Dietary Risk Assessment and Drinking Water

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David Hrdy
Office of Pesticides, U.S. Environmental Protection Agency
Washington, DC
• Dietary Risk Assessment
• Key Data Sources
  • Food and Water Consumption Data Sources
  • Water Pesticide Residue Data
• Drinking Water
• Combine food consumption with food residue levels to estimate food exposure
• Combine water consumption with water concentration level(s) to estimate water exposure
• Add food and water exposures together, and compare to a quantitative measure of hazard to calculate risks
• Major required inputs are consumption, residue and concentration estimates
Dietary Exposure Calculation

\[
\text{Exposure} = \frac{\text{Residue} \times \text{Consumption}}{\text{Body Weight}}
\]

\[
\frac{\text{mg pesticide}}{\text{kg bw-day}} = \frac{\text{mg pesticide}}{\text{kg food}} \times \frac{\text{grams consumed}}{\text{day}} \times \frac{\text{kg food}}{1000 \text{ g food}} \times \frac{1}{\text{kg bw}}
\]

Conversion factor
Dietary exposure is a function of (i) food and water consumption and (ii) pesticide residue.

**Food and Water Consumption Data Sources**
- **USDA’s What We Eat In America (WWEIA):**
  - Nationally representative food consumption survey
- **U.S. EPA’s Food Commodity Intake Database (FCID):**
  - Recipe database that links WWEIA foods to PDP residue data

**Food Commodity Pesticide Residue Data**
- **USDA’s Pesticide Data Program (PDP):**
  - Nationally representative food commodity residue sampling program

**Water Pesticide Residue Data**
- **EFED Estimated Drinking Water Concentrations (EDWC):**
  - Modeled estimates based on surface water and ground water
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USDA’s What We Eat In America (WWEIA)

- Conducted as part of National Health and Nutrition Examination Survey (NHANES)
- Nationally representative/statistically-based
- Collected on two-year continuous basis
  - Approximately 10,000 individuals per two-year cycle
  - Oversampling of various subpopulations
- Contains food and water consumption data
  - Data collected on two days of 24-hour dietary recall

Additional Information:  http://www.ars.usda.gov/Services/docs.htm?docid=13793
U.S. EPA’s Food Commodity Intake Database (FCID)

• Developed to improve the utility of the WWEIA food consumption survey for pesticide dietary exposure assessment.

• Integral component in the Dietary Exposure Evaluation Model (DEEM) used estimate the dietary exposures in OPP risk assessments.

• Translates food and water consumption as reported in WWEIA into consumption of U.S. EPA-defined food commodities and water categories.

• Water that is included as a commodity in FCID includes:
  • Direct tap water,
  • Direct bottled water, and
  • Indirect water from all sources.
# FCID Water Categories

What FCID water categories are included in OPP drinking water assessments?

<table>
<thead>
<tr>
<th>Type</th>
<th>Components</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Included as Drinking Water Consumption</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Water</td>
<td>Tap Water</td>
<td>Tap Water includes water from the tap or faucet; drinking fountain (not water cooler); water served in a restaurant or other food service establishment that was not bottled</td>
</tr>
<tr>
<td></td>
<td>Bottled Water</td>
<td>Bottled Water includes plain noncarbonated water such as spring water or other water sold in a store, or a water cooler</td>
</tr>
<tr>
<td>Indirect Water</td>
<td>Water added to make Beverages and other Foods</td>
<td>Water component to make Infant Formula or various beverages (e.g., Coffee, Tea), as well as water added to prepare foods (soups-add water; rice, pasta, etc.).</td>
</tr>
<tr>
<td><strong>Not Included as Drinking Water Consumption</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbonated Water</td>
<td>Beverages</td>
<td>Seltzer water, Club soda, Tonic water</td>
</tr>
<tr>
<td>Sodas</td>
<td>Beverages</td>
<td>Water contained in sodas</td>
</tr>
<tr>
<td>Food Products</td>
<td>Ready-to-eat</td>
<td>Water added by commercial food producers (e.g., soup ‘do not add water’), or the (biological) moisture content in foods.</td>
</tr>
</tbody>
</table>
FCID Consumption Calculator?

• Web application that estimates U.S. consumption of food commodities and water

Key Features

1. Based on nationally representative U.S. food consumption data

2. Interactive and customizable consumption statistics based on:
   ✓ 500+ commodities
   ✓ Age
   ✓ Gender
   ✓ Race

3. Data and tool free and accessible at FoodRisk.org

http://fcid.foodrisk.org/
Key Data Sources for Consumption & Residue

- Dietary exposure is a function of (i) food and water consumption and (ii) pesticide residue

Food and Water Consumption Data Sources
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Drinking water residues of concern are determined jointly by HED and EFED.

Estimated Drinking Water Concentrations (EDWCs) are provided by EFED for use in HED’s dietary/aggregate assessments.

- **Two Sources:**
  - **Surface Water:** lakes, reservoirs, rivers
  - **Ground Water:** underground sources
Summary

• Pesticide dietary risk assessments aggregate exposure from consumption of food and water.

• Key data sources for estimating water (and food) consumption are:
  • USDA’s What We Eat In America Survey
  • EPA’s Food Commodity Intake Database

• Estimated drinking water concentrations are determined by EFED and based on both modeling and more refined approached.
Thanks for your time!