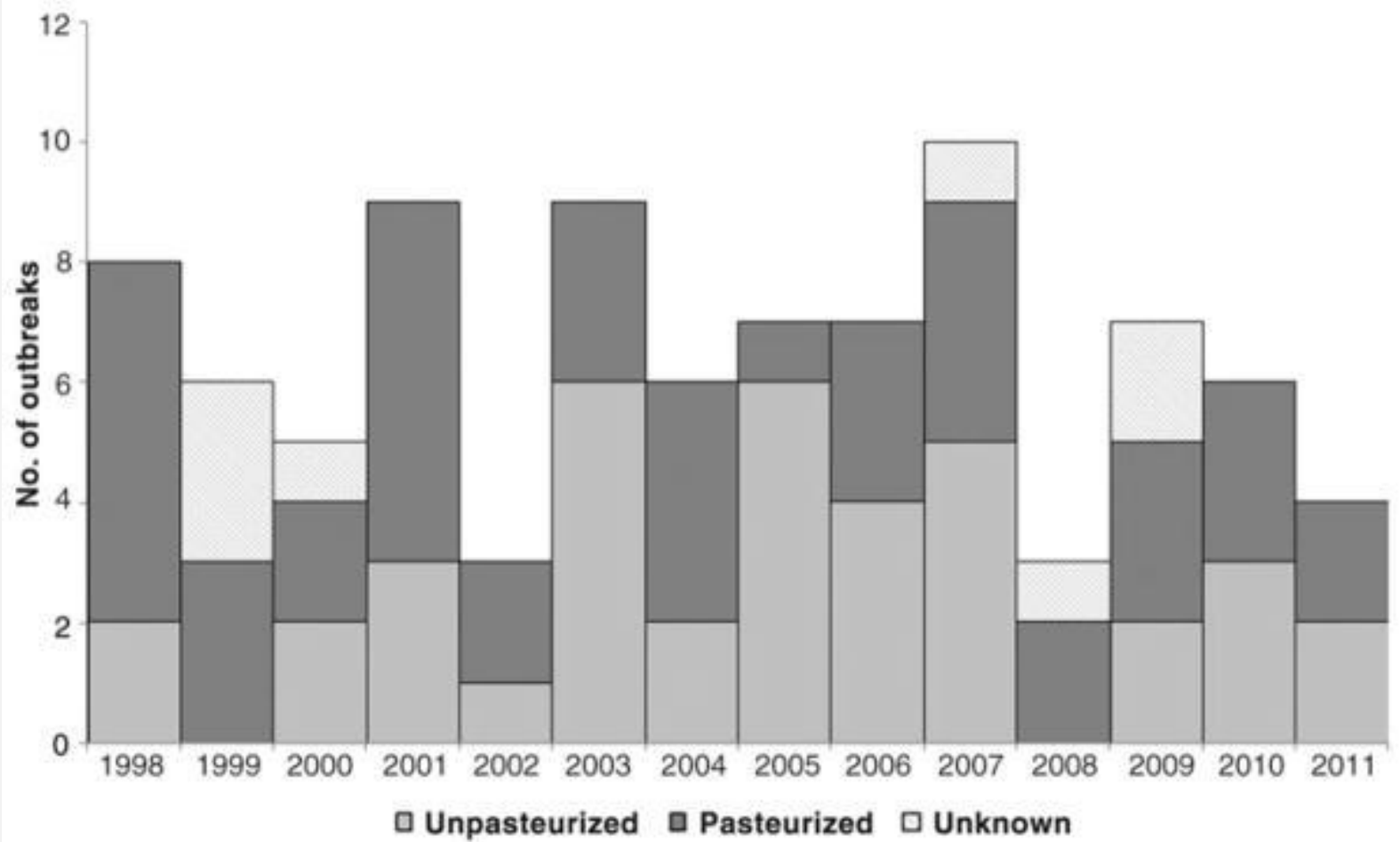
OUTBREAKS ASSOCIATED WITH NONPASTEURIZED MILK, BY ETIOLOGIC AGENT AND YEAR, UNITED STATES, 2007–2012



RAW MILK OUTBREAKS BY STATE



OUTBREAKS ATTRIBUTED TO CHEESE: DIFFERENCES BETWEEN OUTBREAKS CAUSED BY UNPASTEURIZED AND PASTEURIZED DAIRY PRODUCTS, UNITED STATES, 1998-2011



