

Title: Spatial Diffusion: Epidemics and Pandemics Over Time

Lesson Idea: Celeste Crotwell and Carlota Rodriguez

Grade Level: 9th Grade World Geography

Time Frame: 2 Days

Rationale: Epidemics and pandemics can be traced over time showing the process of diffusion and human movement. Students will understand how epidemics and pandemics impact society. In this one day lesson, students will visit four learning centers tracing the movement of four different epidemics and pandemics that have occurred throughout history using a world map, vocabulary cards, technology and personal reflection.

Objectives: Students will be able to:

1. Understand the spread of disease over time
2. Define diffusion, epidemic, pandemic and migration
3. Trace the path of epidemics and pandemics on a world map

TEKS, World Geography Studies:

(1) History. The student understands how geography and processes of spatial exchange (diffusion) influenced events in the past and helped to shape the present. The student is expected to:

(B) trace the spatial diffusion of phenomena such as the Columbian Exchange or the diffusion of American popular culture and describe the effects on regions of contact

(7) Geography. The student understands the growth, distribution, movement, and characteristics of world population. The student is expected to:

(D) examine benefits and challenges of globalization, including connectivity, standard of living, pandemics, and loss of local culture

20) Science, technology, and society. The student understands how current technology affects human interaction. The student is expected to:

(B) examine the economic, environmental, and social effects of technology such as medical advancements or changing trade patterns on societies at different levels of development.

(22) Social studies skills. The student communicates in written, oral, and visual forms. The student is expected to:

(B) generate summaries, generalizations, and thesis statements supported by evidence;

(C) use geographic terminology correctly;

(D) use standard grammar, spelling, sentence structure, and punctuation,

Materials:

3x5 index cards, World map, colored pencils, Reflection sheets, paper, pen or pencil, and Computer(s) to access:

<http://nationalhumanitiescenter.org/tserve/nattrans/ntecoindian/essays/columbian.htm>

<http://www.aidsinafrica.net/>

<http://www.sars.us>

<http://www.pbs.org/wgbh/americanexperience/features/general-article/influenza-first-wave/>

Procedures:

1. Students will be asked to take a piece of paper and fold it into four sections.
2. Students are to write the following terms (one word per square) diffusion, epidemic, pandemic and migration on their paper.
3. Once students have written their definitions, they are to pair-share their answers with their shoulder partner.
4. The teacher can then ask for volunteers to orally share their definitions of the terms.
5. The teacher will briefly give some background information on pandemics and epidemics such as Columbian Exchange, Severe Acute Respiratory Syndrome (SARS), AIDS, and Influenza Epidemic of 1918
6. After a brief review of selected pandemics and epidemics, students will be divided into four groups (count off or popsicle stick choice) to go to an assigned learning center.
7. Students will be given a world map. Students will trace the spread/diffusion of the diseases at each center (using a different colored map pencil). [Suggestion: Red for SARS, Orange for Columbian Exchange, Black for Influenza and Brown for AIDS.]
8. Before rotating to the different centers, students are to write one paragraph, or jot down notes on what they think about the disease they map. Students could infer how present day response to outbreaks differs from historical response; did one disease travel more quickly than another, if so why, etc.
9. Once the students have been able to visit each center, they will return to their seat for a whole/large class discussion.

Evaluation: Student maps can be reviewed. The whole/large class discussion can determine if students understand and can define the vocabulary, trace the diffusion of pandemics and examine how technology and medical advancements impact current spatial diffusion of pandemics.

The 3x5 cards can be used as an exit ticket for students to define or describe their understanding of spatial diffusion, specifically with epidemics and pandemics over time.

Brief Teacher Notes:

Columbian Exchange:

Source: http://www.economics.harvard.edu/faculty/nunn/files/Nunn_Qian_JEP_2010.pdf

The exchange not only brought gains, but also losses. European contact enabled the transmission of diseases to previously isolated communities, which caused devastation far exceeding that of even the Black Death in Fourteenth Century Europe. Europeans brought deadly viruses and bacteria such as smallpox, measles, typhus, and cholera, for which Native Americans had no immunity (Denevan, 1976).

