**Data Collection and Analysis Using**

**the CDC’s National Notifiable Diseases Surveillance System (NNDSS)**

Every week, the United States Centers for Disease Control and Prevention, better known as the CDC, publishes a weekly journal on public health information, the Morbidity and Mortality Weekly Report (MMWR). This publication includes reports on disease outbreaks, updates on medical treatment and prevention research, and long-term statistics and disease trends. As the CDC is a government funded agency, the MMWR is part of the public domain, and the data and other materials published in it are freely available. This includes the National Notifiable Diseases Surveillance System (NNDSS) which tracks incidence of infectious disease at the country, region, and state levels. This give scientists the opportunity to mine the data for patterns which may signal a new disease outbreak or reveal the leading edge of a new epidemic.

In this activity, we are going to explore the raw data from the NNDSS of weekly cases of “[notifiable infectious diseases](https://www.cdc.gov/nndss/)” in the United States. These are diseases which we expect to be involved in host-pathogen evolution dynamics, because they are caused by another organism (e.g., bacteria, fungi, protist, virus). As such, infectious diseases can drive the evolution of their human hosts and humans can drive the evolution of the pathogen.

I have downloaded and compiled five years of data (2016-2020) on five of these diseases. I will assign each of you to a group, and each group will be assigned a disease. Each group will explore the cases of this disease across the United States as a whole, as well as in six states of similar total population sizes, but different population densities. This will give you an idea of seasonal and regional prevalence of the disease. Your group will prepare a **BRIEF** report on the disease, it’s prevalence, and any trends in the data. Next week, we will use the reports to discuss potential ecological and evolutionary differences between these diseases.

**Report Format**

Each group will write a 3-page disease report including the following sections and content (please follow length guidelines). The questions on the next two pages will help you gather the appropriate data for this report. Each member of your group should bring a printed copy of your report class on Tuesday, April 6th, and your group should submit a single electronic copy on Blackboard. Please include all group member names on your report.

1. **Page 1: Disease Summary** (single spaced, 12 pt Times New Roman, 1 in margins)
   1. Include information on transmission, symptoms, and treatments
2. **Page 2: Figure(s)** (construct in Excel or Google Sheets)
   1. Include caption(s) which describes the figure(s) and cite the source of data. Label axes, include a title and legend if necessary. Additional pages of figures are acceptable as needed.
3. **Page 3: Interpretation of Figure(s)** (single spaced, 12 pt Times New Roman, 1 in margins)
   1. Given what you know about the disease, interpret the pattern(s) in your figure in an evolutionary and/or ecological context

The following guiding questions will help summarize the details of your disease and the data you are analyzing. Please do not turn these pages in but use them to organize your thoughts for your group’s report.

**Disease Summary**

1. Which disease was your group assigned?

1. How is this disease transmitted to humans? Include information on any intermediate hosts or vectors.

1. What are the common symptoms of this disease? Note if the disease is often asymptomatic.

1. What are the common treatments for this disease?

1. Are there any other interesting details about your disease and how it is transmitted that might be relevant to its evolution or ecology?

**Interpret your figures & make conclusions**

1. Do you notice any seasonal or regional patterns in disease occurrence?
   1. Be sure to consider: What does the nation-wide data show? How do the six states vary seasonally? Is the seasonal pattern in the six states the same?

1. If you found a seasonal or regional pattern, can you hypothesize why that pattern might exist? Consider how seasonal or regional changes in environment may affect:
   1. The pathogen,
   2. The pathogen’s other hosts,
   3. The likelihood humans will encounter the pathogen in a way conducive to transmission

1. What next steps would you take to be confident that the pattern you identified actually exists? Remember: while we used 5 years of data, we had two scales: the whole country, and 6 individual states with similar population sizes, but very different population densities.
   1. What’s the difference between population size and population density?
   2. Why might population density matter for the ecology of a disease?
   3. Based on what you learned about your disease, are there states that we did not explore that you think will have identifiable patterns? If so, which states and what patterns do you expect?