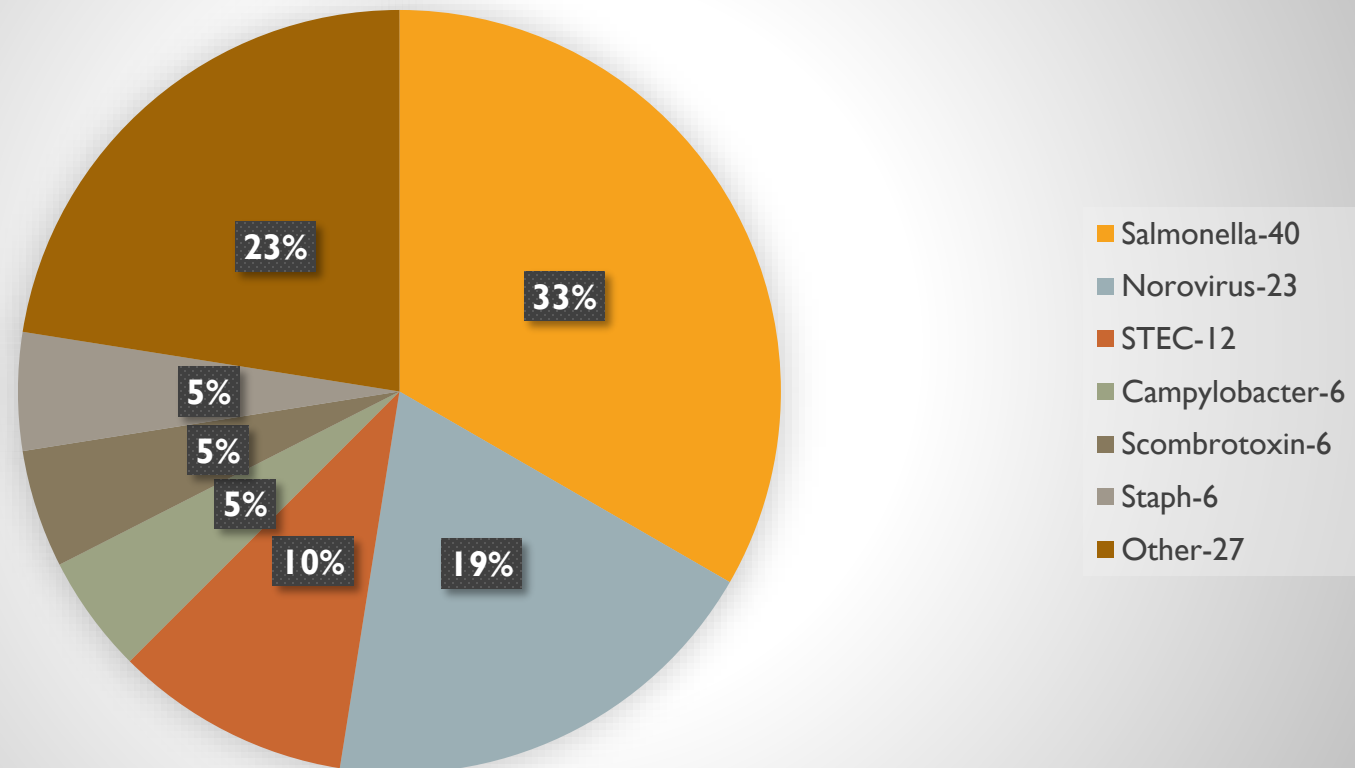
TEMPORARY & MOBILE FOOD OUTBREAKS

REPORTED US FOODBORNE DISEASE OUTBREAKS

- 17,339 reported foodborne disease outbreaks 1998 – 2013
- 129 outbreaks linked to TFE or mobile food
- 4,364 illnesses in these TFE or mobile outbreaks and no deaths

