Using Expert Elicitation to Attribute Foodborne Illness to Food Consumption

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RESOURCES FOR THE FUTURE

Take Home Messages

- Know why you're doing an attribution.
- Expert elicitation can improve the information basis for risk management.
- Our expert elicitation study contributes information relevant to risk-based food safety management.

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Know why you're doing an attribution

1. You can attribute foodborne illness to many different factors
   - pathogens (Mead et al., 1999)
   - food consumption (Hoffmann et al., 2007)
   - food contamination
   - food production, processing and handling

   Decision needs must drive attribution.

   Mixing purposes can result in inconsistent attribution categories.

2. Having attributions that attribute *all* foodborne illness to broad categories are a useful starting point.

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Expert Elicitation Is Widely Used to Inform Risk-based Decision Making

- Systematic methods for eliciting and integrating expert judgment
- Widely used in government and industry
- Methods vary
  - See Clemen (1996), Cooke (1991), Morgan and Henrion (1990)

Expert Elicitation Can Shed Light on Food Attribution Data Gaps

- Outbreak data is improving, but incomplete
- Studies indicate outbreak cases and sporadic cases may have different associations with food
- FoodNet is not yet nationally representative
- Experts have relevant knowledge and experience

What we did.

- Surveyed 44 nationally recognized food safety experts
- Asked experts for their best estimates and their high and low bound
- 11 food categories: modified CSPI food categories
- 11 pathogens: FoodNet pathogens, *Toxoplasma gondii*, and Noroviruses
- Used mean expert food attribution percentages to attribute Mead pathogen estimates to foods.

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Multiple Uncertainty Measures Characterize Knowledge about Food Attribution

- Agreement among experts' best estimates
- Agreement between experts' and outbreak-data-based attribution estimates
- Experts' mean individual uncertainty
- Variability in experts' individual uncertainty

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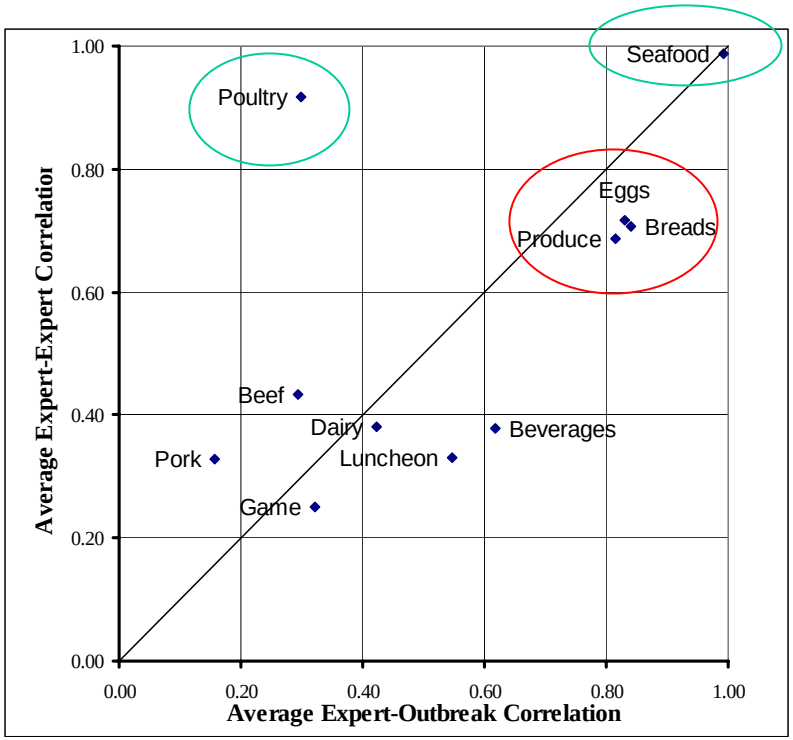
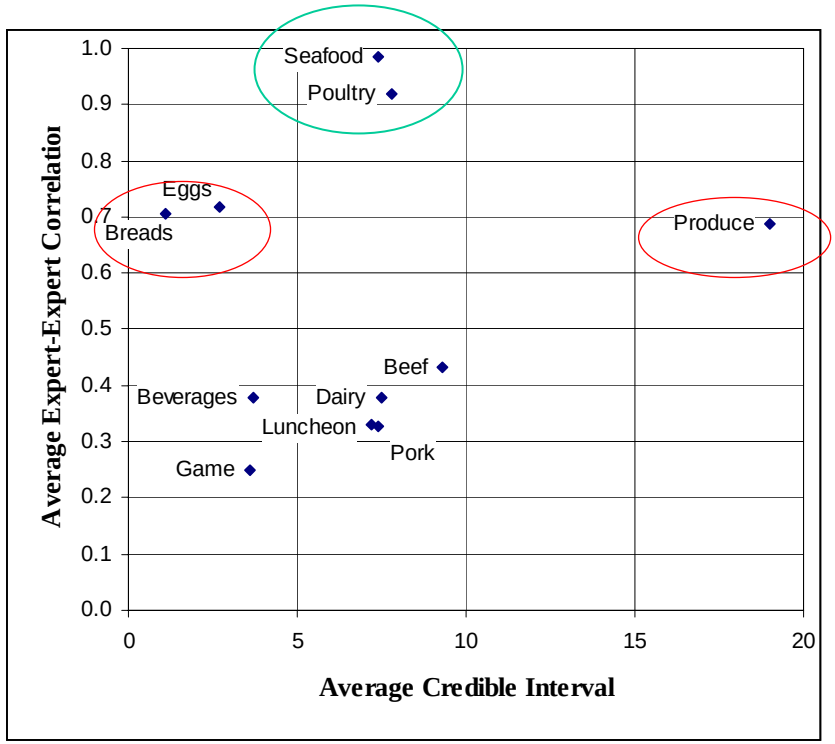
Uncertainty by Food





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Regressions Analysis

- Uncertainty measures are smaller with more outbreaks and more years of experience
- Expert characteristics do not affect best estimates, but do affect individual confidence
- Pathogens are more important than foods in explaining outbreak/expert difference
- Foods are more important than pathogens in explaining variability in individual confidence

Major Stories about Attribution

- 15 food/pathogen pairs cause 90% of foodborne illnesses in the U.S.
- 22 food/pathogen pairs cause 90% of deaths from foodborne illness in the U.S.
- Outbreak-based and expert attribution estimates agree on many, but not all the top exposure routes for foodborne illness and death

Differences in Top Causes of Illness

- Noroviruses/produce (1 for both)
- Noroviruses/seafood (2 for both)
- *Campylobacter*/produce (3 EE), (not in top 15 OB)
- *Campylobacter/*poultry (3 OB), (not in top 15 EE)
- Noroviruses-RTE Meat (15 EE), (4 OB)

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Take Home Messages -- Again

- Know why you're doing an attribution.
- Expert elicitation can improve the information basis for risk-based food safety regulatory decisions.
- Our expert elicitation study:
  - provides food attribution estimates;
  - depicts the state of knowledge about the association between food consumption and foodborne illness;
  - suggests places where outbreak data may need to be supplemented.

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