



Final Rule to Strengthen the National Air Quality Health Standard for Particulate Matter

Fact Sheet

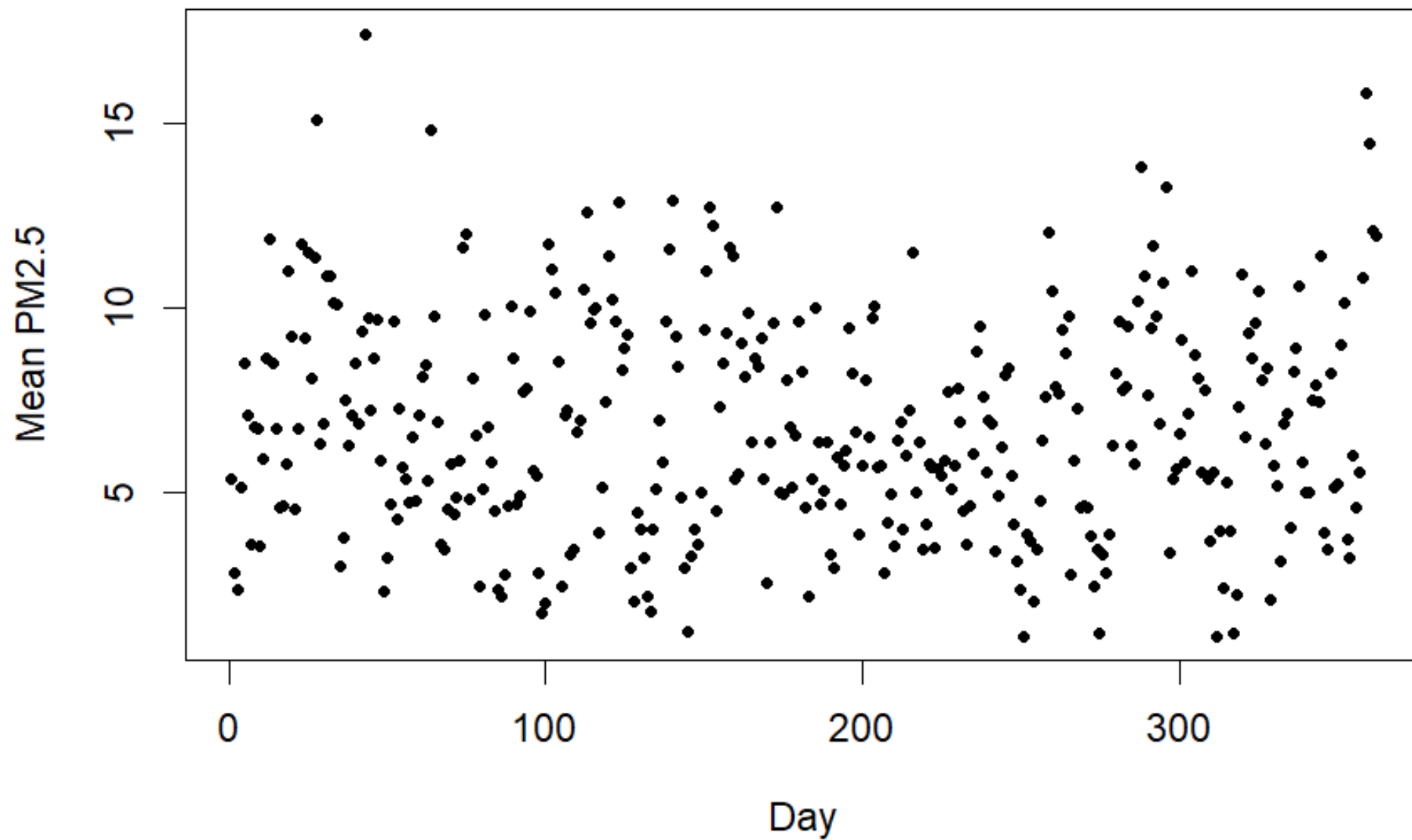
- On February 7, 2024, the U.S. Environmental Protection Agency (EPA) announced a final rule to strengthen the nation's National Ambient Air Quality Standards (NAAQS) for fine particle pollution, also known as fine particulate matter (PM_{2.5}) or soot.
 - EPA is setting the level of the primary (health-based) annual PM_{2.5} standard at 9.0 micrograms per cubic meter (µg/m³) to reflect new science on harms caused by particle pollution.

How does this affect Durham, NC?