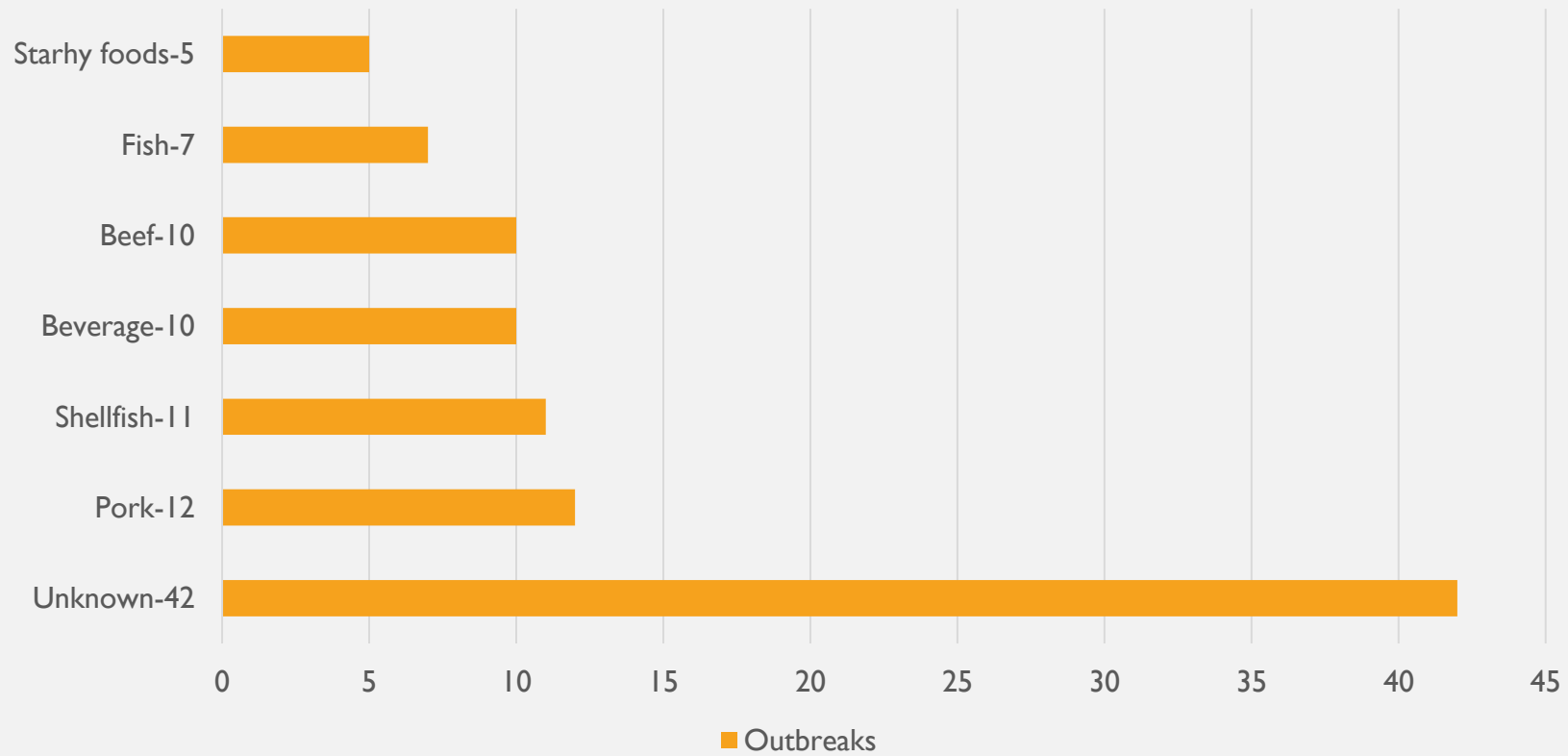
AGENTS

Percent of Outbreaks With A Reported Agent



VEHICLES

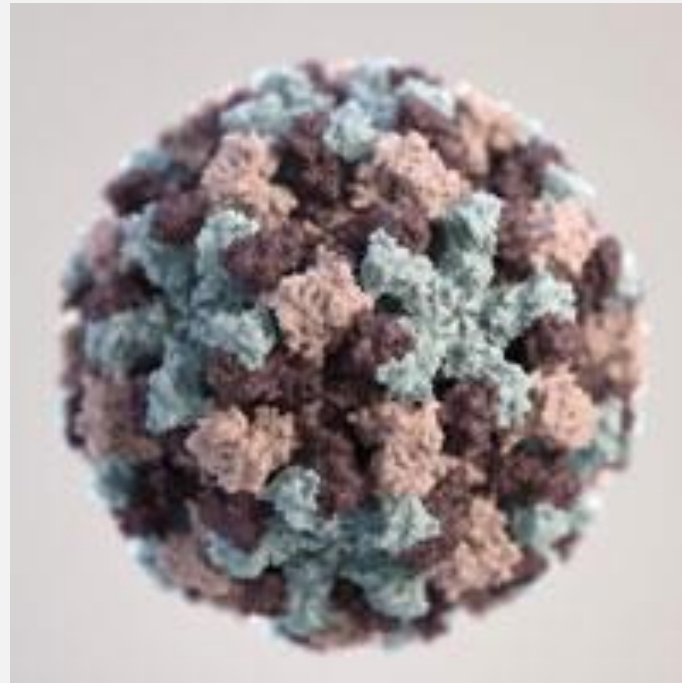
Outbreaks



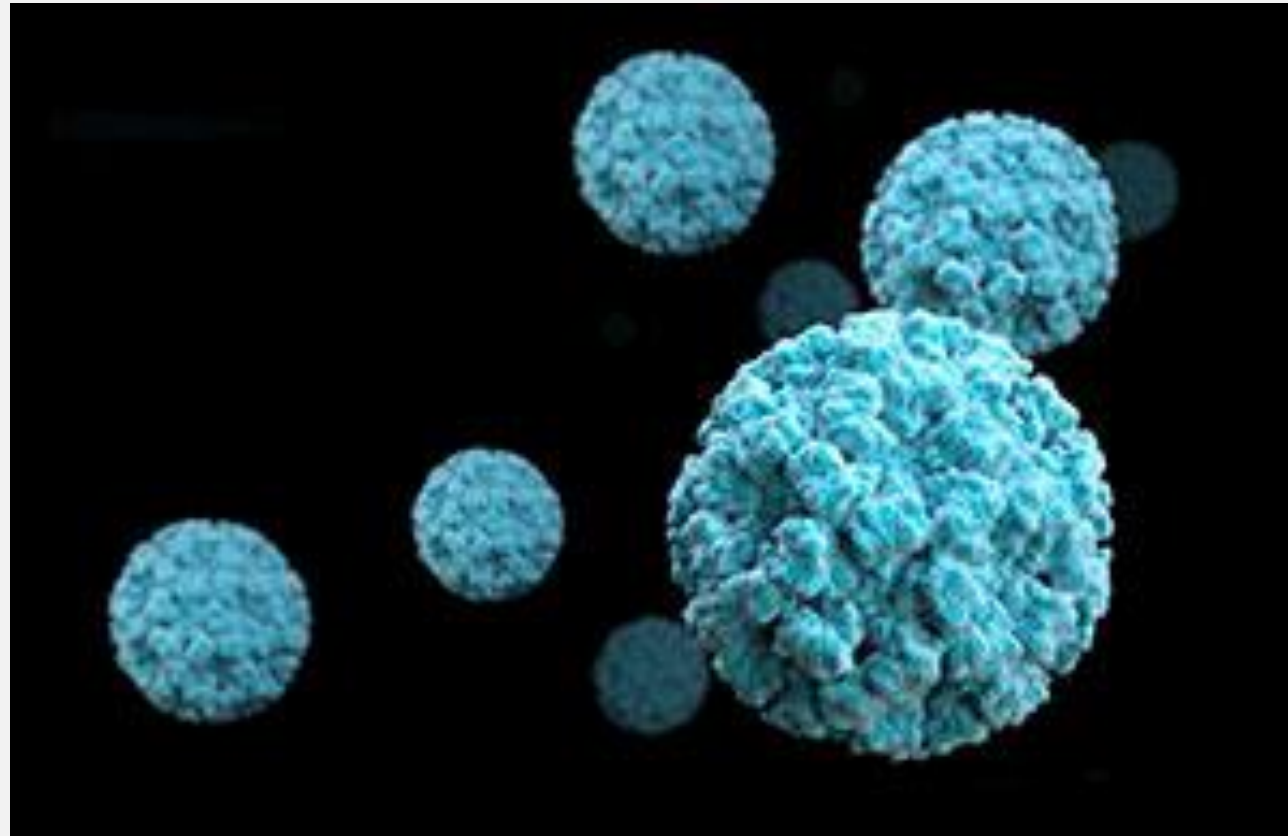
ORGANIC FOODS

- Consumption of organic foods increasing
- 18 outbreaks 1992 – 2014
- 779 illnesses, 258 hospitalizations, 3 deaths
- 56% of outbreaks were between 2010 and 2014
- Salmonella in 44% of outbreaks
- E coli O157:H7 in 33% of outbreaks
- 8 produce, 4 unpasteurized dairy, 2 eggs, 2 nut and seed
- 83% likely or definitely USDA certified

