Course
World Health Research

Unit III
Global Health & Economic Data

Essential Question
How do medical scientists use health data to improve world health?

TEKS
130.209. 1C, 1D, 1E, 1F

Prior Student Learning
Basic math and geography

Estimated time
Lecture & CheckPoint Test: Two 50 minute classes

Rationale
The health status of a population is frequently correlated with economic measures such as income and health expenditures. In order to understand the health of a population, both health and economic data must be collected and analyzed.

Objectives
Upon completion of this lesson, the student will be able to:
- Identify what type of health data is needed to access global health
- Describe the mission and tasks of the World Health Organization
- Clarify why published health data is not "real time" health statistics
- Define and identify *reportable* diseases
- Calculate the following: incident rate, point of prevalence, mortality rate, and infant mortality rate
- Explain why epidemiologists use DALYs

Engage
Health and Economic data reveals disparities in global health:
"Pneumonia, diarrheal diseases, tuberculosis and malaria, when combined, have been estimated to account for more than 20% of the disease burden in the world (mostly in developing countries), yet they receive less than 1% of the total public and private funds which are devoted to health research."

http://www.health-policy-systems.com/content/pdf/1478-4505-3-3.pdf

Key Points
I. Health Data is a collection of organized information that gives a picture of a target population.
   A. Health data typically includes information such as:
      1. population of a country
      2. ages of people in that country
      3. sex of population
      4. their ethnic origin
      5. their urbanization
   B. Health data also includes vital statistics such as:
      1. number of live births
      2. number of deaths by sex and age and cause

II. When health data was recognized as important
   A. The importance of collecting health data was very clear by the beginning of the 20th century because of the following:

1. By the end of the 19th century there was general acceptance of the "germ theory".
2. Antony van Leeuwenhoek's microscope had been refined and improved.
3. Microscopy was being used to research and track many diseases
4. The transmission route and causative agents of almost every important infectious disease were established by this time.
   B. As scientists' understanding of disease and how to control it evolved, the first government health agencies were established.

III. World Health Organization (WHO)
   A. The World Health Organization is a specialized agency of the United Nations and was established on April 7, 1948.
   B. WHO's headquarters is in Geneva, Switzerland
   C. Mission of WHO: "attainment by all people of the highest possible level of health"
   D. WHO provides important health information and health data:
      1. reports of disease outbreaks and other health problems around the world
      2. follows steps that countries are taking to improve global health
      3. promotes international standardization of vaccines
      4. maintains tumor registries, which compile epidemiological data regarding cancer cases
      5. track health services including number and type of health care facilities

IV. The scientists who collect health data are called epidemiologists.
      1. epidemiologists are the "Sherlock Holmes" of health and disease
      2. Some of their duties include:
         a. tracking population health all over the world
         b. finding causes of disease and health in groups of people
         c. conducting outbreak investigations
         d. examining the impact of diseases and conditions on populations

V. Father of Epidemiology: John Snow
      1. British physician who practiced anesthesiology
      2. Dr. Snow was a doubter of the then-dominant miasma theory
         a. Belief that diseases such as the Black Death and cholera were caused by pollution in the noxious form of "bad air"
         b. Since the *germ theory* hadn't been created, he was unaware of mechanisms by which disease was transmitted, but theorized that it wasn't caused by foul air.
      3. In 1854, Dr. Snow tracked a cholera outbreak in Soho, England by carefully plotting cases of the disease on an area map.

          a. map helped him identify a public water pump on Broad Street as the source of the outbreak

          b. it demonstrated the pattern of disease, which was convincing enough to persuade the local council to disable the well pump by removing its handle

    4. This study is now regarded as one of the first epidemiologic analyses.

VI. How societies use health data
  A. as an early warning to identify emerging health problems
  B. Examples:
    1. thalidomide birth defects
      a. sudden spike in the number of deformities of newborn children
      b. data unveiled a common denominator: affected infant's birth mothers had taken a new morning sickness drug, thalidomide
      c. the drug was taken off the market
    2. increased incidence of Kaposi's sarcoma and pneumocystis carinni pneumonia in a healthy population of homosexual men
      a. CDC and other national health institutes launched investigations and eventually identified HIV/AIDS

