A How-To Guide for Visualizing Data from the National Report on Human Exposure to Environmental Chemicals on the Tracking Network

ENVIRONMENTAL PUBLIC HEALTH
TRACKING
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Introduction

The Centers for Disease Control and Prevention's (CDC) Division of Laboratory Sciences and the Environmental Public Health Tracking Program (Tracking Program) collaborated to present analytes from a selected number of chemical groups from the National Report on Human Exposure to Environmental Chemicals (Exposure Report: https://www.cdc.gov/exposurereport/), on the Environmental Public Health Tracking Network (Tracking Network).

The chemical groups chosen from the Exposure Report include the following: metals or metalloids in blood or urine, perfluoroalkyl and polyfluoroalkyl substances in blood, personal care and consumer products metabolites in urine, pesticide metabolites in urine, polycyclic aromatic hydrocarbon metabolites in urine, phthalate metabolites in urine, disinfection by-products in blood, volatile organic compounds in blood, and tobacco metabolite in blood.

The purpose of this document is to provide guidance on how to query these data and make a clustered bar chart using the chart options feature on the Tracking Network Data Explorer.

Access the Tracking Network Data Explorer:
ephtracking.cdc.gov/DataExplorer

The following guidance uses an example of one of the chemical groups, *perfluoroalkyl/polyfluoroalkyl substances*, to illustrate the steps in selecting your analytes from any of these chemical groups and visualizing them in charts. It also provides guidance on how to build a clustered bar chart, which will allow you to generate charts that show trends of one or several analyte measurements over time or compare analyte measurements in demographic groups (among other possibilities).

The Data Explorer provides many more features and functions than what is presented here. As you query and view your data, feel free to hover over any icon and explore its use.
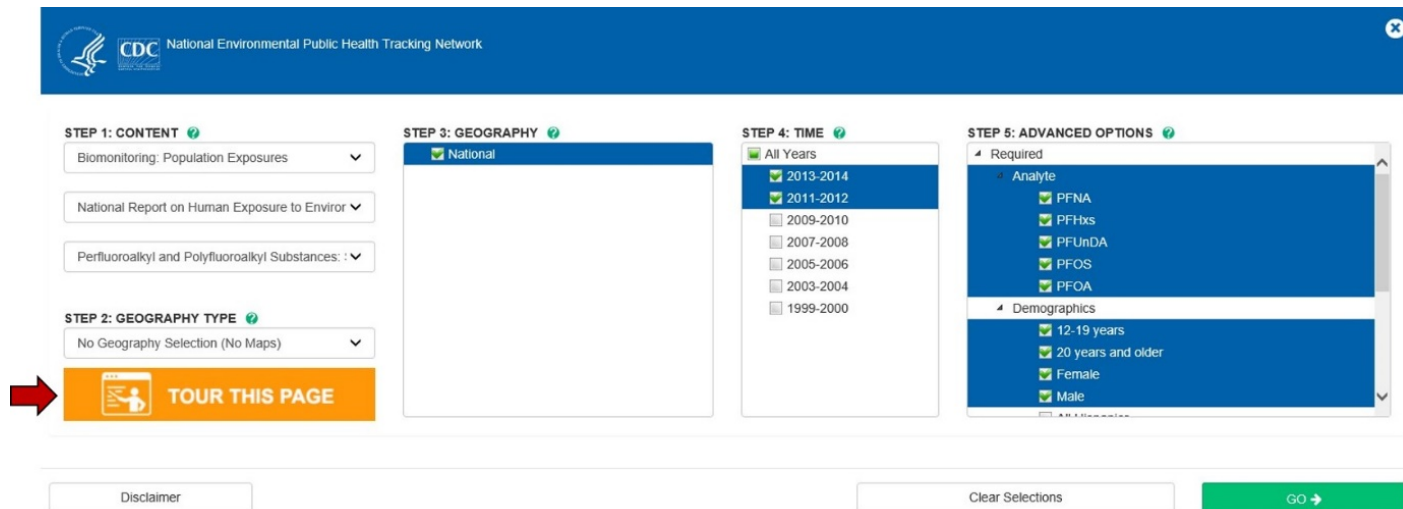
Let's get started!