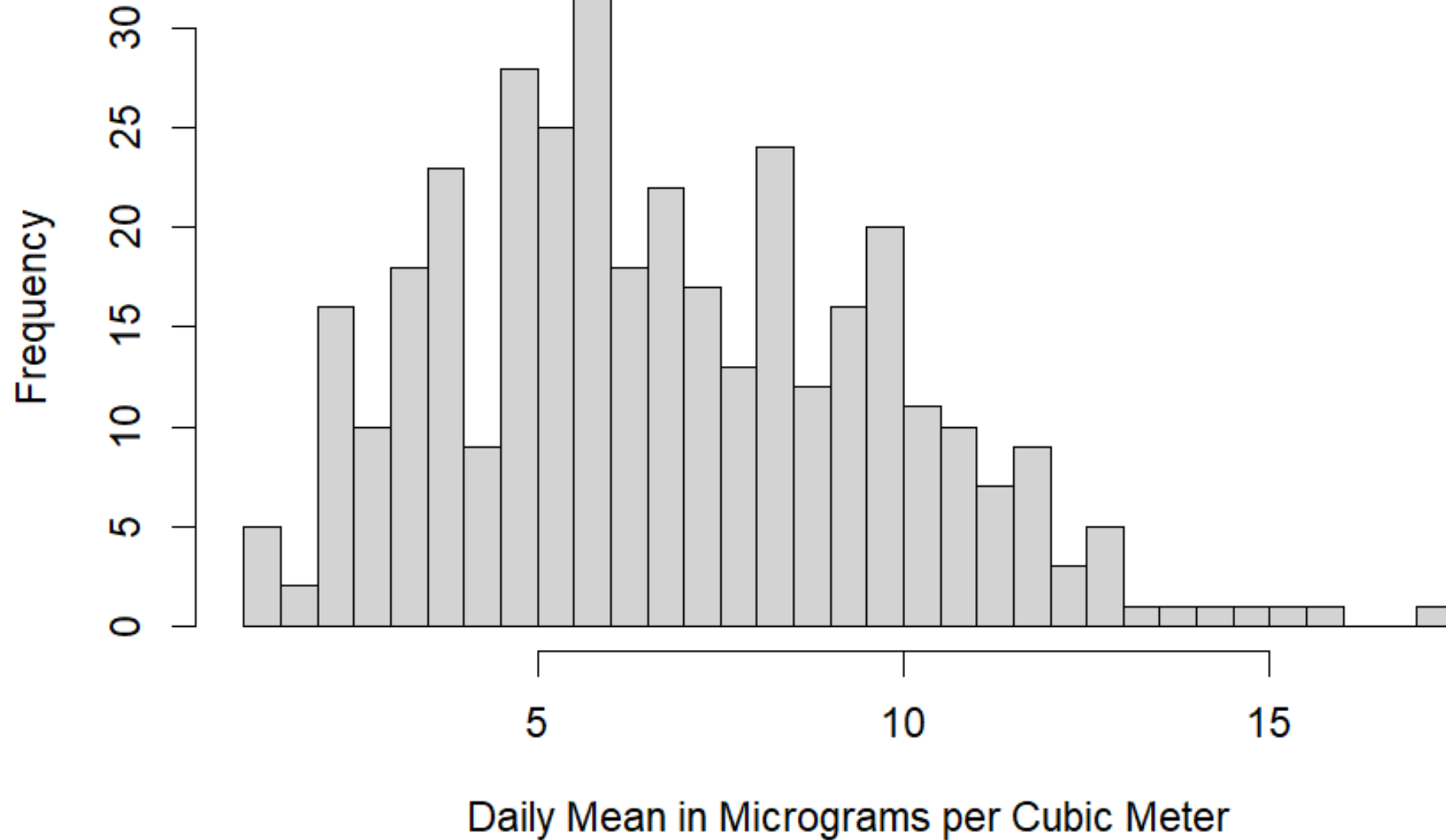
I downloaded daily data for PM2.5 FRM/FEM Mass (88101) from EPA's air quality database
(https://aqs.epa.gov/aqsweb/airdata/download_files.html)