VII. Reportable diseases
  A. Certain epidemic-prone diseases are considered to be *reportable*.
    1. meaning they have to be reported to health agencies around the world
    2. reporting these diseases allows for monitoring of potential outbreaks and it can prevent the spread of epidemics
  B. WHO maintains a world-wide list of reportable diseases
  C. In the United States, the Center for Disease Control and Prevention (CDC) manages mandatory reporting of reportable diseases to WHO.
    1. In the U.S., reportable diseases are referred to as *notifiable diseases.*
    2. Some of the nationally notifiable diseases in the U.S. are:
      a. anthrax, HIV, mumps, pertussis, plague, rubella, smallpox, tuberculosis, & typhoid fever
      b. To see updated national lists you can visit the CDC Notifiable Disease site: http://www.cdc.gov/ncphi/disss/nndss/phs/infdis.htm

VIII. Health Statistics is also included with health data.
  A. health statistics can help predict the following:
    1. frequency of disease by type
    2. severity of a disease outbreak
    3. outcome of an outbreak

B. International health statistics tend to be very problematic
  1. data statistic collection and analysis takes time to compile
  2. statistical data from developing countries is not as comprehensive as that from developed countries
     a. developing countries lack the resources to collect extensive data
  3. comparative health statistical data is not always available
  4. for these reasons, it is rare to find "real time" data for estimates
  5. most health statistics are out of date by the time they are published

IX. Even incomplete statistics help develop a picture of health throughout the world.
  A. Data must be measured in a *quantitative* manner. These data allow estimates of the magnitude of health problems.
  B. Quantitative health measures:
     1. Incidence rate – refers to the number of *new cases* of a disease in a population over a *given period of time*.
        (a measure of the risk of developing a new disease/condition within a specified period of time—usually a year)

        a. To calculate incidence rate:

$$\text{Annual Incidence Rate} = \frac{\text{\# new cases of a defined condition in a defined population in 1 yr.}}{\text{\# in that population at mid-year at that same yr.}}$$

     2. Point of prevalence – refers to the total number of *existing cases* of a disease in a given population *at a specific time*.
        (rather than the rate of occurrence of new cases)

        a. To calculate point of prevalence:

$$\text{Point Prevalence} = \frac{\text{\# cases of defined condition in a defined population at a point in time}}{\text{\# in that population at same point in time}}$$

        b. Making the distinction between incidence and prevalence:
           1) consider a disease with relatively short duration, like the flu
           2) while many people contract the flu each year (incidence), an any given time (prevalence) throughout the year they are not all sick
           3) or—consider a disease with a relatively long duration (a chronic progressive disease like HIV/AIDS)
              1) the point of prevalence can be much higher than the annual incidence rate

3. Mortality rate – quantifies how many people have *died* in a population.

   a. To calculate mortality rate:

$$Mortality\ Rate = \frac{\#\ of\ deaths\ in\ a\ defined\ population\ in\ 1\ yr.}{\#\ in\ that\ population\ at\ mid\text{-}year\ at\ that\ same\ yr.}$$

4. Infant mortality rates – refers to the number of deaths of persons under one year of age.

   a. To calculate infant mortality rate:

$$Infant\ Mortality\ Rate = \frac{\#\ of\ deaths\ under\ 1\ yr\ of\ age\ in\ defined\ population\ in\ 1\ yr.}{\#\ of\ live\ births\ in\ that\ population\ in\ same\ year}$$

5. Morbidity rate – an incidence rate that refers to the degree of the severity of a disease in a given population over a given time
   a. commonly calculated as a percentage of deaths associated with a specific disease