Chemical Groups available on the Tracking Network:

- **Metals**
- **Perfluoroalkyl and Polyfluoroalkyl Substances**
- **Personal Care and Consumer Products**
- **Pesticides**
- **Polycyclic Aromatic Hydrocarbons**
- **Phthalates**
- **Disinfection By-products**
- **Volatile Organic Compounds**
- **Tobacco Smoke**

Selecting Your Data

From the Data Explorer Query Screen (ephtracking.cdc.gov/DataExplorer), build your query by selecting the data you would like to visualize. For guidance on this, you can **click on "tour this page"** as shown below or follow along with the 👆 icon to build a chart or table using data from the National Report on Human Exposure to Environmental Chemicals.

Step 1: Content

In Step 1, you will select the content, indicator and measure that you are interested in visualizing.

👆 **For the example** perfluoroalkyl/polyfluoroalkyl substances, **select the following:**
  - o Content: Biomonitoring: Population exposures
  - o Indicator: National Report on Human Exposures to Environmental Chemicals
  - o Measure: Perfluoroalkyl and Polyfluoroalkyl Substances: Surfactants in blood

The measures are categorized according to chemical groups as presented in the Exposure Report (e.g., Disinfection By-products in blood, Phthalate Metabolites in urine, etc.)

For measures where the sampling design has changed over the years, measures are also categorized by years with similar design (e.g., Disinfection by-products in blood 2011-2014).

Step 2: Geography Type and Step 3: Geography

In Step 2 no geography/map options are specified because these are national level measures. See that "National" was pre-selected in Step 3.

Step 4: Time

In Step 4, you will select the year(s) for the data you are interested in. Select the two latest cycles of years: 2013-2014 and 2011-2012.
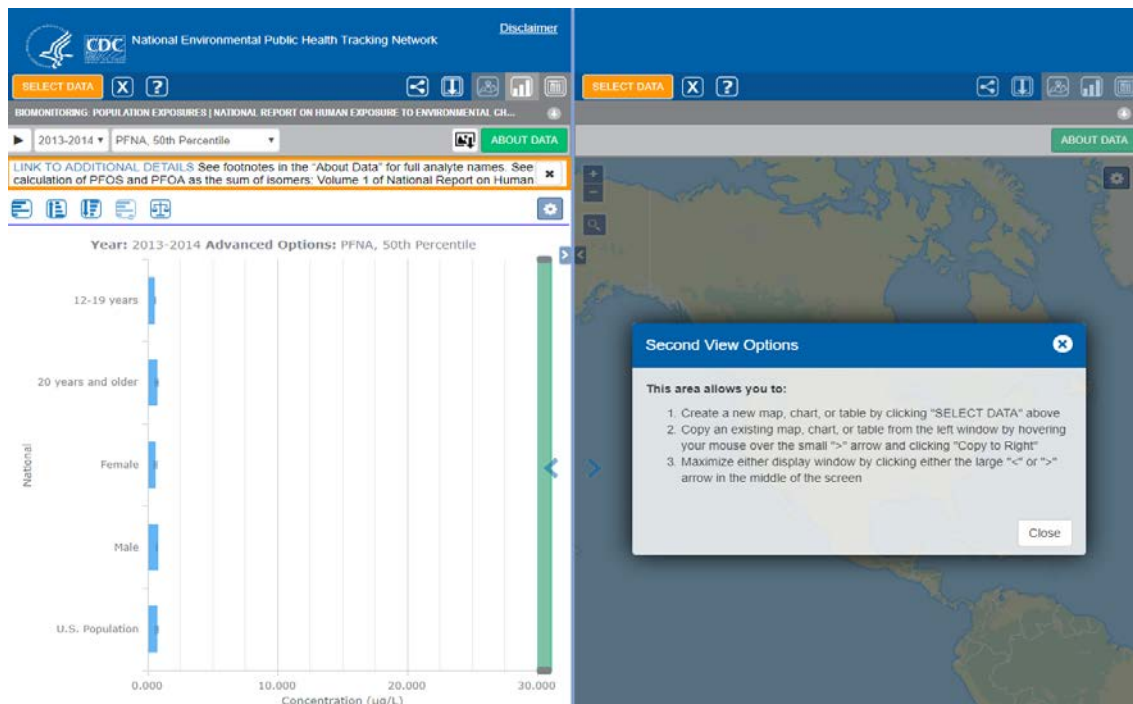
Step 5: Advanced Options
In **Step 5** select the analyte(s), demographics, and estimate(s) you want to visualize.

