

CENTERS FOR DISEASE CONTROL DATA INVESTIGATION

DESCRIPTION:

Students use spreadsheets and the Internet to retrieve information about regional and national health data and to organize and analyze that data.

RATIONALE:

In the Mysterious Illness Outbreak, students use spreadsheets to organize the data that they collected and to compare that data with historical health information about Hydroville and its region.

PURPOSE/GOALS:

Students will be able to:

- Use research skills to access a set of databases.
- Retrieve specific databases for review.
- Assemble the found data in a concise, organized manner.
- Interpret statistical information

PREREQUISITES:

- Using Internet search engines to find a specific website
- Navigating within a website to find specific information
- Statistical analysis of data using spreadsheets

TIME ESTIMATE:

Prep: 30 minutes

Activity: Two 50-minute class periods:

MATERIALS:

- Hydroville Learning Log

MATERIALS (PER GROUP OF 2-3 STUDENTS):

- Computer with Internet access
- Printer to create copies of final documents
- Colored pencils or pens

MATERIALS TO PHOTOCOPY:

(1 copy/student)

- Student Worksheets (pages XX)
- Map of the United States (page X)

(1 copy/group -laminated for class sets)

- Student Handouts 1 – 8: Table 2: Reported Cases of Notifiable Diseases, United States, 2000 (if computers are not available)

BACKGROUND INFORMATION:

The Centers for Disease Control and Prevention (CDC) is the lead federal agency for protecting the health and safety of people at home and abroad, and providing credible information to enhance health decisions. Data collected by the CDC helps to create public policy and to influence decisions that improve human health by preventing and controlling disease, illness, and injuries.

TEAMWORK SKILL:

The skills listed below will be important in this activity.

Basic Team Skills

- Everyone contributes and helps.
- Encourage all in the group to participate.

TERMINOLOGY:

Communicable diseases

Demographics

Mortality rate

Notifiable Disease

Incidence Rate

SUGGESTED LESSON PLAN

Getting Started

1. **Learning Log Prompt:** How can we know if a series of events is an outbreak or just a normal and expected series of events?
One would compare the incident rate or mortality rate for the specific situation with statistics collected by the state health department or CDC for that disease in that area in previous months or years.
2. If necessary you will need to review the following with your students:
 - Performing an Internet search
 - Using spread sheets to interpret statistical data
3. Students should define Terminology for this activity in their Learning Log as homework before beginning their Internet search.
4. If computers are not available, copies of the data tables from the CDC website can be distributed to the students. These student handouts are provided in the student pages of this activity.

Doing the Activity

1. Introduce the activity by showing Transparency 1: *Reporting Notifiable Diseases*
2. Discuss students' answers to the Learning Log question. Bring out the fact that these diseases are reported to local health departments and then the CDC so that health departments can compare incidences of cases with reported averages to know if they are dealing with an outbreak.
3. Focus on the 4 disease that the students will be investigating. Discuss the Mode of Transmission of each diseases. This knowledge will be important for students to have in answering the Discussion Questions.
 - AIDS – person to person – direct contact
 - E. coli – water or foodborne – vehicle borne (water or food)
 - Gonorrhea – person to person – direct contact
 - Lyme disease – tick to person – vector borne (tick)

4. Students work in teams of 2 or 3 at the computer to find information required to create their own spreadsheet or table.
5. As a group, students will work together to complete a spreadsheet (or table if computers are not available), organize the data and answer questions, and create and print a graph that summarizes the information that they find.

