



The Interagency Food Safety Analytics Collaboration (IFSAC)

Michael Bazaco MS, PhD

*US Food and Drug Administration
Center for Food Safety and
Applied Nutrition*

Outline

- Introduction to IFSAC
- Overview of Past Projects
- Overview of Continuing Projects

IFSAC

IFSAC's purpose is to improve coordination of federal food safety responsibilities with the initial objective to estimate the source attribution of infections associated with specific foods and settings

IFSAC Introduction

- IFSAC was established in 2011 by:
 - the Centers for Diseases Control and Prevention (CDC),
 - the Food Safety and Inspection Service (FSIS), and
 - the Food and Drug Administration (FDA).
- Guided by a Charter established in 2011
- Strategic Plan developed in 2012
- Held first public meeting in 2012 to outline goals in the Strategic Plan, which included developing attribution estimates, improving data and methods for uncertainty, and engaging and communicating with stakeholders.

Importance of IFSAC

- IFSAC represents, for the first time, a shared vision amongst CDC, FDA, and FSIS to improve foodborne illness source attribution
- Since its inception, IFSAC has brought the leaders, scientists, and analysts from the three agencies together to create, implement, and complete projects related to food attribution
- IFSAC accomplishments build on each other and allow pursuit of new, ever-more challenging objectives and projects
- Project outputs are supported by all three agencies and can be used to promote a harmonized approach to attribution estimation
- IFSAC efforts rely on the efforts of state and local partners in collecting and submitting data on foodborne outbreaks which is vital to the success of improving foodborne illness attribution.

IFSAC Process

- Steering Committee decides top priorities
- Technical Working Group proposes analytic projects to address priorities
 - Project plans are developed by Technical Working Group for each proposal approved by Steering Committee
- Steering Committee tracks all projects and provides input on analyses
- All public documents and web pages undergo formal clearance by all three agencies (<http://www.cdc.gov/foodsafety/ifsac/index.html>)

Understanding Attribution

Learn the importance of foodborne illness source attribution

[Learn More >](#)

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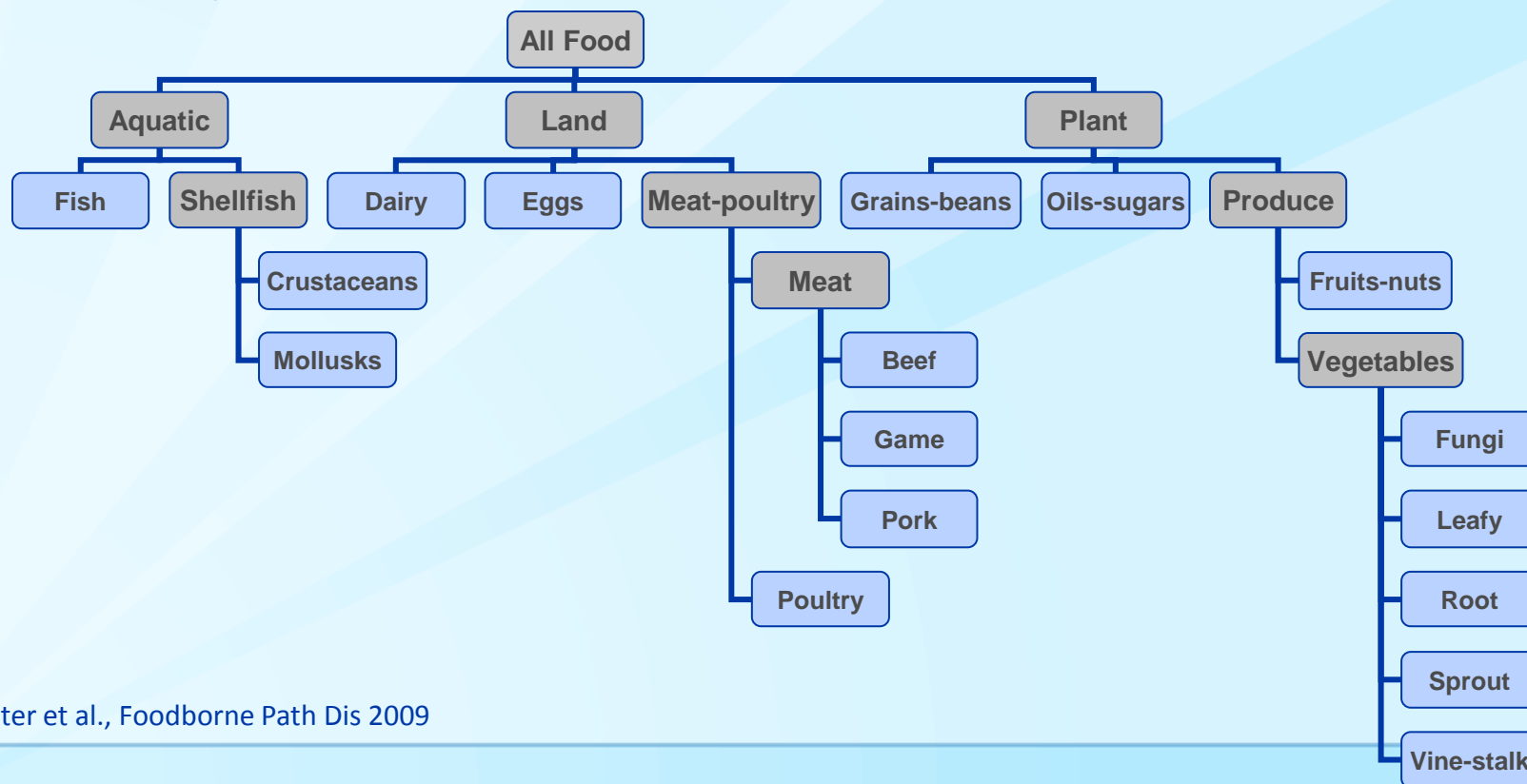