Select the following:
- Analytes*:*
  - PFNA
  - PFHxs
  - PFUnDA
  - PFOS
  - PFOA
- Demographics*:*
  - 12-19 years
  - 20 years and older
  - Female
  - Male
  - U.S population
- Estimate*:*
  - 50th percentile
  - 95th percentile

Click on "GO" to run the query. You should see the following:

Customizing Your Chart View

Once you have made a query, it's now time to customize your display panel and the type of chart you want to view.

Display Panel

The default display returned is of two panels. This is a unique feature of the Data Explorer which allows you to run and view two different queries and compare the charts side-by-side.

To view one chart/window at a time, collapse the right panel by clicking on the arrow button in the right panel. If you would like to re-open the right panel, click on the arrow in the left panel.

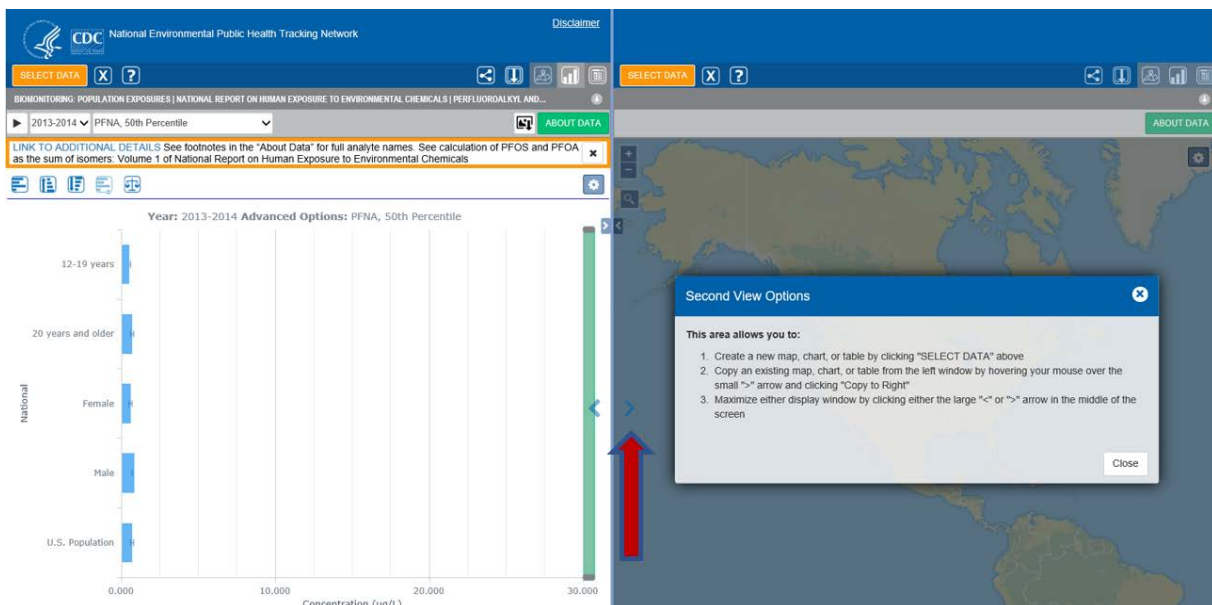Let's continue building our chart. Click on the right arrow to collapse the right panel.