6. Burden of Disease Measure – a measure developed by WHO that combines the effects of both morbidity and mortality rates.
   a. The burden of disease measure is referred to as *Disability-Adjusted Life Years* (DALYs)
   b. DALY - a health gap measure, which combines information on:
      1) "years of life lost" and
      2) "years of life lived with a disability"
   c. DALYs estimates the number of healthy years of life lost due to a premature death and/or a disability
   d. You can think of a DALY as:
      1) average number of years of disability free life that individual who contracts that disease or condition would lose
      2) one DALY represents a loss of one year of "healthy life"
      3) DALYs permit comparisons of a wide range of health problems.
   e. DALYs can be used in three interrelated areas:
      1) for epidemiological surveillance of the total disease burden
      2) to calculate the cost-effectiveness of interventions (cost per avoided DALY)
      3) to decide what should be included in a country's "core services" (package of essential health care services)

DALYs associated with some common diseases/conditions

Disease/Condition	Impact DALYs
Stroke	6
Car accidents	9
Self inflicted injuries	17
Violence	9
Lower respiratory infections	1
HIV	28

Leading Causes of Mortality and Disease Burden from Infectious Diseases (2002)	Deaths (millions)	DALY's (millions)
Respiratory Infections	3.9	94.6
HIV/AIDS	2.8	84.5
Diarrheal Diseases	1.8	62.0
Tuberculosis	1.6	34.7
Malaria	1.3	46.5

X. Organizing and interpreting health data
 A. WHO collects health statistics yearly
 B. These data are organized to create an overall picture of world health which identify:
  a. diseases are most prevalent
  b. diseases that should cause great concern (i.e. SARS, H1N1, etc.)
  c. where outbreaks are occurring

1) data showing the leading causes of mortality throughout the world help prioritize which diseases constitute the greatest health threat
2) the data also allows for resources to be targeted effectively

XI. What economic data reveals about health
  A. There are three economic measures which influence health status:
    a. Average annual per capita income – this is the average annual income per person in a population.
    b. Average annual per capita health expenditure – this is the average amount of money spent on health care each year per person in a population.
    c. Human Development Index (HDI) – this is a measurement of average achievements in a country in three basic areas:
      1) health
      2) education
      3) income
   (the HDI is an average of these 3 indices)

HDI World Map

0,27 0,50 0,70 0,80 0,90 0,96

no data

The Human Development Index (HDI) is calculated using three variables: life expectancy, education level and income.
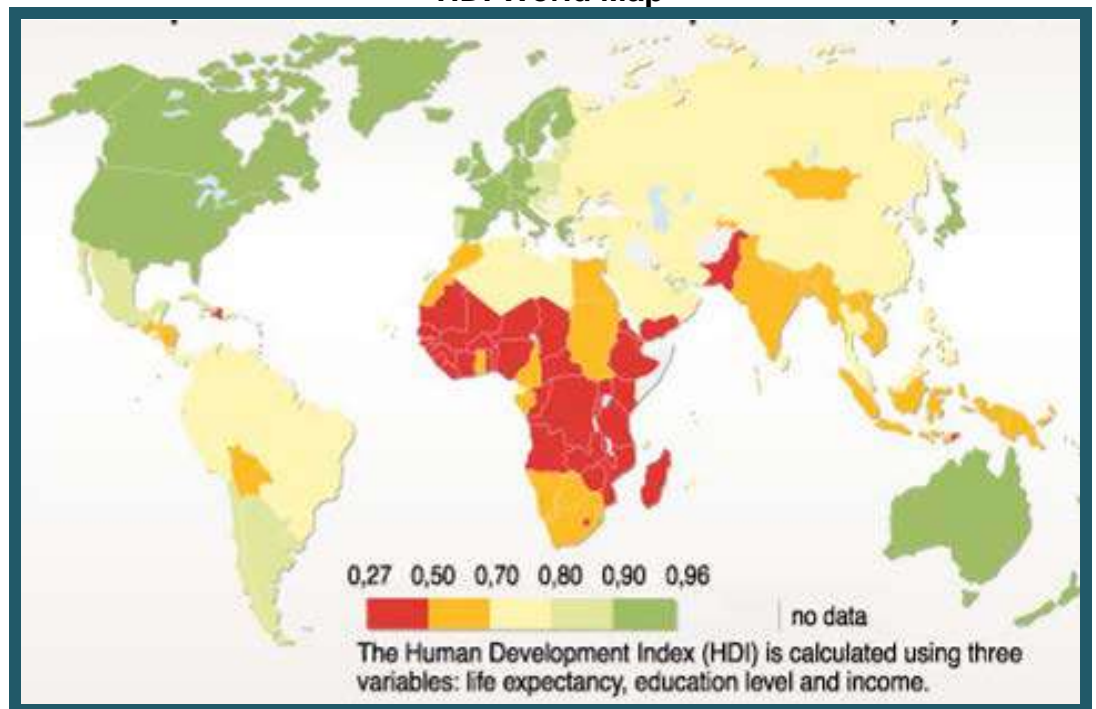
XII. Economic data and the world's countries
  A. The world's countries can be divided into three economic groups:
    a. Developed countries:
      1) countries with diversified economics which rely on technology
      2) enjoy relatively high standards of living
    b. Developing countries:

1) countries with low per capital income
2) have an underdeveloped infrastructure
3) have a low HDI
c. Least developed countries (LDCs)
1) countries with the lowest national incomes
2) have limited access to safe drinking water
3) have much shorter life expectancy
4) disease in these countries destabilizes their economy and political system

**More than 10% of the world's population
lives in 49 least developed countries (LDCs)**
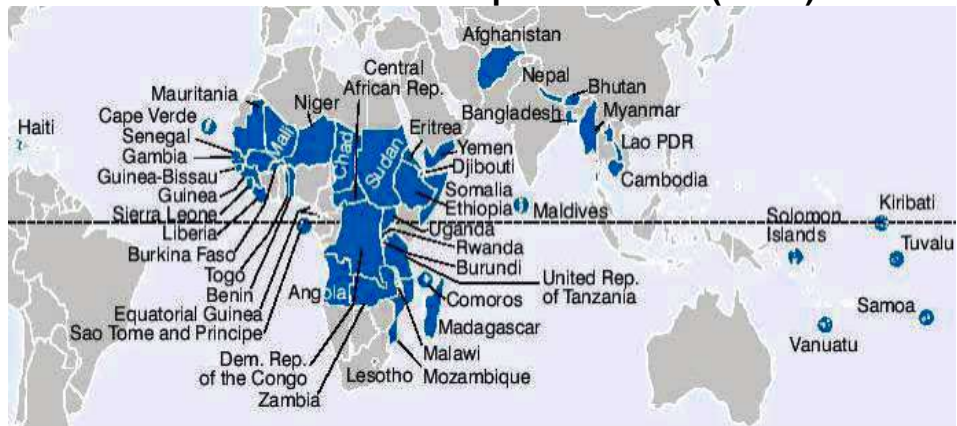
Activity 1: 20 min.

Activity 2: 30 min.

Activity

I. Complete the Incidence and Prevalence Worksheet.

II. Using a classroom world map and the online Health Map (http://healthmap.org/en/), look for and track the following outbreak diseases around the globe: malaria, H1N1, dengue fever, anthrax, West Nile virus, pertussis (whooping cough), mumps, measles, influenza, salmonella, plague, cholera, rabies, rickettsia, meningitis, polio, typhoid, Legionnaire's disease, leishmaniasis, listeriosis, tb   (*Students can make little disease tags with dates and pin them on a classroom map. They can track the same diseases every week for a semester.*)

Assessment
Successful completion of test and worksheet.

☑CheckPoint© Test – The instructional multimedia presentation includes a short quiz known as a ☑CheckPoint test. After every 5 to 8 slides, there will be several questions testing the students' knowledge over the previously viewed slides. There should be no note-taking during these presentations. This is an exercise in *active listening*. Students are expected to practice dynamic listening then write the answers to the ☑CheckPoint questions as they appear during the presentation.

