PAN AFRICAN GLOBAL ACADEMY

WEEKLY LESSON PLAN

UNIT 2

INSTRUCTOR: David Lamptey	WEEK: 7th Ending: XX – XX – XX

SUBJECT: Public Health

SPECIFIC TOPIC: *Our Physical Environment and Environmental Challenges*

INSTRUCTIONAL GOAL:

Students will be able to:

- Understand the concept of 'physical environment' and how it influences our lives
- Understand and distinguish between the different types of resources in Ghana as well as how these resources can be used
- Explain the concept of environmental challenge
- Understand environmental degradation, as well as its forms and causes in Ghana
- Describe the activities of humans that upset the environment in Ghana
- Examine the effects of environmental degradation on the lives of humans
- Understand the causes, effects and importance of bush fires and mining on the environment
- Identify problems arising out of inventions that affect humans
- Understand conservation and its importance
- Explain possible steps to be taken at the local and national levels to conserve the physical environment for future generations

LESSON CONTENT

PHYSICAL ENVIRONMENT

Class Actvity: Ask students what they think that 'physical environment' means. After asking them this, inform them that **physical environment** is defined as the surroundings within which humans, animals and plants live.

Ask the students which of the following is NOT a part of our physical environment:

a. Rocks
b. Mountains
c. Soil
d. Buildings
e. Roads
f. Dogs

Dogs are NOT a part of our physical environment, although they live in it.

There are many types of resources within our physical environment:

1. Natural Resources – materials provided by nature which are used to produce goods and services to satisfy human wants
    a. Renewable natural resource – those that can be regenerated after they have been used (fruits, trees, etc)

b. Non-renewable natural resource – resources that cannot be regenerated after being used (gold, diamonds, etc)

2. Human-made Resources – resources made or produced by humans

How Physical Resources are Utilized in Ghana:

1. Human settlement – settlements generally arose around bodies of water
2. Food items – humans eat foods from our environment, such as fruit and maize
3. Herbal Medicine – humans have learned to use leaves, roots and bark of trees for medicinal purposes
4. Wood products – this can be used to build houses as well as for trade
5. Minerals, Rock and Sand – minerals are mined from the earth

How Ghanaians are Controlled by the Environment:

1. Floods – floods can displace people and destroy buildings
2. Erosion – the sea is eroding the land in many places in Ghana (especially Keta)
3. Rain-Fed Agriculture – many farming activities are only carried out during the rainy season
4. Attitude toward Work – many Ghanaians do not go to work when it rains, unlike people in other countries
5. Foodstuffs – the environment provides humans with food

ENVIRONMENTAL CHALLENGE

Class Activity: Begin by discussing how humans use the environment around them to survive. Emphasize that humans use tools to improve the quality of their lives. Then ask students what they think of when you say, "environmental challenge." Possible student answers include forest fires, floods and burning of trash. Then write on the board so that the students can copy it, "**Environmental Challenge** refers to any condition that hinders or threatens the use of environmental resources for human survival." Discuss with the class how environmental challenges are surmounted by humans in everyday life. Teacher can mention that some of the activities that humans engage in to overcome environmental challenges can be harmful to the environment.

ENVIRONMENTAL DEGRADATION

Class Activity: After discussing the concept of environmental challenge, ask the students what they think of when you say, "environmental degradation." Make sure that the students are familiar with the definition of "degradation." Possible student answers include deforestation (the destruction of forests), hunting of animals and soil exhaustion due to over-farming. Then write on the board so that the students can copy it, "**Environmental Degradation or Pollution** is the gradual process by which the natural state and quality of the environment deteriorates, through the activities of humans and animals, as well as natural means, to the extent that natural environmental resources are inadequate to support living organisms."

After asking the class to come up with examples of environmental degradation that upset the environment, present the students with the following list of human activities that upset the environment in Ghana:

1. Land/Soil degradation (land pollution)
    - **Land or soil degradation** is the gradual process by which the natural state and quality of the land or soil is destroyed or contaminated resulting in a decline of its capabilities to support living organisms.
    - Land or soil degradation is caused by:
        - ❖ Indiscriminate disposal of solid waste (discuss dumping grounds and littering)
        - ❖ Mining activities (discuss how mining rids the land of its vegetation and