PAST PROJECTS

Improve the food categories used to estimate attribution

Background:

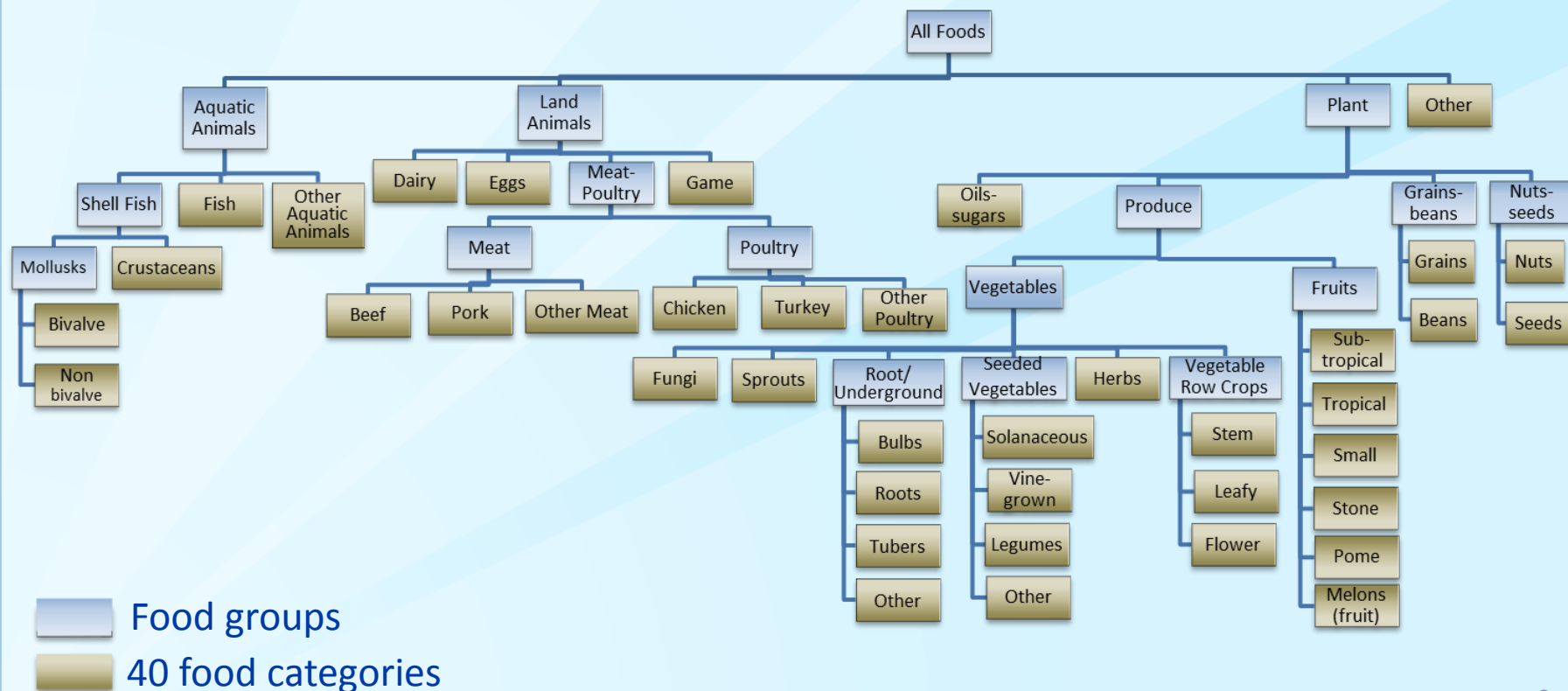
- Prior to the formation of IFSAC, CDC developed a food categorization scheme with input from FSIS and FDA
- 17 food categories (in blue) used to classify 2,000 + foods that were implicated in outbreaks (1998 – 2008)*