Chart Scale

Right now, the current chart scale incorporates all selected years (2011-2012 and 2013-2014) which may reduce the size of the bars on the chart. To scale the chart to only the current view's values (2013-2014), click on the scale icon as shown in the screen shot below. To view the chart on a scale using all the possible years selected in the original query, click on the scale icon again.

Click on the scale icon to scale for the selected year (2013-2014)
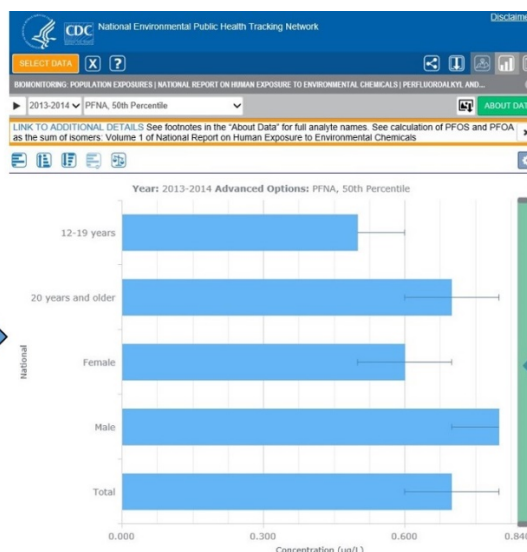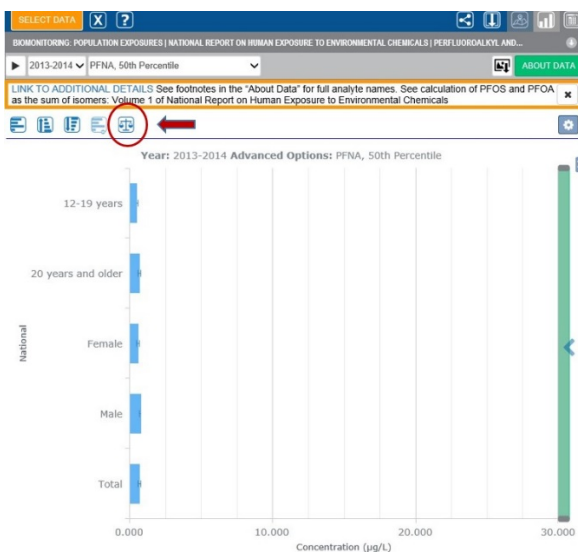
Basic Chart

The first chart displayed is what we call the "Basic Chart". This chart allows you to view one estimate per analyte, for one cycle year at a time for the demographics selected.

Above the chart display, you can click on the down arrow besides the years and estimate/analyte to select the year and estimate/analyte combination you want to view.
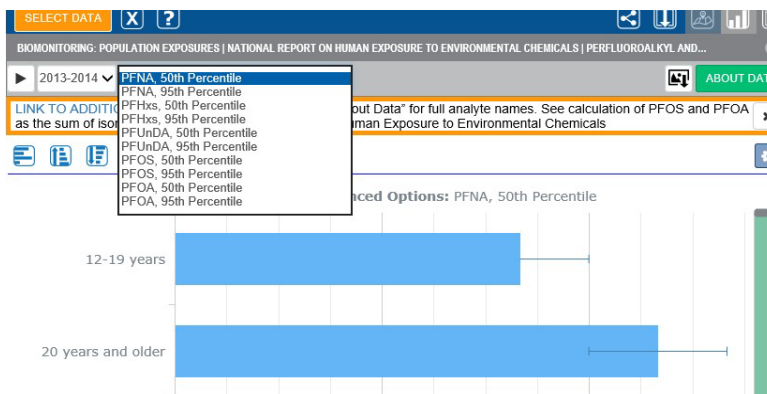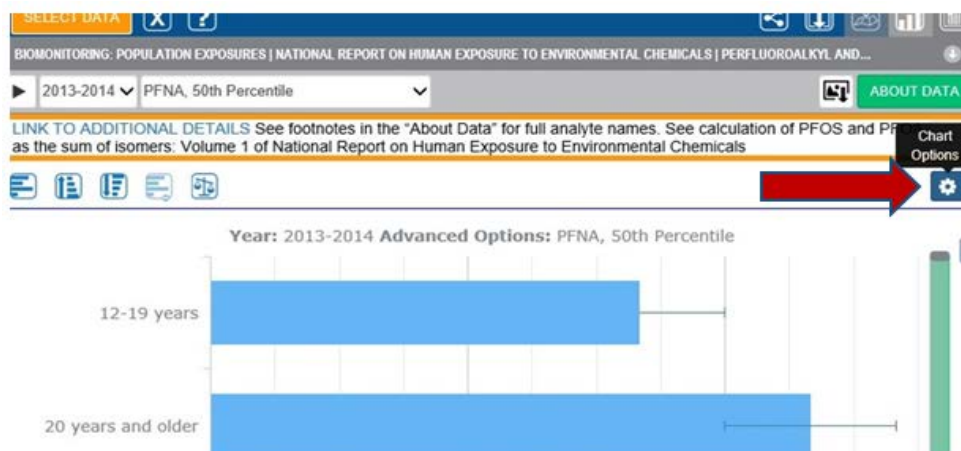
Advanced Charting