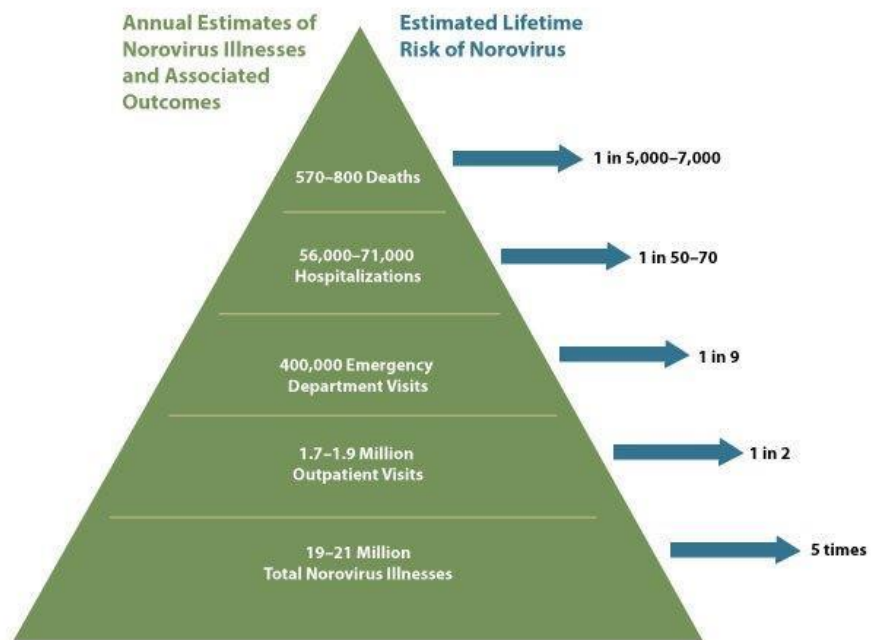
NOROVIRUS




CULTURE OF NOROVIRUS:
UNIVERSITY OF HOUSTON MED SCHOOL



BURDEN OF NOROVIRUS IN THE US



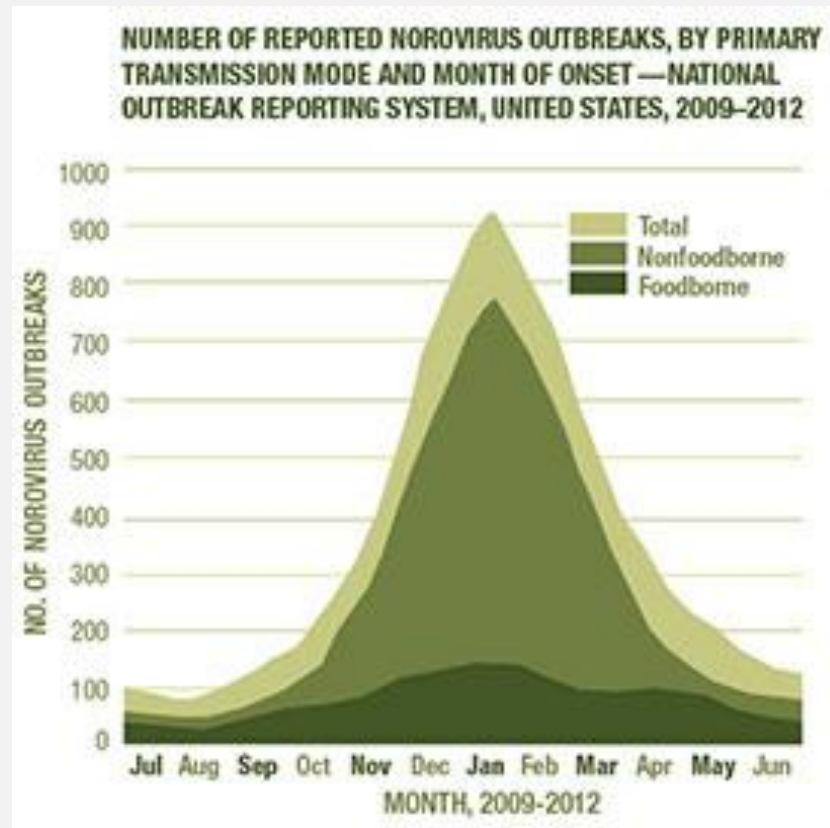


SETTING OF NOROVIRUS OUTBREAKS REPORTED THROUGH THE NATIONAL OUTBREAK REPORTING SYSTEM (NORS), 2009-2012

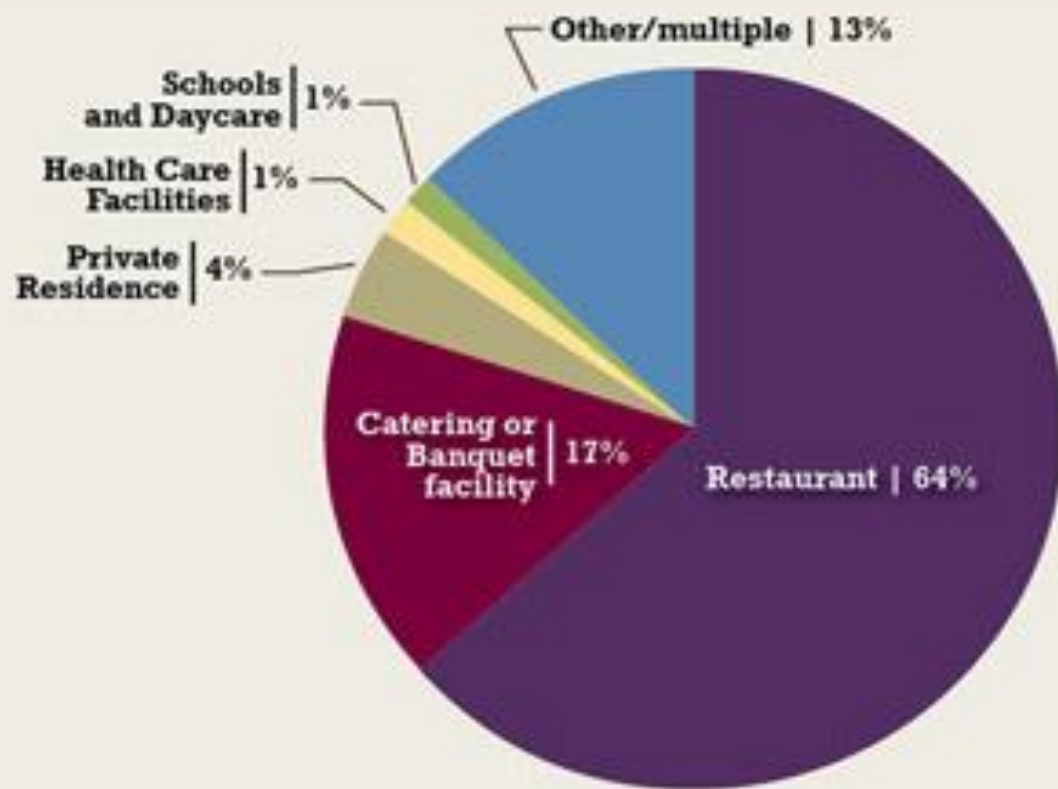
Exposure setting	Number of Outbreaks	Percentage of Outbreaks
Health care facility	2189	62.7%
Restaurant or banquet facility	771	22.1%
School or day-care facility	214	6.1%
Private residence	69	1.9%