<u>Incidence and Prevalence Worksheet</u>

Materials
<u>Terms</u> for Global Health and Economic Data

<u>Instructional Multimedia Presentation: Global Health and Economic Data</u>
(includes CheckPoint Test)
<u>Key for the ☑CheckPoint Test</u>

<u>Incidence & Prevalence Worksheet</u>
<u>Key for Incidence & Prevalence Worksheet</u>

Accommodations for Learning Differences
For reinforcement, the student will view CDC State of the HIV/AIDS
Epidemic, HIV Incidence in United States
http://www.cdc.gov/hiv/surveillance/incidence/sote/fullscreen.htm (need
Adobe Flash Player to view from browser)

National and State Education Standards
National Health Science Cluster Standards
HLC07.01
Health care workers will understand the roles and responsibilities of
individual members as part of the health care team, including their ability to
promote the delivery of quality health care.

TEKS
130.209. 1C contrast health problems in developing and developed
countries;
130.209. 1D describe the function of the World Health Organization;
130.209. 1E define and calculate incidence, morbidity, and mortality; and
130.209. 1F identify and describe the challenges in global health, which can
have the greatest impact on health in developing nations.

Texas College and Career Readiness Standards
English Language Arts
III. A. Understand the elements of communication both in informal group
discussions and formal presentations.
III. B. Develop effective speaking styles for both group and one-on-one
situations.
IV. A. Apply listening skills as an individual and as a member of a group in a
variety of settings.
IV. B. Listen effectively in informal and formal situations.
V. C. Produce and design a document.

Mathematics

I. B. 1. Perform computations with real and complex numbers.
IV. A. 1. Select and use the appropriate type of unit for the attribute being measured.
IV. B. 1. Convert from 1 measuring system to another

Science
II. A. 1. Understand the real number system and its properties.
II. A. 7. Use calculators, spreadsheets, computers, etc., in data analysis.

Social Studies
I. C. Change and continuity of political ideologies, constitutions, and political behavior.
I. D. Change and continuity of economic systems and processes.

Cross-Disciplinary
II. E. 1. Use technology to gather information.
II. E. 3. Use technology to communicate and display findings in a clear and coherent manner.
II. E. 4. Use technology appropriately.

Terms
Global Health Economic Data

Have students read and familiarize the following terms before presentation.

AIDS – Acquired immune deficiency syndrome; disease that attacks and destroys the body's immune system, leaving the patient abnormally vulnerable to infections and many other diseases caused by the human immunodeficiency virus (HIV)

Burden of Disease – a measure that combines effects of both morbidity and mortality rates thus providing a health and economic overview of diseases and injuries to individuals and populations

CDC – Center for Disease Control & Prevention; the U.S. government agency at the forefront of public health; mission is to prevent and control infectious and chronic diseases, injuries, workplace hazards, disabilities, and environmental health threats

Cholera – a bacterial infection of the small intestine that causes severe watery diarrhea, dehydration, and possibly death

Disability Adjusted Life Years (DALYs) – a composite measure of the years of life lost because of premature death & the equivalent years lost because of serious injury/disability

Developed countries – highly industrialized nations with high incomes and human capital; also known as "First World Countries"

Developing countries – countries with low standards of living and a low industrial capacity; used to known as "Third World Countries"

Disability – a physical or mental incapacity, either congenital or resulting from an injury or illness, etc.

Epidemic – a disease occurring suddenly in a community, region or country in numbers clearly in excess of normal

Epidemiologist – a medical scientist who traces the spread of health, disease, and health-related conditions through a population

Epidemiology – the study of factors affecting the health and illness of populations; serves as the foundation and logic of interventions made in the interest of public health and preventive medicine

Germ theory – The theory that microscopic organisms (germs) cause disease (often by infection through the air)

GRID – gay-related immune deficiency (sometimes informally called the gay plague) was an alternative name for AIDS in the early 1980s

HDI – human development index; measures the average achievements in a country of the following three markers: health, education, & income; this is a composite statistic used to rank countries by level of "human development" and separate developed (high development), developing (middle development), and underdeveloped (low development) countries.