Improve the food categories used to estimate attribution

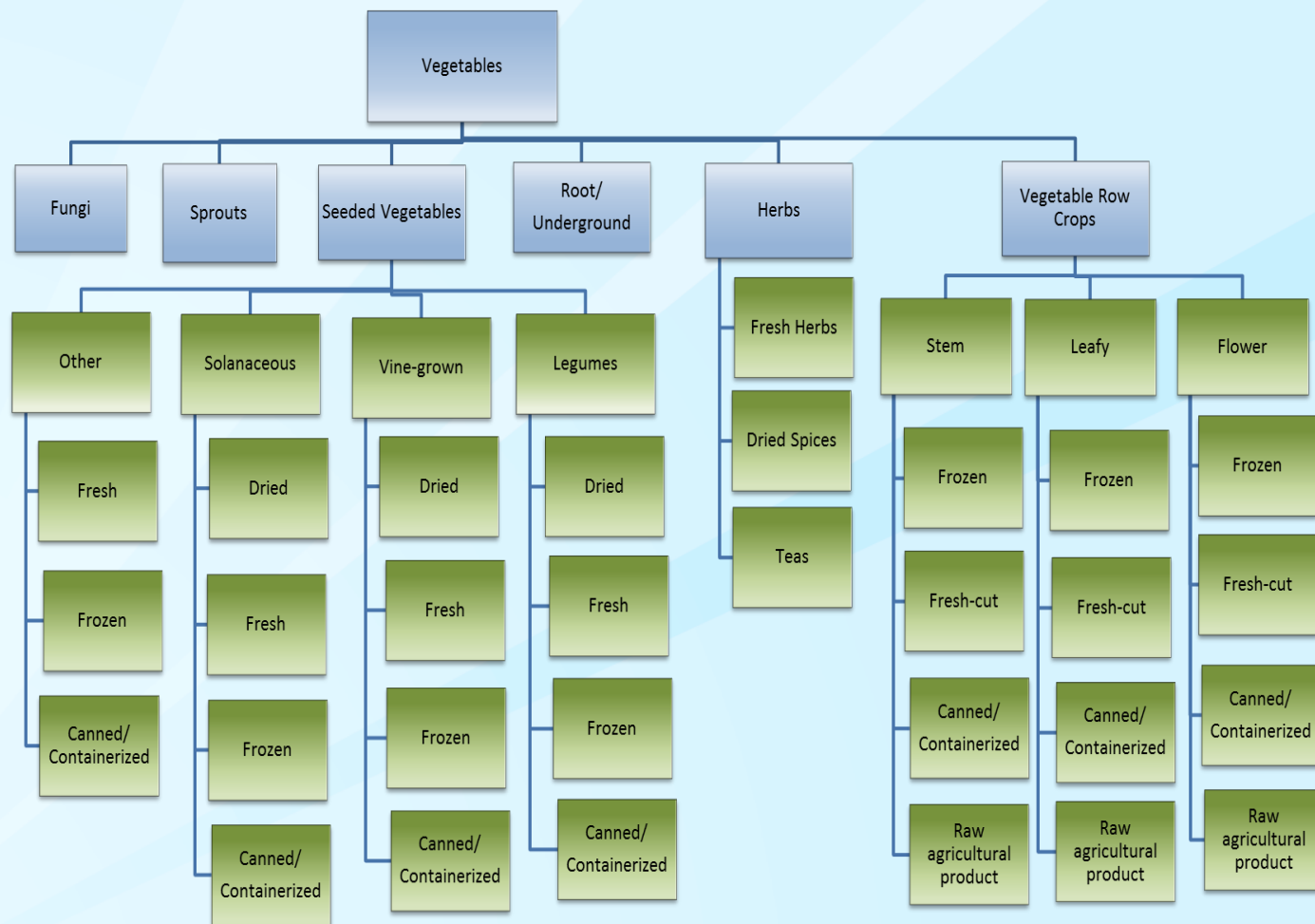
Results:

- New scheme was developed and has been used for attribution studies and outbreak summaries since 2011



Improve the food categories used to estimate attribution

Sub-categories reflect processing in new food commoditization scheme



*Examples: not all sub-categories are shown

Determine representativeness of outbreak data

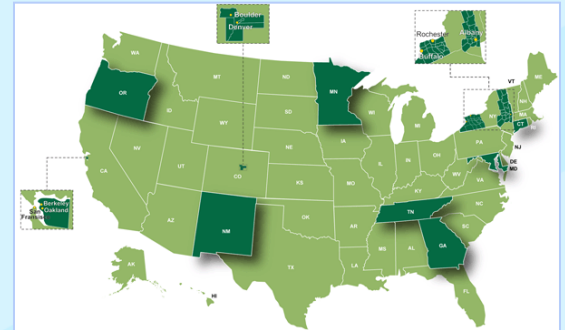
Project Objective:

Compare the characteristics of ill people and foods linked to outbreaks of *Salmonella*, *E. coli* O157, *Listeria monocytogenes*, and *Campylobacter* illnesses with those associated with sporadic illnesses and foods consumed by the general population to determine whether outbreak illness are representative of sporadic illnesses

Determine representativeness of outbreak data

Project addresses objective by using two analyses:

- 1. FoodNet Sub-Project:** Compare the epidemiologic features of outbreak and non-outbreak (sporadic) illnesses ascertained in FoodNet
- 2. National Health and Nutrition Examination Survey (NHANES) Sub-Project:** Compare the distributions of foods associated with foodborne outbreaks to the distributions of foods eaten by NHANES dietary recall participants



Determine representativeness of outbreak data

FoodNet Sub-Project

Results:

- ***E. coli* O157, *Listeria monocytogenes*, and *Campylobacter*** – Outbreak illnesses are similar to sporadic illnesses with respect to patient illness severity, gender, and age
- ***Campylobacter*** – Fewer illnesses associated with outbreaks compared with the other three pathogens in the study
- ***Salmonella*** – Outbreak illnesses are similar to sporadic illnesses with respect to illness severity and gender
 - For age, the percentages of outbreak and sporadic illnesses that occur among older children and adults are also similar. However, the percentage of outbreak illnesses in the youngest age category (≤ 3 years of age) was substantially lower compared with the other age groups

Determine representativeness of outbreak data

FoodNet Sub-Project

Conclusion:

These findings are important because they indicate that, with the exception of *Salmonella* illnesses among children ≤ 3 years of age, it may be appropriate to use outbreak data to estimate which foods may be associated with sporadic illnesses in the population.