Wrap-up

1. As a class, discuss student's findings and interpretations of the data collected.
2. **Learning Log Prompts:**
If you looked the number of cases of the following diseases reported by age group (0-14, 15-39, 40-64, >65) in the United States in the year 2000, would you expect to find a difference between the reported age groups? Explain your answer.
 - a. E.coli (food poisoning)
 - b. gonorrhea (a sexually transmitted disease)
 - c. lyme disease (a tick-borne disease)

ASSESSMENT:

1. Collect and grade the United States Map, spreadsheet or table, and Discussion Question responses.
2. Using the Internet and the CDC National Injury Map website, create and print two maps of your state showing the injury mortality rate by county for suicides and motor vehicle accidents for 1989-1990. Create and print each map separately and put your state's major cities and roads on the map. Then, create them together to get the national statistical comparison. Use each map to answer the following questions in two well organized paragraphs:
 1. Do you see any patterns in the map? Where do the most cases of death from suicide (traffic accidents) occur? Are the deaths scattered around the state or focused in a certain area? Are they in the most populated areas? Are the statistics for your
 2. Propose hypotheses for the differences or patterns that you have noticed?

EXTENSIONS:

Mathematics

See Extension Section for the following activity:

- Mathematics Extension 1: Mileage

Language Arts

- Analyzing and organizing information

Social Studies

Students could write a paper or develop a presentation (PowerPoint or Multimedia) on the following:

- Differences between leading causes of death in 1900 and 2000.
- The manner in which socio-economic backgrounds, cultural and genetic background and gender affect health status.

RESOURCES:

Center for Disease Control Website: www.cdc.gov

Centers for Disease Control and Prevention. *Summary of notifiable diseases, United States, 2000.* MMWR 2000;49(53):[inclusive page numbers].

TEACHER KEY

Part 1: Researching Databases on the Internet

| Region | Total Pop (in thousands) | AIDS | AIDS Cases/ 1,000 | E.Coli (NEYSS) | E.Coli Cases/ 1000 | Gonor- rhea | Gonor- rhea Cases/ 1000 | Lyme Disease | Lyme Disease Cases/ 1000 |
|---------------|-----------------------------|--------|-------------------------|-------------------|--------------------------|----------------|----------------------------------|-----------------|-----------------------------------|
| United States | 272,692 | 20,758 | 0.08 | 4,528 | 0.02 | 358,995 | 1.32 | 17,730 | 0.065 |
| New England | 13,496 | 2,028 | 0.15 | 380 | 0.03 | 6,883 | 0.51 | 5,801 | 0.430 |
| Mid.Atlantic | 38,334 | 9,825 | 0.26 | 443 | 0.01 | 40,953 | 1.07 | 9,131 | 0.238 |
| E.N.Central | 44,442 | 3,734 | 0.08 | 1,103 | 0.02 | 71,694 | 1.61 | 773 | 0.017 |
| W.N.Central | 18,800 | 956 | 0.05 | 683 | 0.04 | 18,114 | 0.96 | 570 | 0.030 |
| S. Atlantic | 49,561 | 11,234 | 0.23 | 387 | 0.01 | 94,350 | 1.90 | 1,176 | 0.024 |
| E.S.Central | 16,584 | 1,989 | 0.12 | 151 | 0.01 | 36,658 | 2.21 | 50 | 0.003 |
| W.S.Central | 30,325 | 3,892 | 0.13 | 227 | 0.01 | 54,035 | 1.78 | 93 | 0.003 |
| Mountain | 17,128 | 1,403 | 0.08 | 434 | 0.03 | 10,389 | 0.61 | 16 | 0.001 |
| Pacific | 44,022 | 5,599 | 0.13 | 730 | 0.02 | 25,919 | 0.59 | 120 | 0.003 |

- Which region had the highest number of cases of E. coli in the year 2000?
E.N.Central
- Which region had the highest number of cases of Lyme Disease in the year 2000?
Mid. Atlantic
- Identify the region that you live in. What is the number of cases of gonorrhea in the year 2000 in your region?
Answers will vary
- What two regions had the highest number of AIDS cases in the year 2000?
S.Atlantic and Mid.Atlantic
- When comparing the incidence of notifiable diseases in different regions of the country, why should you compare cases/1000 rather than the total number of reported cases?
Because regions vary in populations, you must compare data that refers to the same number of people counted. For example, cases per 16,584 will be different than cases/1000.
- Which three regions have the highest incidence (cases/1000) of E. coli cases in the year 2000? Is the region you reported in question 1 the same as one of these 3 regions? Why or why not?
W.N.Central, New England, Mountain No, the total number of reported cases was the highest but the incidence of cases(cases/1000) were lower 0.02.
- Which regions have a very high incidence of Lyme Disease: 10 times the reported incidence of the other regions. Propose a hypothesis to explain this wide variation in incidence of Lyme Disease.
New England and Mid.Atlantic. The deer tick, the vector that carries the disease, is found primarily in those two regions.
- Is your region above or below the national rate of reported cases of Gonorrhea? Suggest several reasons why this is the case.
Answers will vary.