Health Data – a collection of organized information that will give a "picture" of the overall health of a population

Health Statistics – the application of statistics to the health sciences that help reveal which diseases are most prevalent, which diseases are of greatest concern, and where outbreaks are occurring

HIV – human immunodeficiency virus; the retrovirus that causes AIDS

Incidence – the number of deaths or new cases of a condition, symptom, or injury that arises during a specific period of time, such as a year

Kaposi's sarcoma – a disease in which cancer or malignant cells are found in the tissues under the skin or mucous membranes that line the mouth, nose and anus; most common AIDS-related cancer. It causes reddish purple lesions that usually appear on the skin.

LDCs – least developed countries; the lowest national incomes of all countries

Morbidity rate – incidence of disease; rate of sickness, as in a specified community or group

Miasma theory – belief that diseases such as cholera & Black Death were caused by noxious clouds of "bad air"

Mortality rate – death rate; the ratio of the total number of deaths to the total population

Pandemic – worldwide outbreak of a disease in numbers clearly in excess of normal; i.e. AIDS

Pneumocystis carinni pneumonia – a form of pneumonia caused by the yeast-like fungus; relatively rare in people with normal immune systems but common among people with weakened immune systems, such as premature or severely malnourished children, the elderly, and especially AIDS patients

Opportunistic infections – infections caused by organisms that typically don't produce disease in healthy people but affect people with damaged immune systems. These organisms attack when there's an "opportunity" to infect

Outbreak – sudden appearance of a disease in a specific geographic area

Pertussis – a reportable bacterial infection of the respiratory tract characterized by short, convulsive coughs that end in a whoop sound when breath is inhaled (commonly called whooping cough); mainly affects children

Prevalence – a measure of the proportion of persons in the population with a certain disease at a given time

Reportable diseases (called Notifiable diseases in the U.S.) - diseases considered to be of great public health importance (AIDS, anthrax, pertussis, West Nile virus, etc.); such diseases need to be reported when they are diagnosed by doctors or laboratories. Reporting allows for the collection of statistics that show how often the disease occurs, which in turn helps researchers identify disease trends and track disease outbreaks.

Thalidomide – was introduced in the late 1950s as an anti-nausea drug to help alleviate morning sickness in early pregnancy; realized that many of the babies whose mothers had taken this drug developed severe birth defects. There is now an interest in using it in clinical trials for the treatment of a number of conditions and diseases, including lupus and cancer.

✓CheckPoint
Global Health & Economic Data

1. Name two types of information that are usually included in health data.
   Population, ages, sex ethnicity, urbanization, vital statistics: number of live births, number deaths

2. Briefly define the "germ theory"?
   The theory that germs cause disease, often by infection through the air.

3. Where is World Health Organization (WHO) headquarters located?
   a. Washington D.C.
   b. London, England
   c. Geneva, Switzerland
   d. Paris, France

4. Name one important function of WHO.
   Provides important health information: [1]disease outbreaks, [2]standardization of vaccines, steps to improve health

5. What is the "miasma theory"?
   Belief that diseases such as cholera & Black Death were caused by noxious form of "bad air"

6. How did Snow track cholera in Soho, England?
   carefully plotted cases of cholera on area map where he identified a water pump as source of the disease; removed pump handle

7. What made epidemiologists suspect that a new drug might be the cause of rare, severe birth defects?
   a. it had caused birth defects in mice
   b. there was a sudden spike in birth defects
   c. the drug hadn't been clinically tested

8. Name 3 reportable diseases.
   Anthrax, HIV/AIDS, Mumps, Pertussis, Plague, Rubella, Smallpox, TB, Typhoid fever

9. Why are health statistics rarely "real time" data?
   Because it is difficult to collect data in a timely fashion especially from developing countries due to their lack of resources, infrastructure, etc.