Other/multiple settings	251	7.2%

Data on specific settings are restricted to outbreaks with a single exposure setting; for foodborne outbreaks, setting refers to the setting where implicated food was consumed.

SEASONALITY



Where do norovirus outbreaks from food contamination happen?



SOURCE: CDC National Outbreak Reporting System, 2009-2012

How contagious is norovirus?



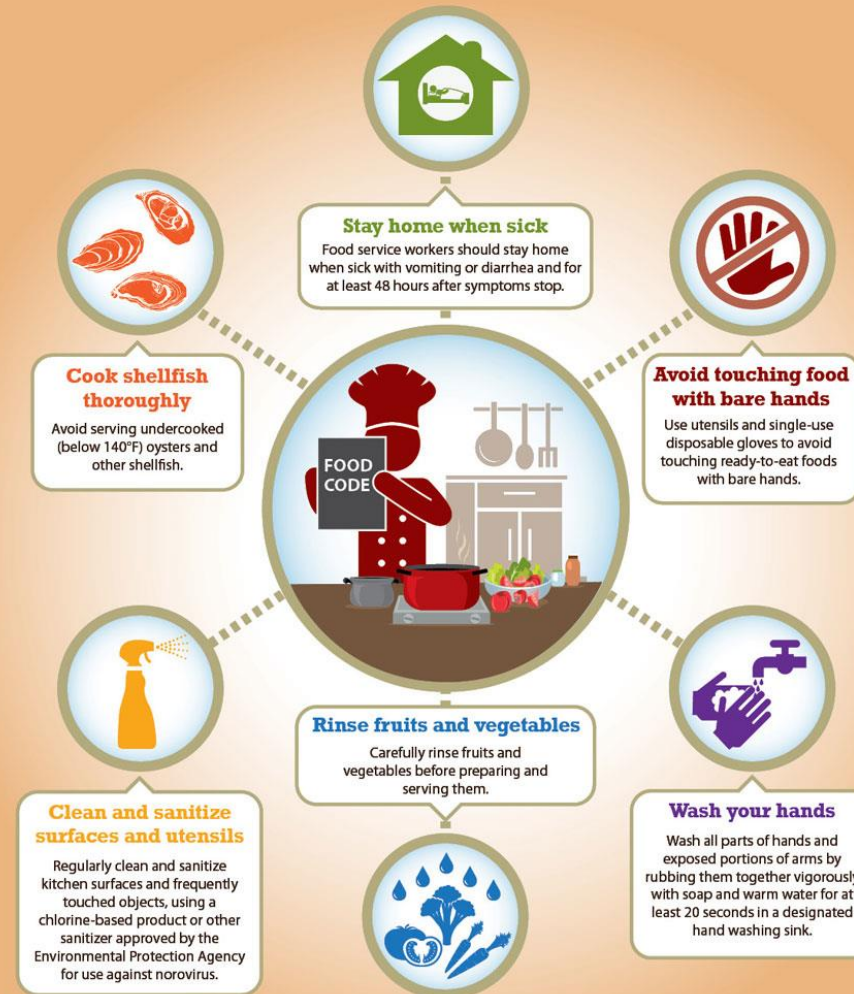
Just a **very small amount** - as few as 18 viral particles - of norovirus on your food or your hands can make you sick.

