Policy Discussion #1

Fish consumers and nonconsumers
Outline

• Introduction
• Who is a fish consumer or a nonconsumer?
• How do we know?
• What do we know about Idaho?
• A look at distributions and statistics
• What has EPA done with this question?
• Recommendations
Introduction

- Question is whether or not to include nonconsumers of fish in a calculation of a fish consumption rate
- Why exclude nonconsumers?
  - They are not at risk from fish borne contaminants
- Why include nonconsumers?
  - Measurement issues, may not exist
  - Messaging, what do resulting statistics tell us
Who is a nonconsumer?

- Is it someone who reports they eat no fish or shellfish?
- Over what timeframe?
- May not be the same as ‘not a fish consumer’
How do we know?

- We ask people in a survey
- What do we ask them?
  - Food frequency survey – How often do you eat ... ?
  - Short-term dietary recall – Did you eat ... in the past day, two days, week?
  - How much do/did you eat?
Measurement Issues

- Recall bias – aka memory frailty
  - How well do people remember minor components of their diet?
  - How far back is memory reliable, accurate?
- Episodic consumers can be missed
  - This also creates a bias
- There are ways to adjust for the latter
  - FFQ + Dietary recall (Keogh & White 2011, Subar 2006)
Two questions were asked about fish consumption

1. How often do you eat fish?
2. How often do you eat fish that has been caught in Idaho waters?

Respondents were allowed to answer in times per day, week, month or year.

The Idaho Department of Health and Welfare analyzed these data recently.
2012 BRFSS Results

2012 BRFSS Data
Idaho Fish Consumption Frequency

- Ate Fish: n=5410
- Ate Idaho Fish: n=4634

Percent of respondents

- Monthly
- Annually
A Look at Calculated FCRs

- Two hypothetical distributions
  1. 10% nonconsumers
  2. 10% nonconsumers + 15% consumers misidentified as having an FCR of zero
- Will use a sample size of 100 people surveyed
Hypothetical Distribution #1, 10% of the observations at zero (nonconsumers)

Median = the middle of the data set = 17.5

Mean = \( \frac{\text{sum of observations}}{\text{number of observations}} = \frac{4751.5}{100} = 47.515 \)

90th percentile = 90% of data below and 10% above = 127.8

Credit: Cheryl Niemi, WADOE
Hypothetical Distribution #2,
10% nonconsumers + 15% of previous consumers with mistaken FCR=0

| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 13 | 13 | 13 | 14 | 14 | 14 | 14 | 15 | 15 | 15 | 16 | 16 | 16 | 17 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| 34 | 37 | 39 | 42 | 43 | 45 | 45 | 51 | 53 | 54 | 57 | 58 | 59 | 63 | 65 | 66 | 69 | 75 | 77 | 77 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| 86 | 88 | 91 | 97 | 99 | 103 | 108 | 112 | 120 | 125 | 127 | 135 | 135 | 151 | 164 | 169 | 174 | 188 | 210 | 248 | 298 | 345 | 345 | 345 | 345 | 345 |

Median = the middle of the data set = **17.5**

Mean = \( \frac{\text{sum of observations}}{\text{number of observations}} = \frac{4748}{100} = 47.48 \)

90th percentile = 90% of data below and 10% above = **127.8**
What can we conclude from this?

- Misidentifying 15% of our sample (population) as nonconsumers makes:
  
  - Very little difference in mean FCR, 47.515 vs 47.48 grams per day
  
  - And no difference in median and 90\textsuperscript{th} percentiles
Hypothetical Distribution #1, without zeros
This is what we would have if removing the nonconsumers from our data

90 remaining observations used in statistics

\[ \text{Mean} = \frac{\text{sum of observations}}{\text{number of observations}} = 4751.5 = 52.8 \]
\[ \text{Median} = \text{the middle of the data set} = 23.0 \]
\[ \text{90th percentile} = 90\% \text{ of data below and } 10\% \text{ above} = 136.6 \]
What can we conclude from this?

- Trimming nonconsumers from the distribution:
  - Shifts all our statistics to substantially higher values
    - Median rises from 17.5 to 23.0
    - Mean rises from 47.5 to 52.8
    - 90th percentile rises from 127.8 to 136.6
Hypothetical Distribution #2, without zeros
This is what we would have if removing the nonconsumers and the consumers with an estimated FCR = 0

75 remaining observations used in statistics

Median = the middle of the data set = 39.0

Mean = sum of observations \( \div \) number of observations = \( \frac{4748}{75} \) = 63.0

90th percentile = 90% of data below and 10% above = 158.8
What can we conclude from this?

- Misidentifying 15% of our sample (population) as nonconsumers AND then trimming the distribution:
  - Shifts the statistics even more to the right
    - Median rises from 17.5 to 39.0
    - Mean rises from 47.5 to 63.3
    - 90th percentile rises from 127.8 to 158.8
  - Unlike statistics for the whole population, even percentiles are biased upward
# Tabulated Statistics

<table>
<thead>
<tr>
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<th>Distribution 1 (True)</th>
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<th>Distribution 2 (15% Misidentified Nonconsumers)</th>
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<tr>
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<td>Entire Population</td>
<td>Trimmed</td>
<td>Entire Population</td>
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<td>Median</td>
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Conclusions

- Based on BRFSS data it is reasonable to assume that all Idahoans are likely consumers of some fish and shellfish in their lifetime.

- Misclassification of some infrequent consumers of fish as nonconsumers will have little to no effect on whole population statistics.
Conclusions

- If a regulatory fish consumption rate is based on just known fish consumers it is very important to take steps in survey execution and analysis to ensure that consumers and nonconsumers are accurately identified—or else large biases could result.

- If only fish consumers are used, this will add a measure of conservatism—greater protection for the whole population.
We would like your comments on these matters

Comment deadline is Nov. 8th