10. A quantitative measure that indicates the number of existing cases of a disease in given population at specific time describes:
    a. incidence
    b. prevalence

11. What does morbidity mean?
    The degree of severity of a disease in a given population

12. What is the age cut-off used when calculating infant mortality rates?
    a. 3 months
    b. 6 months
    c. 12 months
    d. 18 months

13. The *burden of disease* is a measure of what two things? (select two answers, please)
    a. incidence
    b. point of prevalence
    c. mortality
    d. DALYs
    e. morbidity

14. DALYs measure:
    a. sum of years of life lost due to disability or premature death
    b. morbidity of cross-cultural cohort groups
    c. value of life after recovering from a disease

15. What international organization collects annual health statistics?
    a. CDC
    b. WHO
    c. NHI
    d. UN

16. Name two of the basic areas that the Human Development Index uses as a measure?
    health, education, income

Incidence and Prevalence Worksheet

1. Ms. Cody is a teacher at Collin's High School where she teaches five different sections of biology to a total of 151 students. During the 2009 school year, H1N1 virus began affecting students and faculty. Although Ms. Cody didn't get ill, she had 33 students absent from the flu over the course of the school year. What was the incidence rate of the H1N1 flu for Ms. Collin's population of biology students?

There was a head lice outbreak at Miss Eleanor's preschool during the month of November, which took several weeks to eradicate. Below is information regarding the number of school attendees and lice cases:

Miss Eleanor's Preschool NUMBER OF STUDENTS	
18 mo - 2 year-olds	10
3 year-olds	12
4 year-olds	18

Miss Eleanor's Preschool 2009 HEAD LICE OUTBREAK (new cases each week)				
	1st Wk Nov.	2nd Wk Nov.	3rd Wk Nov.	4th Wk Nov.
2 year-olds	0	2	0	0
3 year-olds	3	8	1	0
4 year-olds	1	12	2	1

2. What was the incidence of head lice in during the 2009 school year?

3. What was the incidence of head lice among 4 year-olds during the 2009 school year?

4. What was the prevalence of head lice in 3 year-olds during the 1st week of November?

5. What was the prevalence of head lice in 4 year-olds during the 2nd week of November?

During March of 2010, Mr. Tillman began to notice that his several of high school physics students were becoming increasingly inattentive and lethargic. He feared that they had the dreaded and highly contagious spring fever and began keeping count of affected students through the remainder of the school year:

Mr. Tillman's 2010 Physics Classes NUMBER OF STUDENTS PER PERIOD	
Periods	**# Students/Class**
1st Period (Juniors)	22
2nd Period (Juniors)	23
3rd Period (Seniors)	20
4th Period (Seniors)	25
6th Period (Seniors)	27
7th Period (Seniors)	21

Mr. Tillman's 2010 Physics Classes NUMBER OF NEWLY AFFECTED STUDENTS / PERIOD (# new cases each month)			
	March	**April**	**May**
1st Period (Juniors)	2	4	9
2nd Period (Juniors)	0	3	7
3rd Period (Seniors)	3	6	11
4th Period (Seniors)	3	7	11
6th Period (Seniors)	2	6	8
7th Period (Seniors)	4	9	14

6. What is the incidence rate of Mr. Tillman's physics students who suffered from spring fever during the 2009-2010 school year?

7. What is the incidence rate of Mr. Tillman's senior physics students suffering from spring fever during the 2009-2010 school year?