In fact, the amount of virus particles that fit on the head of a pin would be enough to infect **more than 1,000 people!**

Source: *Journal of Medical Virology*, August, 2008

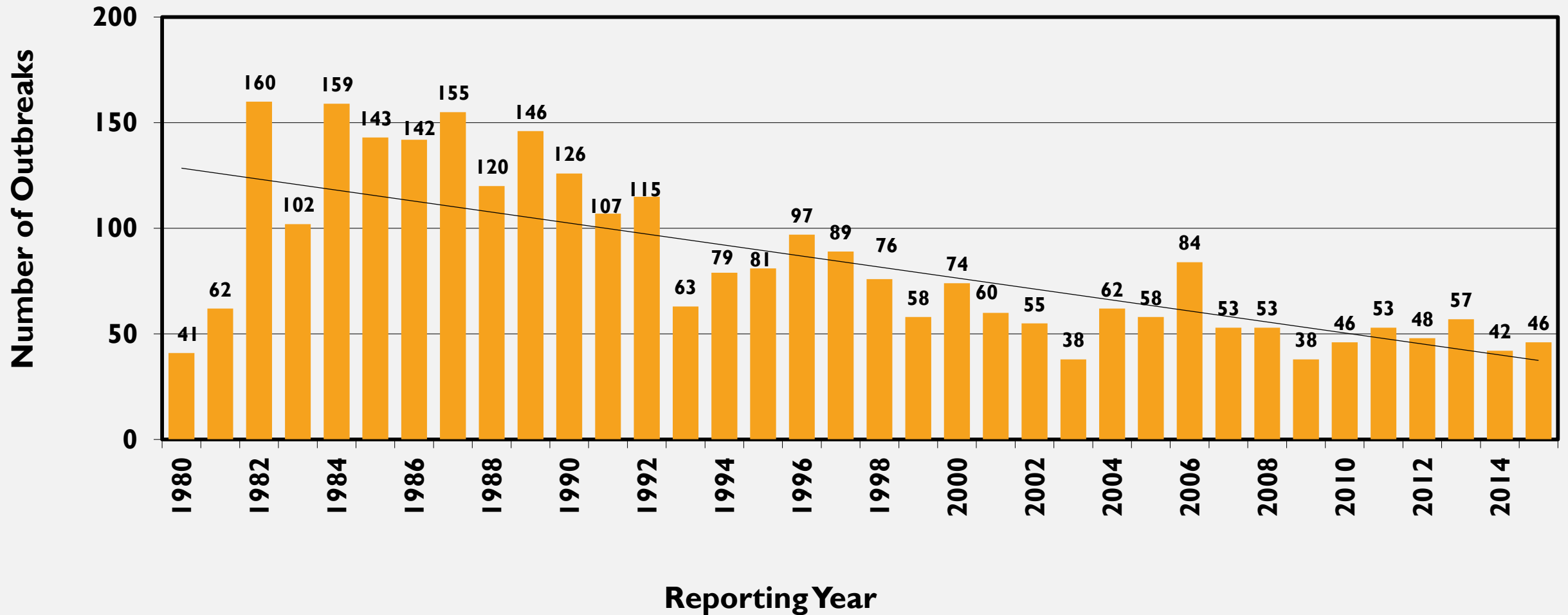
Ways to prevent norovirus outbreaks from food contamination

Kitchen managers should be trained and certified in food safety and ensure that **all food service workers follow food safety practices** outlined in the **FDA model Food Code** and **CDC guidelines**.