From this, I extracted daily PM2.5 data for Durham, NC, for 2022

Daily PM2.5 for 2022 in Durham, NC



Daily PM2.5 for 2022 in Durham, NC



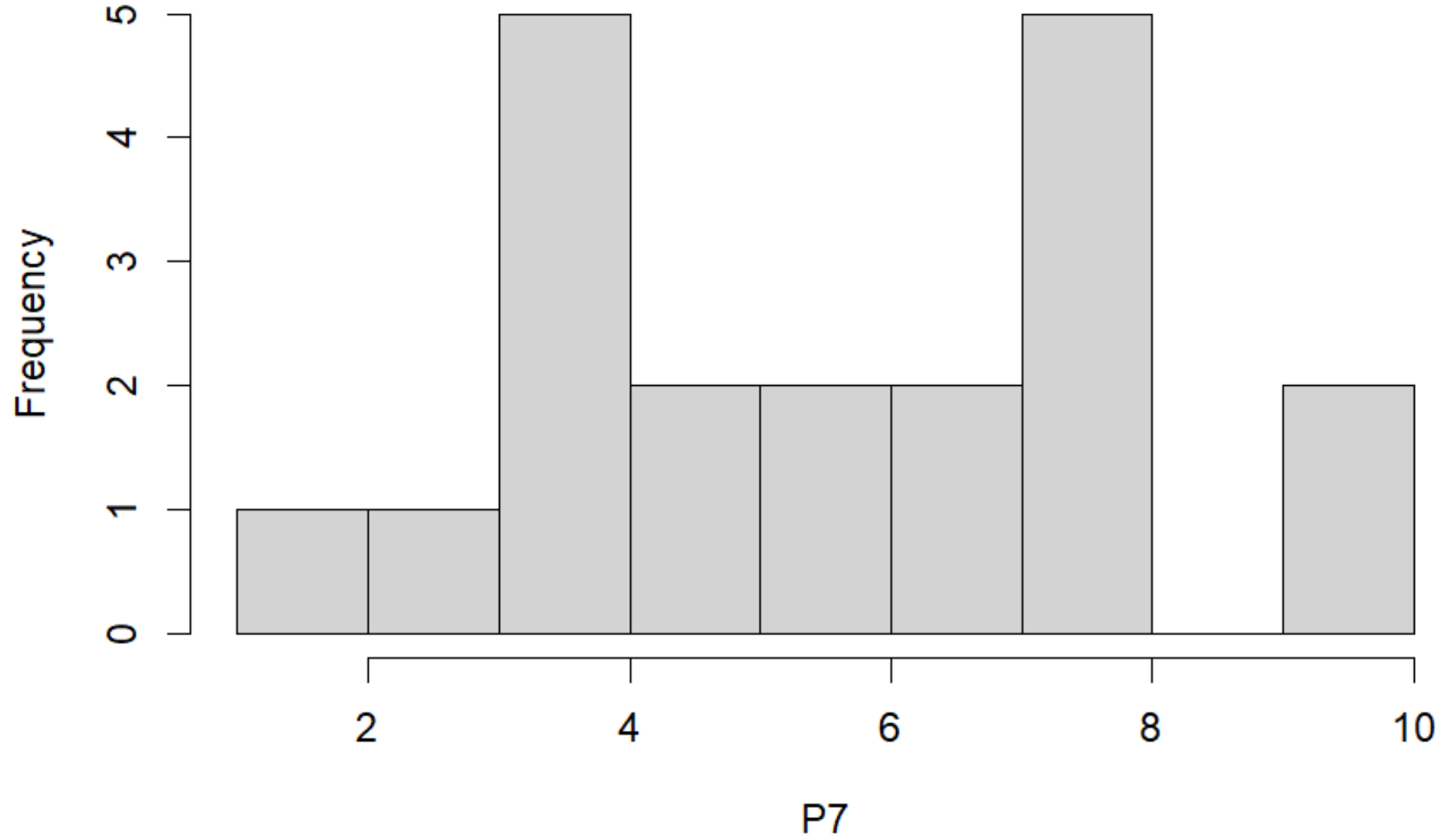
To illustrate the process of calculating confidence intervals from a sample, I extracted a sample of 20 days from the 2022 daily records in Durham.

Full year: mean=6.79, SD=2.97

Sample: mean=5.62, SD=2.31

The sample size is <30 , but the data are approximately symmetric and there are no outliers, so we assume the distribution of the sample mean is normal.

Sample of 20 Values



Calculation: sample mean is 5.62, SE is $2.31/\sqrt{20}=0.5165$

The sample size is $n=20$, so $df=n-1=19$

The t value associated with a two-tailed test at significance level 0.05 is 2.09 (Table, page 414)

Therefore, the bounds of the 95% confidence interval are at $5.62-2.09*0.5165=4.54$, $5.62+2.09*0.5165=6.70$.

In this case, the confidence interval does *not* include the true value (6.79)

I repeated the whole experiment 100 times, using 100 independent samples of size 20 from the 362 daily values

In each case, I calculated the 95% confidence interval for the population means

The results are shown on the next slide

In 97 of the 100 cases, the 95% confidence interval does include the true mean (6.79).