Advanced charting gives you more options to visualize your data. For example, you can view several years or analytes on the same chart, as a clustered bar chart.

👆 Select the Chart Options Icon on the right side of the screen. ⚙️

You will see three chart options: 1) Horizontal Bar Chart, 2) Vertical Bar Chart and 3) Clustered Bar Chart for analyte comparisons.

The vertical bar chart is under revision to produce the same display as the horizontal bar chart, but in a vertical view.

Chart Options

Bar Chart
Horizontal

Compare data for multiple geographies during a single time period. May select one advanced option.

Bar Chart
Vertical

Compare data for multiple geographies during a single time period. May select one advanced option.

Analyte Comparisons
Clustered Bar Chart

Compare one or more analytes by demographics, years, or estimates.

👆 Select the Analyte Comparisons-Clustered Bar Chart.

When you click on clustered bar chart, the chart builder opens up, allowing you to select various combinations of analytes, demographic information, estimates and years to display.

For any analyte (or other variable) to be listed in this chart builder, you have to select it in the original query.

Let's build a Clustered Bar Chart.

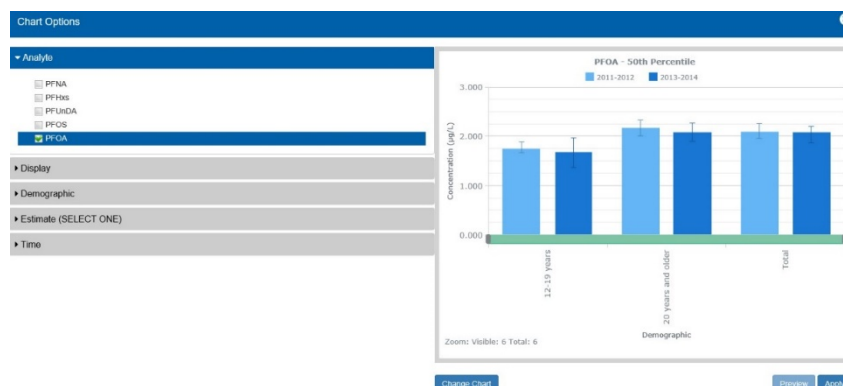**Select the following:**

- Analyte:
  - PFOA
- Display:
  - Demographics by Time
- Demographics:
  - 12-19 years
  - 20 years and older
  - U.S. population
- Estimate:
  - 50th percentile
- Time:
  - 2013-2014
  - 2011-2012

For **Display**, you are selecting the variables you would like to see in the X and Y axis. Whatever you display first will be in the X axis.

For the variables you have selected to display in the X and Y axes, you can choose several options within them. However, you will be restricted to only one option for the other variables *not selected* for either axis.

For example, you can now select various options for demographics (X axis) and time (Y axis), but will be restricted to only one option for estimate and analyte.

Select "Preview" to preview your chart.