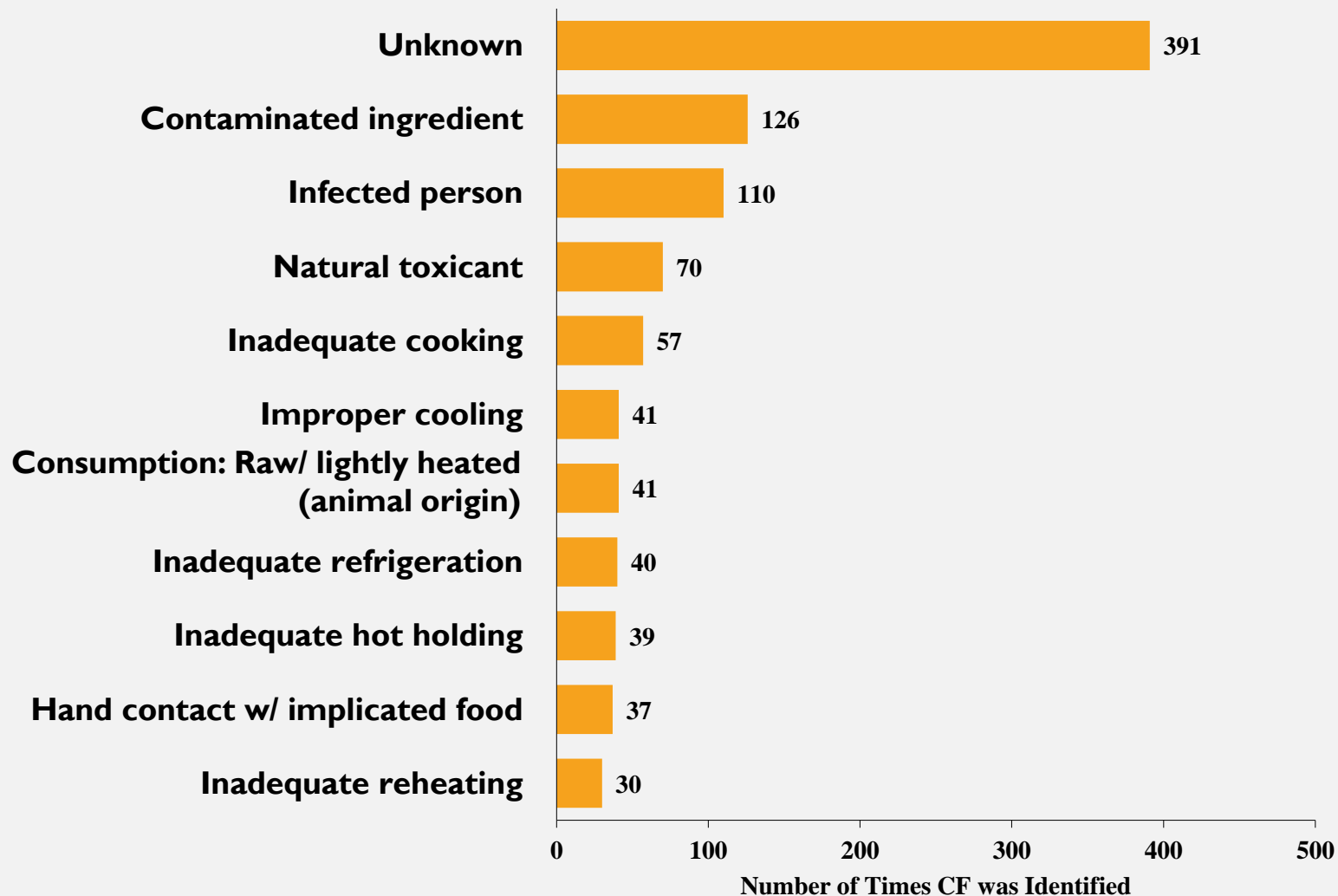
NEW YORK STATE TRENDS

Number of Foodborne Outbreaks, New York State 1980 – 2015

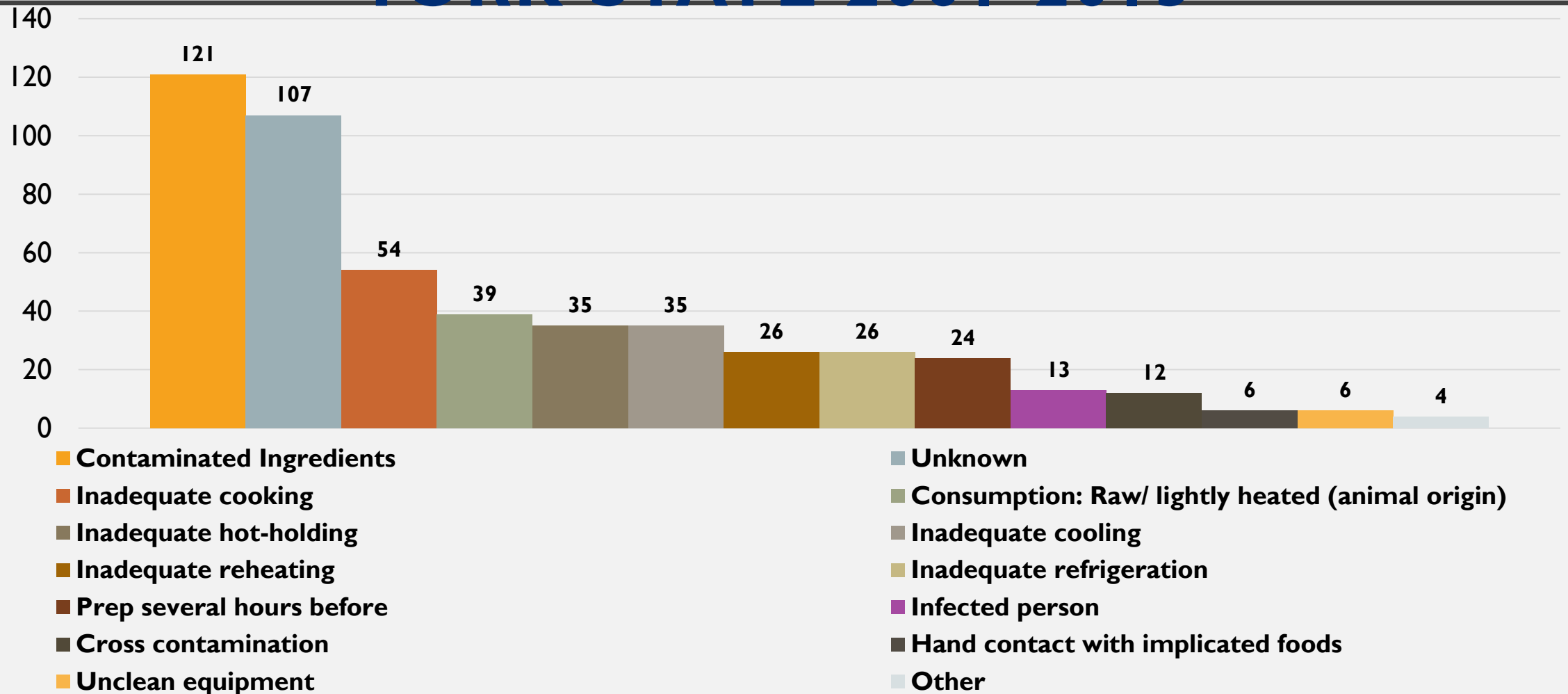


TOP 10 CONTRIBUTING FACTORS IDENTIFIED IN FOODBORNE OUTBREAKS, NEW YORK STATE 2001-2015

Contributing Factor (CF)