Communication:

IFSAC Webinar on January 10, 2014: “Are Outbreak Illnesses Representative of Sporadic Illnesses?”

<http://www.cdc.gov/foodsafety/ifsac/events.html>

Next Steps: Manuscript in development

Determine representativeness of outbreak data

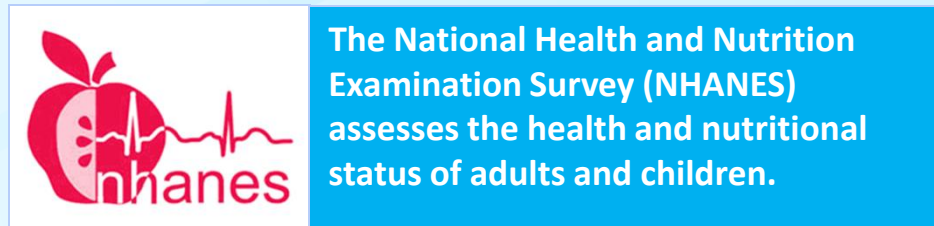
National Health and Nutrition Examination Survey (NHANES) Sub-Project

Methods:

- Compare the distributions of foods associated with foodborne outbreaks to the distributions of foods eaten by NHANES dietary recall participants
- Link all foods implicated in outbreaks to foods consumed by NHANES dietary recall study participants

Progress:

- Analyses continuing



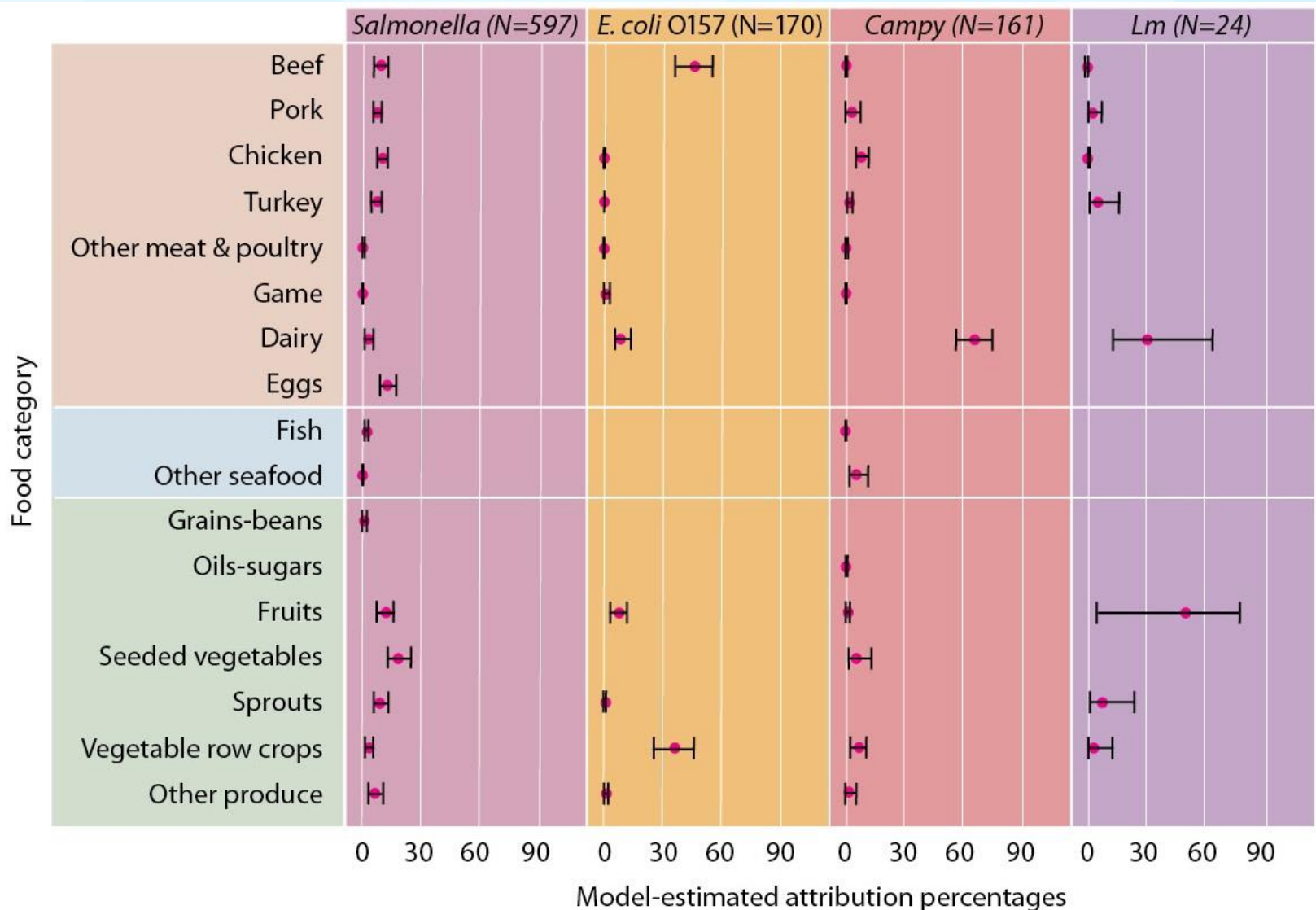
Foodborne Illness Attribution

Estimating Foodborne Illness Attribution

GOAL

To provide harmonized source attribution estimates by developing a single, robust method to produce estimates that all 3 agencies may use in their food safety activities

Results: Estimated Attribution Percentages



***Salmonella* and *Campylobacter* were attributed to the most food categories**

Foodborne Illness Attribution

Conclusions

- ***Salmonella* illnesses were attributed to multiple food categories and attribution estimates had the least amount of statistical uncertainty compared with the other pathogens in the model**
- ***Campylobacter* infections spanned a broad array of categories, but the point estimate for the Dairy category was notable (66%) and had wide credibility intervals (57-74%)**
 - High number of outbreaks associated with raw milk or cheese produced from raw milk (e.g., unpasteurized queso fresco)

Foodborne Illness Attribution

Conclusions (cont.)

- **82% of *E. coli* O157 illnesses were attributed to Beef and Vegetable row crops**
- **81% of *Lm* illnesses were attributed to Dairy and Fruit**
 - The limited number of *Lm* outbreaks and the wide credibility intervals dictate caution in interpreting the proportion of listeriosis illnesses attributed these two food categories

Foodborne Illness Attribution

Conclusions (cont.)

- **Improved method for estimating attribution percentages from outbreak data**
- **These estimates should be interpreted in the context of the analysis:**
 - The credibility intervals should be considered when evaluating the precision of the estimates
 - Limitations associated with the use of outbreak data
- **We urge caution in interpreting results**
 - *Lm* in fruit
 - *Campylobacter* in dairy
- **Results should be used with other scientific data when informing decisions on food safety activities**

CONTINUING PROJECTS

Attribution of *Salmonella* illnesses to food commodities using the Hald model

Background:

- **Hald model, developed by Tine Hald from Technical University of Denmark, links the number of reported foodborne illnesses caused by *Salmonella* to**
 - Levels of contamination in food reservoirs
 - Amount of each food consumed
- **Model includes two other factors assumed to influence the number of illnesses**
 - **Food source factors:** relative differences among food reservoirs that influence their ability to transmit *Salmonella* (e.g., differences in food processing, preparation practices)
 - **Pathogen factors:** relative differences between *Salmonella* subtypes that influence their ability to cause a disease (e.g., pathogenicity, survival in food)

Attribution of *Salmonella* illnesses to food commodities using the Hald model

Objective:

Expand a U.S. model previously used* to attribute illnesses to FSIS-regulated food products by incorporating data about FDA-regulated food sources of *Salmonella*, exploring whether model can provide reasonable estimates of foodborne illness source attribution to

- Evaluate the relationships between food contamination, consumption, and human illness
- Estimate the percentage of illnesses attributable to food contaminated before the point of food preparation and service

* Guo, C., Hoekstra, R. M., Schroeder, C. M., Pires, S. M., Ong, K. L., Hartnett, E., ... & Cole, D. (2011). Application of Bayesian techniques to model the burden of human salmonellosis attributable to US food commodities at the point of processing: adaptation of a Danish model. *Foodborne Pathogens and Disease*, 8(4), 509-516.

Attribution of *Salmonella* illnesses to food commodities using the Hald model

Methods:

- Include data from additional food products, such as seafood, herbs, and produce
- Include shell eggs in the model, using 3 different contamination scenarios and assess model results under each scenario
- Update the model to improve model performance

Other Current Projects

- ***Campylobacter Attribution***

- Evaluate data sources and methods other than outbreak data for making source attribution estimates
- Re-analyze a FoodNet case-control study conducted in 1998 using a new method
 - Examine differences in attribution percentages between these results and those that use outbreak data

- **Temporal Trends of Outbreaks**

- Examine possible reasons for changes in outbreak data over time
 - e.g., does recognition of a new food vehicle result in more outbreaks being recognized as due to that food?

Other Current Projects

- **Point of Contamination Analysis**
 - Examine how data on contamination at various points in the food chain can inform source attribution
 - Evaluate data that may help estimate the percentage of illnesses that can be attributed to contamination at point of consumption vs earlier points
- **Develop method to incorporate data from outbreaks due to complex foods into attribution estimates**
 - This is the next step in the progression for developing and further refining our attribution estimates

IFSAC Communications

- Developed and shared the IFSAC Charter and Strategic Plan
- Held a public meeting in 2012 to introduce IFSAC and its initial accomplishments
- Organized two webinars to present analysis project results
- Shared work at professional meetings/scientific conferences and webinars
- Developed an IFSAC webpage with information about IFSAC's organizational structure, projects, and key information
- Interacted with other committees with a shared interest in foodborne illness attribution
 - CDC Board of Scientific Counselors, Food Safety Modernization Act Surveillance Working Group (2014)
 - FDA Risk Communication Advisory Committee Meeting (2011)

Summary

- IFSAC contributes to the food safety priorities of all three agencies
 - Shared priorities, data, analyses, and expertise
 - In-depth communication and coordination to further advance development of foodborne illness source attribution estimates
- IFSAC projects result in harmonized methods and interpretation of source attribution data and estimates by all three agencies
 - Attribution estimates may support state and local food safety agencies in their prioritization efforts
- IFSAC serves to increase transparency and understanding, both publicly, with our state and local partners and across agencies, about foodborne illness source attribution

IFSAC Team

- **Steering Committee**

- Chris Alvares (FSIS)
- Chris Braden (CDC)
- David Goldman (FSIS)
- Patricia Griffin (CDC)
- Sherri McGarry (FDA)
- Katherine Vierk (FDA)

- **Technical Leads**

- Michael Bazaco (FDA)
- Mike Hoekstra (CDC)
- Cary Parker (FDA)
- LaTonia Richardson (CDC)
- Joanna Zablotzky Kufel (FSIS)

- **IFSAC Technical Team**

- Christopher Aston (FSIS)
- Michael Batz (UF/FDA)
- Neal Golden (FSIS)
- Weidong Gu (CDC)
- Kristin Holt (FSIS)
- Shacara Johnson (CDC)
- Andre' Markon (FDA)
- Anangu Rajasingham (CDC)
- Bab Timbo (FDA)
- Antonio Viera (CDC)
- Beverly Wolpert (FDA)

- **Former Members**

- Dana Cole (CDC)
- Kathleen Gensheimer (FDA)
- Chuanfa Guo (FSIS)
- Kara Morgan (FDA)
- Debra Street (FDA)