

## Methods Description for Measure E8

### Measure

E8. Percentage of fruits, vegetables, and grains with detectable residues of organophosphate pesticides.

### Summary

The U.S. Department of Agriculture (USDA) has been conducting the Pesticide Data Program (PDP) since 1991. Since 1994 the PDP has measured pesticide residues on fresh fruits and vegetables, canned and frozen fruits and vegetables, fruit juices, whole milk, wheat, soybeans, oats, corn syrup, peanut butter, and poultry. In order to maintain comparability across the years 1994 to 2004, the organophosphate detection rates reported in this measure include only detections of the original 34 organophosphate pesticides and metabolites included in the PDP in 1994 above the minimum of the original limits of detection available in 1994. Measure E8 is the percentage of fruits, vegetables, and grains with detectable residues of organophosphate pesticides. This measure is calculated as the number of food samples with a detectable residue divided by the total number of food samples analyzed for one or more of the 34 pesticides.

### Overview of Data Files

The following files are needed to calculate this measure. They were all obtained from the Pesticide Data Program website <http://www.ams.usda.gov/science/pdp/Download.htm>. This webpage contains separate zipfiles with ASCII data for each calendar year:

- PDP94PES.ASC. Pesticide Data Program pesticide names and codes for 1994. The three digit pesticide codes are used to extract the data for the 34 pesticides from the Analytical Results data files.
- PDPXXREY.ASC. Pesticide Data Program Analytical Results data. There is a separate file for each calendar year (XX) and quarter (Y). Each record is for a single sample and pesticide. The sample is identified by the combination of the following codes: State, Year, Month, Day, Site, Commod (commodity), Lab (laboratory), SS\_ID (Sample Source/Sub ID). The pesticide analyzed is given by the pesticide code (Pest\_Code). For these analyses we also needed the level of detection (LOD) and the measured concentration (Concen); the concentration value is missing if it is at or below the level of detection.

### Pesticide Data Program Metadata for Measure E8

|              |  |
|--------------|--|
| Measure Name | Percentage of fruits, vegetables, and grains with detectable residues of organophosphate pesticides. |
|--------------|--|

|   |  |
|---|--|
| Measure Number:                             | E8   |
| Data Set Name:                              | PDP  |
| Who provides the Data set:                  | U. S. Department of Agriculture, Agricultural Marketing Service  |
| Source location of the Data set:            | <a href="http://www.ams.usda.gov/science/pdp/Download.htm">http://www.ams.usda.gov/science/pdp/Download.htm</a>  |
| Years reported for this measure:            | 1994-2004  |
| Data Collection Frequency:                  | 62 samples per commodity per month, except for highly seasonal commodities.  |
| Brief Data Set Description:                 | The Pesticide Data Program is managed by the USDA Agricultural Marketing Service and is used primarily by EPA to prepare realistic dietary exposure assessments for implementing the 1996 Food Quality Protection Act. PDP provides measurements of pesticide residues in food, particularly food most likely consumed by infants and children, including minor crops. Sampling and/or testing is currently carried out in 12 states, that represent about 50 % of the U.S. population. In 2004, PDP collected and analyzed more than 13,000 food samples and analyzed 231 organophosphate pesticides and metabolites. |
| Variables Used to Calculate This Indicator: | State, Year, Month, Day, Site, Commod (commodity), Lab (laboratory), SS_ID (Sample Source/Sub ID), Pest_Code (pesticide code), Pest_Name (pesticide name), LOD (level of detection), Concen (concentration).   |
| Comments:                                   | Only the 34 pesticides analyzed in 1994 are used for this measure.   |

### Pesticide Data Program

The data analysis was carried out by Roger Fry, USDA AMS, and was independently confirmed by EPA's contractor. Pesticide residue data for the years 1994 to 2004 were obtained from the Pesticide Data Program website:

<http://www.ams.usda.gov/science/pdp/Download.htm>.

For each year and calendar quarter, the analytical results data are reported in the ASCII file PDPXXREY.ASC, where "XX" denotes the last two digits of the calendar year and "Y" denotes the quarter. A single sample is defined by the combination of the variables State, Year, Month, Day, Site, Commod (commodity), Lab (laboratory), SS\_ID (Sample Source/Sub ID). The same sample can be measured for pesticide residues of one or more organophosphate (OP) pesticides or metabolites, as defined by the three digit pesticide code (Pest\_Code). The pesticide codes and names are reported in the ASCII file PDP94PES.ASC. For these analyses we extracted only those sample/pesticide

combinations where the pesticide compound was one of the 34 compounds in the following list of compounds analyzed in 1994:

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**34 OP Compounds Analyzed in 1994**

|                      |                                |
|----------------------|--------------------------------|
| Acephate             | Malathion                      |
| Azinphos ethyl       | Methamidophos                  |
| Azinphos methyl      | Methidathion                   |
| Chlorpyrifos         | Mevinphos Total                |
| Demeton              | Omethoate                      |
| Demeton-S            | Parathion ethyl                |
| Diazinon             | Parathion methyl               |
| Dichlorvos (DDVP)    | Phorate                        |
| Dimethoate           | Phorate oxygen analog          |
| Disulfoton           | Phorate sulfone                |
| Disulfoton sulfone   | Phorate sulfoxide              |
| Disulfoton sulfoxide | Phosalone                      |
| Ethion               | Phosmet                        |
| Ethoprop             | Phosphamidon                   |
| Fenamiphos           | Terbufos                       |
| Fenamiphos sulfone   | Terbufos oxygen analog sulfone |
| Fenamiphos sulfoxide | Terbufos sulfone               |

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For all years, we compared the measured values with the 1994 minimum detection limit. For each pesticide, the 1994 minimum detection limit is defined as the minimum of all the detection levels (LOD) for that pesticide in the 1994 analytical results file, across all samples, laboratories and commodities.

**Calculation of Measure**

Measure E8 is calculated as follows.

1. The number of unique samples is calculated for each year: Each sample is defined by the combination of the variables State, Year, Month, Day, Site, Commod (commodity), Lab (laboratory), SS\_ID (Sample Source/Sub ID). The same sample can appear multiple times in the database. For each sample, we only count the first of the records where one of the 34 pesticide compounds listed above was measured. Samples where none of the 34 pesticide compounds listed above were measured are not included.
2. The number of unique samples with a detectable residue is calculated for each year: For this step, we first list the subset of records where the measured pesticide compound was among the 34 compounds tabulated above, the concentration was above the detection limit for that laboratory measurement (i.e., the concentration field is not blank), and the concentration is greater than and not equal to the 1994 minimum detection limit for the same pesticide. (As above, for each pesticide, the 1994 minimum detection limit is defined as the minimum of all the detection levels (LOD) for that pesticide in the 1994

analytical results file, across all samples, laboratories and commodities.) Note that a measured value might exceed the detection limit for that pesticide compound, measurement year, laboratory, and commodity, but not exceed the 1994 minimum detection limit for the compound. The number of unique samples with a detectable residue is the number of distinct samples in this subset.

3. The percentage of fruits, vegetables, and grains with detectable residues is calculated by dividing the total number of food samples with detectable residues (step 2) by the total number of samples analyzed (step 1):

Percentage of fruits, vegetables, and grains with detectable residues =

$$\frac{\text{[Number of unique samples with a detectable residue]}}{\text{Number of unique samples}} \times 100 \%$$

### **Questions and Comments**

Questions regarding these methods, and suggestions to improve the description of the methods, are welcome. Please use the “Contact Us” link at the bottom of any page in the America’s Children and the Environment website.