

Name:

Date:

Class:

## Example Research Plan Example: Using Existing Data

Use the following template to plan your project. Feel free to edit and reformat as needed.

### Group Members & Contact Info

Names, phone numbers, emails go here.

### Research Question or Hypothesis

A year ago, a bypass was built in our town to send truck traffic around the town rather than through it. We would like to see if the bypass improves air quality in town.

*Hypothesis:* Air quality in town will be better after the bypass was built because fewer diesel semi-trucks will be driving through town.

*Research Question:* What impact did building the bypass have on air quality in town?

What larger theme does this relate to? (For example, climate change, public health, etc.)

This project relates to public health, because particulate matter (PM) can cause respiratory and cardiovascular problems. Less PM in the air means people are at less risk for these negative health effects.

Who might be interested in this data? Why?

The city might be interested in this data and in learning what impact building the bypass had on air quality in town.

### Background Information

List what you *already* know:

PM<sub>2.5</sub> is bad for human health and one major local source is diesel truck traffic. We can use existing data from an air quality monitor for PM<sub>2.5</sub> that is located downtown on top of the Public Health Building.

List what you *need* to know:

We need to know exactly when the bypass was built so we can choose data from a time well before and a time well after. We also need to know how to access and download the data from the downtown PM<sub>2.5</sub> monitor.

List your next steps:

Investigate to find out when the highway bypass was built. Find out from the town government about how to access and download the data.

### Method

What pollutants are you interested in?

Particulate matter 2.5.

What additional quantitative or qualitative data do you need?

We also want to know more about the seasonal weather patterns from year to year, to make sure these are fairly similar.

What are you comparing? (For example, two pollutants in different locations, or the same location at different times.)

We are comparing PM<sub>2.5</sub> levels from the same location before and after an event.

### Required Materials

Computer with Internet access for downloading, processing and analyzing data.

Name:

Date:

Class:

### Procedure

How will you collect your data, step by step? This applies to groups using the Pods and groups using existing data.

- We will download data from the first week of every month for three years before the bypass was built and three years after. This will help us understand overall impact independent of variations caused by seasonal or weather differences.
- In Excel, we will organize this data into two data sets—a “before” and an “after” set.
- Then we will conduct a statistical analysis of the data.

### Timeline

Project Phase	When will this happen?	What will we need?	Who will bring it? Or, how will we get it?	Questions?
Complete Project Plan	03/24/2016	Group to get together to finish writing plan	Group meeting after school on 03/23	
Prep Equipment	03/25/2016	Computer	We each have one.	
Collect Data	03/25/2016	Download and organize data	We will each be responsible for a portion of the data	
Check Data	03/30/2016	*Request assistance	In class with teacher	
2 <sup>nd</sup> Data Collection (if necessary)	NA	NA	NA	
Data Analysis	04/10/2016	Computers with Excel	In class	
Make Poster	04/20/2016	Laptop, PowerPoint template and our data	In class	
Symposium	5/5/2016	Poster and prepared 2-5 minute talk	University student mentor prints and brings poster	How should we dress?

### Potential Sources of Error

List two potential sources of error and how you can minimize their effects on the data.

- Missing data: It is possible that data might be missing during our planned timeframes. We will check to make sure the data is complete before downloading it, and adjust as necessary.
- Weather: If the weather from one year is significantly different from all of the other years, we may want to choose a different year.

### Data Analysis Plan

Describe two statistics that you will compute to help you evaluate your hypothesis.

- Average  $PM_{2.5}$  levels before and after (overall and seasonal averages). We will look for statistically significant differences in these averages.
- Median  $PM_{2.5}$  levels before and after (overall and seasonal). The average can be thrown off by outliers. Examining the median, too, will tell us more.

Describe two plots that you will make to help you evaluate your hypothesis.

- We will plot time series of the  $PM_{2.5}$  levels before and after to make a visual comparison and look for patterns.
- We will make a bar chart to visually compare the statistics mentioned above.