If you select more than one analyte, they will be automatically included in the x axis, and you can then select another variable to display by these analytes. Before clicking "apply", let's add more analytes.

Let's build another clustered bar chart to view multiple analytes.

Click on the down arrow next to Analyte, and this time **select all the analytes.**

Now you'll see that "Analyte" is pre-selected for the X-axis.

Select the following:
- Display:
  - Analyte by Time
- Demographic:
  - U.S. population
- Estimate:
  - 95th percentile
- Time:
  - 2013-2014
  - 2011-2012

Select "Preview" to preview your chart, then **select "Apply"** to view it in the Data Explorer.
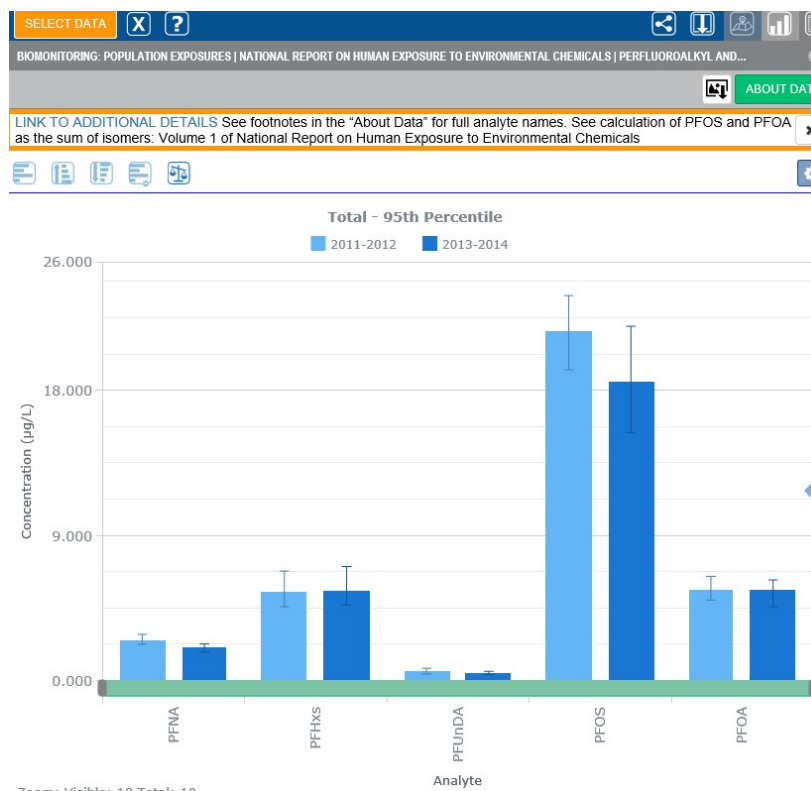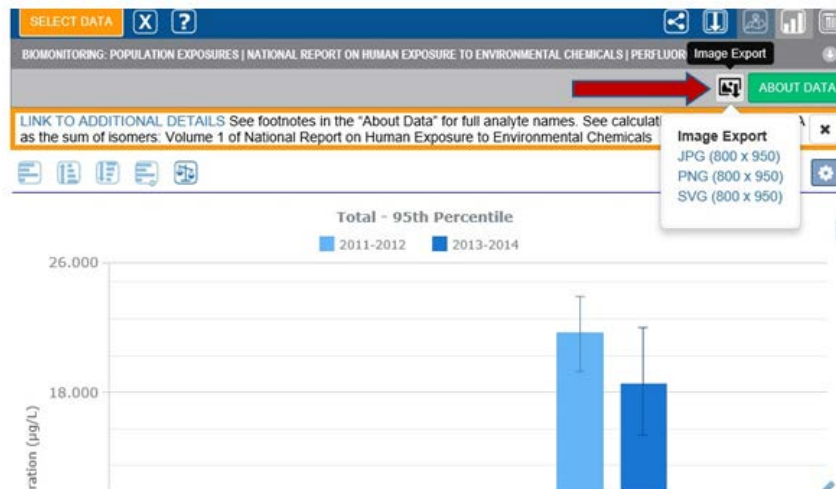
Export Image of Chart

An image of the chart you just built can be exported in 3 different formats: JPG, PNG, and

SVG. In order to see the SVG format, hold the shift key and click on Image Export.