9. Do the two regions that you reported in Question 4 also have the highest incidence rate of AIDS. Propose a hypothesis that would explain why these two regions might have the highest incidence of AIDS in the country.

Yes. Answers will vary.

10. You are a public health officer in a county in Pennsylvania with a population of 64,250. After the county fair, doctors reported 6 cases of E. coli 0157. Calculate the cases/1000 and compare it to your table. If the incident rate exceeds that reported for the year 2000, then you may be dealing with an out break.

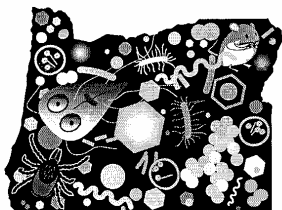
$$6/64,250 \times 1000 = 0.09 \text{ cases}/1000$$

Pennsylvania is in the Mid. Atlantic region. The reported incidence of E.coli 0157 in 2000 was 0.01. Therefore, one should investigate the incident as you may be dealing with an outbreak.

A notifiable disease is one that once identified must be reported to the local health department in order for the prevention and control of the disease. There are 58 diseases on the “Disease Reporting” list along with specific timeframe requirements for each infectious disease. Every health care provider must notify the local health department for each case or suspected case of any of the notifiable diseases. Also, every licensed laboratory shall report on the identification or suspected identification of disease-causing organisms.

DISEASE REPORTING

OREGON HEALTH DIVISION



All Oregon physicians and other health care providers are required¹ to report patients with the following conditions to their local health department. Both lab-confirmed and clinical diagnoses are reportable within the time intervals specified below. Reporting enables appropriate public health follow-up for your patients, helps identify outbreaks, and provides a better understanding of Oregon morbidity patterns.



IMMEDIATELY^{2*}

- any cluster of illnesses²
- any unusual case²
- anthrax
- botulism (foodborne)
- diphtheria
- outbreaks of foodborne illness³
- plague

^{*} If your local health department cannot be reached, call the Oregon Health Division directly: 503/731-4024 (weekdays); 731-4030 (all other times).



WITHIN 24 HOURS

- animal bites (by possibly rabid beasts)
- cholera
- foodborne illness⁴
- Haemophilus influenzae* (invasive disease)
- measles
- meningococcal disease
- polio
- rabies (animal or human)
- rubella

WITHIN ONE WORKING DAY⁵



- amebiasis
- botulism (infant)
- campylobacteriosis
- Chlamydia trachomatis* (urogenital tract infections)
- cryptosporidiosis
- Escherichia coli* O157 infections
- giardiasis
- gonorrhea
- hemolytic uremic syndrome
- hepatitis (A, B, C, D, E; other)
- malaria
- pertussis
- pesticide poisoning
- salmonellosis (including typhoid)
- shigellosis
- syphilis (infectious)
- trichinosis



WITHIN ONE WEEK

- AIDS
- brucellosis
- chancroid
- congenital rubella syndrome
- HIV infection⁶
- lead poisoning⁷
- leprosy
- leptospirosis
- listeriosis
- Lyme disease
- lymphogranuloma venereum
- PID (acute, non-gonococcal)
- psittacosis
- Q fever
- Rocky Mountain spotted fever
- syphilis (non-infectious)
- tetanus
- tuberculosis
- tularemia
- yersiniosis

NOTES

¹ORS 433.004; OAR 333-18-000 et seq.
²of possible public health significance
³defined as ≥2 cases from separate households, associated with a suspected common source
⁴other than outbreak-associated cases
⁵Monday through Friday, excluding holidays
⁶under specified circumstances (see OAR 333-18-030).
⁷for children (<18 years old), ≥10 µg/dl; for adults, ≥25 µg/ml

HOW TO REPORT

Reporting is fun and easy. Call or fax your local health department (see list, verso). Give them the patient's name, address, phone number, date of birth, the diagnosis, and the onset date of symptoms.