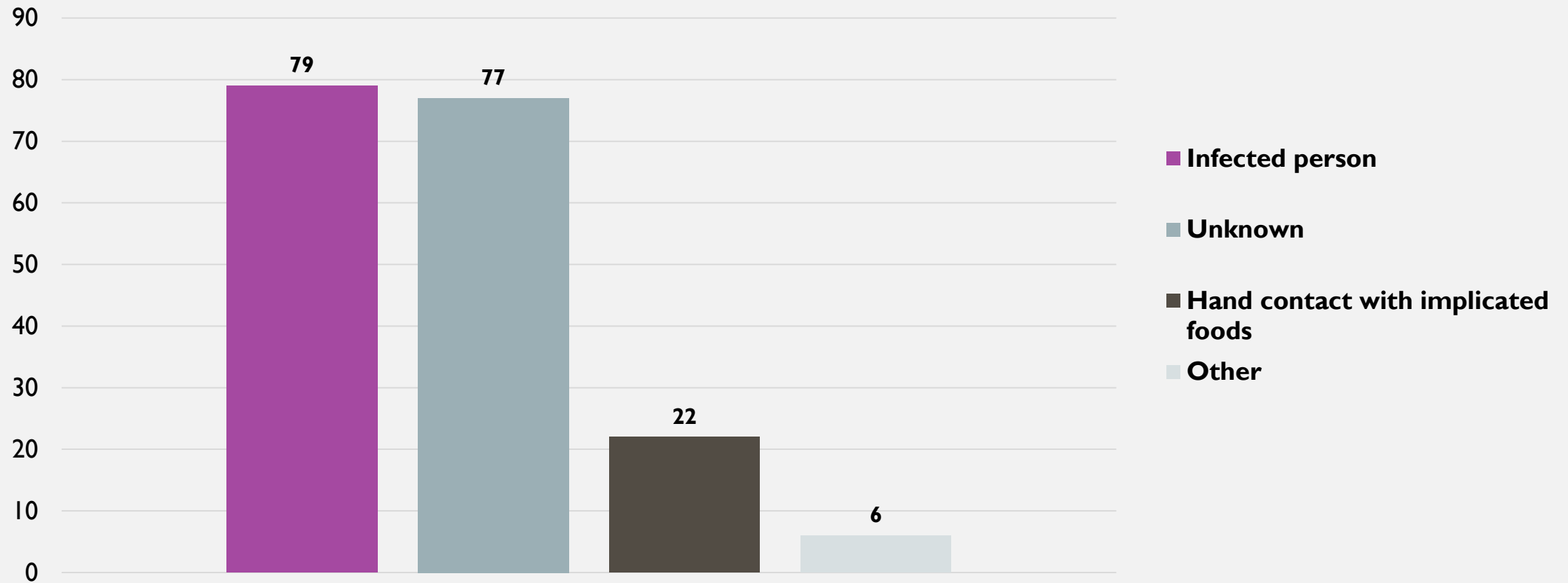


SPECIFIC CONTRIBUTING FACTORS IDENTIFIED IN BACTERIAL OUTBREAKS, NEW YORK STATE 2001-2015



508 of Contributing Factors identified in 311 Bacterial Outbreaks

SPECIFIC CONTRIBUTING FACTORS IDENTIFIED IN VIRAL OUTBREAKS, NEW YORK STATE 2001-2015



183 Contributing Factors identified in 160 Viral Outbreaks

**ENVIRONMENTAL
ASSESSMENT (ROOT CAUSE ANALYSIS)**

NATIONAL ENVIRONMENTAL ASSESSMENT REPORTING SYSTEM (NEARS)

- Identify environmental causes of outbreaks in your jurisdiction.
- Take follow-up action to reduce or prevent future foodborne illness outbreaks.
- Evaluate your food safety program and make improvements based on established guidelines.
- Develop or modify program policies or regulations.
- Focus limited program resources on actions with the highest impact.

COLLABORATIVE IMPLEMENTATION OF FMSA WORKSHOP ON ROOT-CAUSE ANALYSIS

- Develop a common understanding around root-cause analysis, including:
 - o Definition and core components
 - o Value and expectations for improving food safety
 - - Identify potential areas for improving root-cause analysis
 - o What makes a successful root-cause analysis?
 - o What are common challenges and how they can be overcome?
 - - Extract more value from future root-cause analyses
 - o Examine approaches to overcoming common challenges to sharing lessons learned
- from root-cause analysis
 - o Propose additional next steps/actions

SUMMARY

- Foodborne Disease continues to be a significant public health problem
- Public health interventions can make a difference, but we still have a long way to go
- Norovirus is the leading cause of foodborne illness -restaurants
- Bacterial agents are the most common ones in FDA and USDA regulated foods
- Listeria will continue to be a problem as our population ages
- Produce will continue to be a significant vehicle
- Environmental Assessments will highlight the root causes that will need to be addressed