Select your preferred format and save your image to your computer. You can change the format from an SVG file to an EMF to provide you with more options of editing the picture.


Export Data

You can also export the data that you have queried into a .csv file, and make your own charts using Microsoft excel or other software packages. The exported data includes information from the footnotes which will help with interpreting the data.

Click on Export Data and save the documents to your computer.
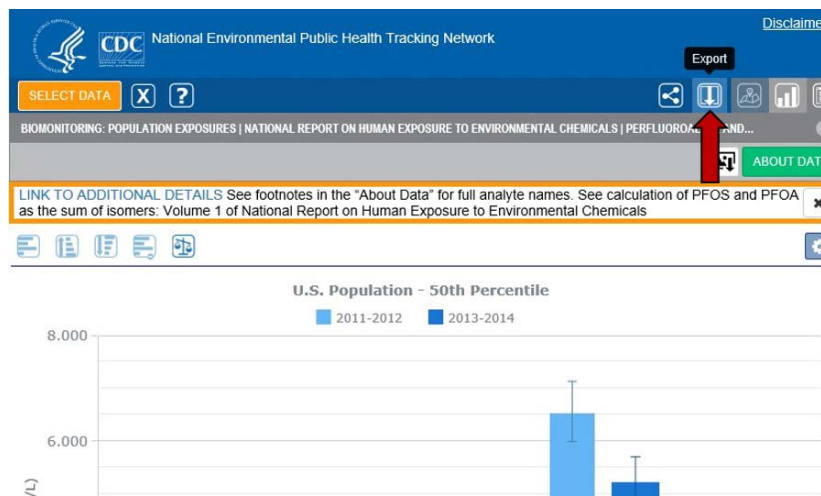
Click on Save As and follow the usual steps when saving documents to your computer.
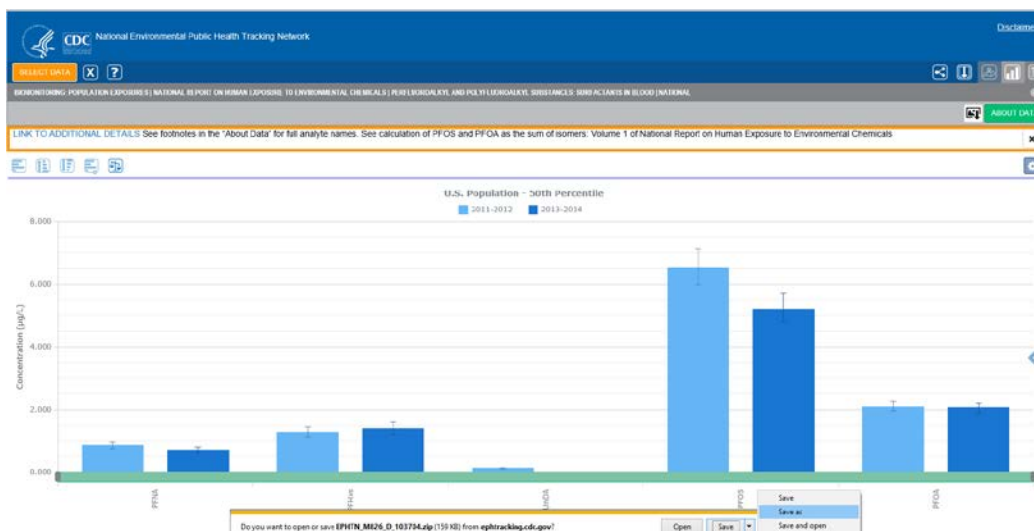
For more information about the Tracking Program and Tracking Network, visit the following links:

- Tracking Network: www.cdc.gov/ephtracking
- Tracking Program: www.cdc.gov/nceh/tracking

You can also contact us at this email address: TrackingSupport@cdc.gov