SARS

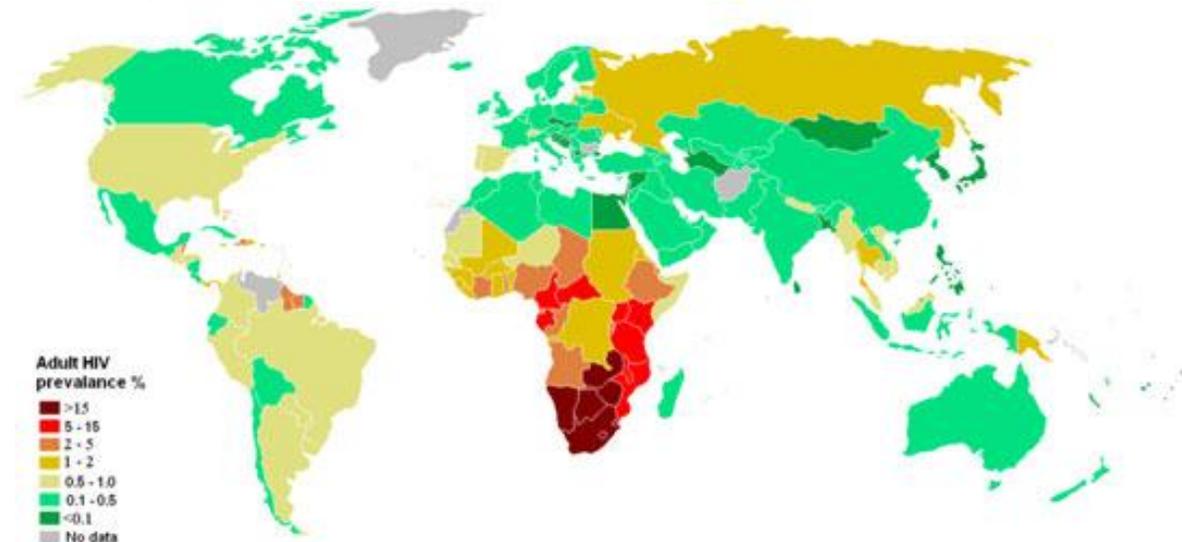
Source: <http://www.cdc.gov/sars/>

Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a coronavirus, called SARS-associated coronavirus (SARS-CoV). SARS was first reported in Asia in February 2003. The illness spread to more than two dozen countries in North America, South America, Europe, and Asia before the SARS global outbreak of 2003 was contained.

Since 2004, there have not been any known cases of SARS reported anywhere in the world.

AIDS

Source: <http://www.medicalnewstoday.com/articles/17131.php>



Estimated HIV/AIDS prevalence among young adults (15-49) by country as of 2008. UNAIDS 2008 report

Source: Ritter, M. (2008, October 1). *Scientists trace the origin of the AIDS virus.* Huffington Post. http://www.huffingtonpost.com/2008/10/01/scientists-trace-the-orig_n_131056.html?view=print

NEW YORK — The AIDS virus has been circulating among people for about 100 years, decades longer than scientists had thought, a new study suggests. Genetic analysis pushes the estimated origin of HIV back to between 1884 and 1924, with a more focused estimate at 1908.

Previously, scientists had estimated the origin at around 1930. AIDS wasn't recognized formally until 1981 when it got the attention of public health officials in the United States.

The new result is "not a monumental shift, but it means the virus was circulating under our radar even longer than we knew," says Michael Worobey of the University of Arizona, an author of the new work.

The results appear in Thursday's issue of the journal *Nature*. Researchers note that the newly calculated dates fall during the rise of cities in Africa, and they suggest urban development may have promoted HIV's initial establishment and early spread.

Scientists say HIV descended from a chimpanzee virus that jumped to humans in Africa, probably when people butchered chimps. Many individuals were probably infected that way, but so few other people caught the virus that it failed to get a lasting foothold, researchers say.

But the growth of African cities may have changed that by putting lots of people close together and promoting prostitution, Worobey suggested. "Cities are kind of ideal for a virus like HIV," providing more chances for infected people to pass the virus to others, he said.

Perhaps a person infected with the AIDS virus in a rural area went to what is now Kinshasa, Congo, "and now you've got the spark arriving in the tinderbox," Worobey said.

Key to the new work was the discovery of an HIV sample that had been taken from a woman in Kinshasa in 1960. It was only the second such sample to be found from before 1976; the other was from 1959, also from Kinshasa.

Researchers took advantage of the fact that HIV mutates rapidly. So two strains from a common ancestor quickly become less and less alike in their genetic material over time. That allows scientists to "run the clock backward" by calculating how long it would take for various strains to become as different as they are observed to be. That would indicate when they both sprang from their most recent common ancestor.

The new work used genetic data from the two old HIV samples plus more than 100 modern samples to create a family tree going back to these samples' last common ancestor. Researchers got various answers under various approaches for when that ancestor virus appeared, but the 1884-to-1924 bracket is probably the most reliable, Worobey said.

The new work is "clearly an improvement" over the previous estimate of around 1930, said Dr. Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases in Bethesda, Md. His institute helped pay for the work.

Fauci described the advance as "a fine-tuning."

Experts say it's no surprise that HIV circulated in humans for about 70 years before being recognized. An infection usually takes years to produce obvious symptoms, a lag that can mask the role of the virus, and it would have infected relatively few Africans early in its spread, they said.

Influenza Pandemic of 1918

Source: <http://virus.stanford.edu/uda/>

The influenza pandemic of 1918-1919 killed more people than the Great War, known today as World War I (WWI), at somewhere between 20 and 40 million people. It has been cited as the most devastating epidemic in recorded world history. More people died of influenza in a single year than in four-years of the Black Death Bubonic Plague from 1347 to 1351. Known as "Spanish Flu" or "La Grippe" the influenza of 1918-1919 was a global disaster.

"The 1918 has gone: a year momentous as the termination of the most cruel war in the annals of the human race; a year which marked, the end at least for a time, of man's destruction of man; unfortunately a year in which developed a most fatal infectious disease causing the death of hundreds of thousands of human beings. Medical science for four and one-half years devoted itself to putting men on the firing line and keeping them there. Now it must turn with its whole might to combating the greatest enemy of all-- infectious disease," (12/28/1918).