

Unit 1: Epidemiology

October 29 – December 1, 2007

Introduction

Epidemiology is the scientific study of factors affecting the health and illness of populations. The basic premise of epidemiology is that the cause of a disease results in higher rates of the illness in those that have been exposed to the cause than in those who have not been exposed. And thus, one can look for the commonalities in those who are infected when searching for the cause. Epidemiology serves as the theoretical foundation and cornerstone methodology of public health research. Computer simulations are used in the field of epidemiology to study the spread of diseases and the outcomes of interventions made in the interest of public health and preventive medicine.

Epidemiology was chosen as the first unit in the Project GUTS curriculum because it is a timely and relevant subject and a topic that can be studied as a complex system using a variety of technology tools. We have seen students relate “infectivity” to many situations and scenarios they witness in every day life: the fads and fashions that spread through a school, the spread of rumors, and the infectious quality of bullying behavior have been chosen as students’ research topics that relate to epidemiology.

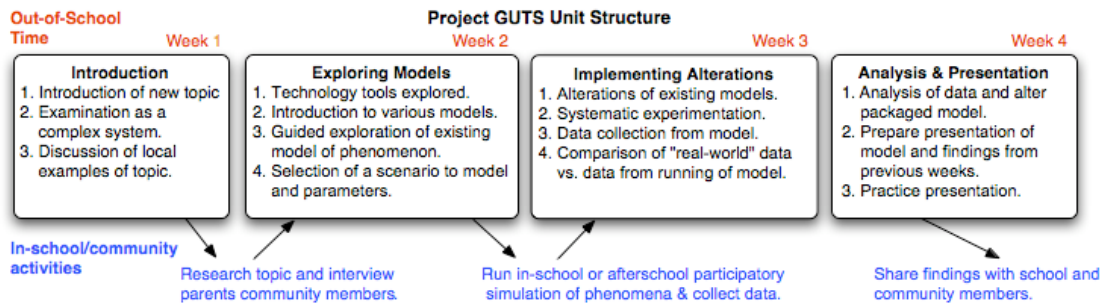
While epidemics have occurred throughout history, the emergence of epidemiology as a scientific discipline did occur until the mid-19th century with the pioneering work of Dr. John Snow. Snow, an anesthesiologist, lived in London’s Soho district during an outbreak of cholera that claimed over 10,000 lives. By mapping the location of fatalities and nearby wells, he ascertained that the epidemic was centered on a single pump. The simple act of removing the handle of the pump stopped the spread of the epidemic.

In this unit, we will study the spread of disease under different circumstances using hands-on activities and computer models. The unit culminates with students’ study of a local phenomenon that can be modeled as a complex system using agent-based modeling tools.

Goals for student learning:

The primary goal of this unit is to engage students in looking at the world with a scientific perspective. Students will also be exposed to various kinds of simulations used to understand the phenomenon of epidemics.

Unit Structure:



Week 1: Introduction to Epidemiology

Presentation: What is epidemiology? Its definition, history and significance

Review: What is a complex system? Its definition, characteristics, hallmarks.

Question: How can the spread of disease be studied as a complex system?

Activity: "Which Well?" a simulation of John Snow's London.

Discussion: What epidemics do you hear of in the news?

Discussion: What other things spread?

Activity: "It's a Toss-up" a simulation of simple infectivity

Assignment: Ask parents/guardians and community members about what actions they would take if a deadly flu reaches their community.

Concept mapping activity: Describe how diseases spread (protocol to be provided)

Blog: Who did you talk with for your assignment? What actions did they say they would take if a deadly flu came to their community?

Week 2: Exploring models of epidemics

Demonstration: StarLogo TNG model on computers

Demonstration: StarLogo 2.2 model on computers

Activity: PDA Virus Game on Palm Zires

Discussion: How could you use these tools to study real-life epidemics?

Activity: Devise an experiment to study the spread of a virus under different conditions. Give specific rules on who to meet and how many times they can meet.

Assignment: Run the Virus game participatory simulation in which fellow classmates are the agents who follow the rules.

Assignment: How would you alter one of the StarLogo Epidemic models to reflect the live experiment that was run with classmates?

Blog: What did you learn about the spread of disease that you didn't know before?

Week 3: Implementing alterations to existing models

**Depending on time and facilitator availability, students will either be guided through making changes to existing models to reflect the experiments they ran with their classmates or will be presented with a model changed to their specifications.*

Discussion: How would you use this model to run experiments?

Activity: Use the altered model to run experiments and collect data.

Activity: Compare data from participatory simulation vs. model output.

Blog: *Go back and reread your first blog entry. Based on what you've learned through the models and experiments you've conducted, which of the actions proposed would be more likely to keep you from getting the flu?*

Week 4: Analysis and Presentation preparation

Activity: Analyze data,

Activity: Prepare presentation of experiments and findings

Activity: Practice presentation before club members.

Concept mapping activity: *Describe how diseases spread (same protocol as week 1)*

Planning notes:

Materials

Materials will be made available through the facilitators

Snacks

Snacks will be made available through the facilitators

Equipment needs

We need to schedule the Palm usage and laptops

Field trips?

First field trip is planned for November 9th

Interviews?