VACCINATIONS

Private providers must report adverse events following immunizations directly to the feds (800/822-7967).



STUDENT PAGES
FOR
BACKGROUND ACTIVITY 3:
CDC DATA INVESTIGATION

FOLLOW THIS PAGE

Researching Databases on the Internet

1. Using the Internet, locate Center for Disease Control Website.
2. Go to *Data and Statistics* then under National Notifiable Diseases Surveillance System go to *Summary of Notifiable Diseases*. Under DOWNLOAD, click and download *Summary of Notifiable Diseases, United States, 2000* ([1MB PDF file](#))
You must have Adobe Acrobat on the computers to open these documents.
3. Find Table 2: *Reported Cases of Notifiable Disease, by geographic division and area – United States 2000* in this document
Note: If computers are not available, your teacher will provide you with information (data tables) from these databases.
4. Color each reporting region on Table 2 a different color on the map of the United States. Use this map for reference when answering the Discussion Questions.
4. Use the information in Table 2: *Reported Cases of Notifiable Disease, by geographic division and area – United States 2000* to create the following table or a spreadsheet on your computer.

| Region | Total Population | Disease (Number of Cases in 2000) | | | |
|---------------|------------------|-----------------------------------|--------|-----------|--------------|
| | | AIDS | E.Coli | Gonorrhea | Lyme Disease |
| United States | | | | | |
| New England | | | | | |
| Mid.Atlantic | | | | | |
| E.N.Central | | | | | |
| W.N.Central | | | | | |
| S. Atlantic | | | | | |
| E.S.Central | | | | | |
| W.S.Central | | | | | |
| Mountain | | | | | |
| Pacific | | | | | |
| | | | | | |

5. Sort the spreadsheet or table for each disease from highest number of cases to lowest number of cases. Answer Discussion Questions 1-4.
6. Calculate the number of cases per thousand population for each disease. Give your table or spreadsheet the title: *Cases of Four Notifiable Diseases by Region for the year 2000*. Print your spreadsheet. Use this spreadsheet or table to answer Discussion Questions 5 – 10.

Discussion Questions (WRITE ANSWERS IN LEARNING LOG OR STUDENT WORKSHEET 3 ☺):

Use the spreadsheet or table you created to answer the following questions:

11. Which region had the highest number of cases of E. coli in the year 2000?
12. Which region had the highest number of cases of Lyme Disease in the year 2000?

13. Identify the region that you live in. What is the number of cases of gonorrhea in the year 2000 in your region?
14. What two regions had the highest number of AIDS cases in the year 2000?
15. When comparing the incidence of notifiable diseases in different regions of the country, why should you compare cases/1000 rather than the total number of reported cases?
16. Which three regions have the highest incidence (cases/1000) of E. coli cases in the year 2000? Is the region you reported in question 1 the same as one of these 3 regions? Why or why not?
17. Which regions have a very high incidence of Lyme Disease: 10 times the reported incidence of the other regions. Propose a hypothesis to explain this wide variation in incidence of Lyme Disease.
18. Is your region above or below the national rate of reported cases of Gonorrhea? Suggest several reasons why this is the case.
19. Do two regions that you reported in Question 4 also have the highest incidence rate of AIDS. Propose a hypothesis that would explain why these two regions might have the highest incidence of AIDS in the country.
20. You are a public health officer in a county in Pennsylvania with a population of 64,250. After the county fair, doctors reported 6 cases of E. coli 0157. Calculate the cases/1000 and compare it to your table. If the incident rate exceeds that reported for the year 2000, then you may be dealing with an out break.