8. What is the prevalence of the junior physics students during the month of April?

9. What is the prevalence of the senior physics students suffering from spring fever during the month of April?

10. What is the prevalence of the senior physics students suffering from spring fever during the month of May?

KEY: Incidence and Prevalence Worksheet

Incidence rate = <u># new cases of defined condition in a defined population in a year</u>
#of that population in that population at mid-year of same year

Prevalence rate = <u># cases of defined condition in a defined population in a point in time</u>
in that population at same point in time

a. Ms. Cody is a teacher at Collin's High School where she teaches five different sections of biology to a total of 151 students. During the 2009 school year, H1N1 virus began affecting students and faculty. Although Ms. Cody didn't get ill, she had 33 students absent from the flu over the course of the school year. What was the **incidence rate** of the H1N1 flu for Ms. Collin's population of biology students?

<p style="text-align:center;color:red;font-weight:bold">33/151 = .218
22% H1N1 incidence rate</p>

There was a head lice outbreak at Miss Eleanor's preschool during the month of November, which took several weeks to eradicate. Below is information regarding the number of school attendees and lice cases:

Miss Eleanor's Preschool NUMBER OF STUDENTS	
18 mo - 2 year-olds	10
3 year-olds	12
4 year-olds	18
Total # students	**40**

Miss Eleanor's Preschool 2009 HEAD LICE OUTBREAK (new cases each week)				
	1st Wk Nov.	2nd Wk Nov.	3rd Wk Nov.	4th Wk Nov.
2 year-olds	0	2	0	0
3 year-olds	3	8	1	0
4 year-olds	1	12	2	1

11. What was the **incidence** of head lice in during the 2009 school year?

<p style="text-align:center; color:red">30/40 = .75
75% incidence rate</p>

12. What was the **incidence** of head lice among 4 year-olds during the 2009 school year?

<p style="text-align:center; color:red">16/18 = .88
89% incidence rate</p>

13. What was the **prevalence** of head lice in 3 year-olds during the 1st week of November?

<p style="text-align:center; color:red">3/12 = .25
25% prevalence</p>

14. What was the **prevalence** of head lice in 4 year-olds during the 2nd week of November?

<p style="text-align:center; color:red">12/18 = .66
67% prevalence</p>

During March of 2010, Mr. Tillman began to notice that his several of high school physics students were becoming increasingly inattentive and lethargic. He feared that they had the dreaded and highly contagious spring fever and began keeping count of affected students through the remainder of the school year:

Mr. Tillman's 2010 Physics Classes NUMBER OF STUDENTS PER PERIOD	
Periods	**# Students/Class**
1st Period (Juniors)	22
2nd Period (Juniors)	23
3rd Period (Seniors)	20
4th Period (Seniors)	25
6th Period (Seniors)	27
7th Period (Seniors)	24
Total # physics students	**141**

Mr. Tillman's 2010 Physics Classes NUMBER OF NEWLY AFFECTED STUDENTS / PERIOD (# new cases each month)					
		March	**April**	**May**	**Total/period**
1st Period (Juniors)		2	4	9	15
2nd Period (Juniors)		0	3	7	10

3rd Period (Seniors)		3	6	11	20
4th Period (Seniors)		3	7	11	21
6th Period (Seniors)		2	6	8	16
7th Period (Seniors)		4	8	10	22
Total Cases					**104**

15. What is the **incidence rate** of Mr. Tillman's physics students who suffered from spring fever during the 2009-2010 school year?

<div style="text-align:center; color:red;">

104/141 = .74
74% incidence rate

</div>

16. What is the **incidence rate** of Mr. Tillman's senior physics students suffering from spring fever during the 2009-2010 school year?

<div style="text-align:center; color:red;">

79/96 = .82
82% incidence

</div>

17. What is the **prevalence** of the junior physics students during the month of April?

<div style="text-align:center; color:red;">

7/45 = .155
16% prevalence

</div>

18. What is the **prevalence** of the senior physics students suffering from spring fever during the month of April?

<div style="text-align:center; color:red;">

27/96 = .28
28% prevalence

</div>

19. What is the **prevalence** of the senior physics students suffering from spring fever during the month of May?

<div style="text-align:center; color:red;">

40/96 =.416
42% prevalence

</div>