promotes soil erosion)
        - ❖ Sand winning activities (discuss how this renders the land susceptible to earthquakes)
        - ❖ Excessive use of chemicals and fertilizers (discuss how this destroys the soil and makes it more acidic)
        - ❖ Overgrazing (discuss how cattle and sheep rid the land of its vegetation and make the soil too compact for agricultural activity)
        - ❖ Over-cultivation/over-cropping (discuss how continuous use of land rids it of its nutrients)
        - ❖ Indiscriminate bush burning (discuss how this deprives the land of its vegetation and renders it unfit for agricultural activity)
        - ❖ Acid rain (discuss how gases emitted into the atmosphere can form acid rain)
    - The effects of land and soil degradation involve: destruction of vegetation, soil erosion, loss of soil fertility, desertification (process by which the biological potential of the land is reduced or destroyed to such an extent that the land cannot be used for any meaningful agricultural activity) and extinction of rare animals
    - **Deforestation** – the process by which the vegetative cover of the land including trees and plants is removed, making the land bare
    - Soil Erosion (process by which the top soil is washed or carried away by water or wind) results in:
        - ❖ Loss of soil fertility
        - ❖ Destruction of crops and plants
        - ❖ Pollution of water bodies
        - ❖ Reduction of cultivatable lands
2. Water degradation (water pollution) is caused by:
    - Disposal of solid waste
    - Disposal of liquid waste
    - Excessive application of agro-chemicals
    - Oil spills
    - Acid rains
    - Unorthodox fishing methods (use of chemicals and dynamite)
    - The effects of water degradation include:
        - ❖ Scarcity of water
        - ❖ Expensive treatment of water
        - ❖ Health hazards
        - ❖ Destruction of organisms in the water
        - ❖ Climatic changes
    - Measures to control water degradation include:
        - ❖ Proper disposal of waste
        - ❖ Appropriate methods of fishing
        - ❖ Proper application of chemicals on farms
        - ❖ Banning of farming along the banks of water bodies
3. **Atmospheric/Air degradation (air pollution)** is defined as the gradual process by which the natural state and quality of the atmosphere or air is destroyed or contaminated through human activities resulting in a decline of its capabilities to support living organisms
    - Causes of atmospheric/air degradation include:
        - ❖ Emission of smoke from automobiles
        - ❖ Emission of smoke from burning
        - ❖ Bush fires

- ❖ Emission of gases and dust from industries
- ❖ Destruction of vegetation

- Effects of atmospheric degradation include:
  - ❖ Health hazards (respiratory diseases including asthma, lung cancer, bronchitis, pneumonia and others)
  - ❖ Poor visibility
  - ❖ Acid rain
  - ❖ Destruction of vegetation
  - ❖ Global warming
  - ❖ Depletion of ozone layer

4. **Human Invention** refers to the devices or systems that have been made by humans to satisfy our needs (examples include airplanes, trains, thermal plants, ploughs and tractors)
   - Human inventions are used to increase agricultural and industrial production; facilitate trade; facilitate the movement of people; facilitate communication; reduce disease; enhance quality of life; and reduce work.
   - Problems of inventions include: domestic accidents (such as electrocution); occupational hazards (accidents that occur in the workplace); automotive accidents (accidents that occur in transit)
   - We can reduce accidents by educating people, taking precautionary measures and obeying traffic regulations

Class Activity: After discussing the problems associated with environmental degradation, introduce students to the concept of environmental conservation and write on the board so that the students can copy it, "**Environmental Conservation** is the process of preserving and protecting the quantity and quality of natural environmental resources so that they may provide the greatest sustainable benefit to the present generation as well as maintaining their potential for future use."

MATERIALS AND AIDS:

- Lecture Notes

TEACHING AND LEARNING ACTIVITIES:

Teacher will explain:

- The concept of 'physical environment' and how it influences our lives
- The differences between the types of resources in Ghana as well as how these resources can be used
- The concept of environmental challenge
- The concept of environmental degradation, as well as its forms and causes in Ghana
- The activities of humans that upset the environment in Ghana
- The effects of environmental degradation on the lives of humans
- The causes, effects and importance of bush fires and mining on the environment
- The problems arising out of inventions that affect humans
- Environmental conservation and its importance
- Possible steps to be taken at the local and national levels to conserve the physical environment for future generations

EVALUATION

Sample Homework

1.
    a. Define the term physical environment.
    b. Explain five human activities that destroy the physical environment.
2. What are the causes of deforestation? Suggest measures to control deforestation.
3. Discuss four human activities that improve the environment.
4. What are the effects of desertification?
5. Explain how human activities are controlled by the environment.
6. Describe the effects of mining on the environment.
7. What are the effects of bushfire on the environment?
8. Why is it necessary to promote awareness on environmental degradation?
9. Explain five aspects of environmental degradation associated with the mining industry in your country.
10. Explain five measures that the government can adopt to improve the environment.

RESOURCES / REFERENCES:

Mastering Social Studies for Senior High Schools by Isaac Ayertey

Social Studies for Senior High Schools by Joseph Kojo Boahene

Aki-Ola Series Social Studies for Senior High Schools Past Questions with Answers by Kwesi H. Klutsey

PAN AFRICAN GLOBAL ACADEMY

WEEKLY LESSON PLAN

UNIT 2

INSTRUCTOR: David Lamptey	WEEK: 8th Ending: XX – XX – XX

SUBJECT: Public Health

SPECIFIC TOPIC: *Climate Change and Waste Management*

INSTRUCTIONAL GOAL:

Students will be able to;

- Understand the concept of 'climate change' and why it is a danger to humans
- Understand the damaging effects of climate change
- Review what the ozone layer is and what it does for the Earth
- Understand why depleting the ozone layer can be dangerous to humans on Earth
- Understand the definition of waste and ways to prevent the amount of waste produced by a community
- Review the benefits and techniques of composting
- Understand why burning trash at home can be dangerous
- Understand the different types of toxins and carcinogens that are produced by burning trash
- Understand the disease that can result from burning trash

LESSON CONTENT

CLIMATE CHANGE AND GLOBAL WARMING

Also called the 'Greenhouse Effect,' global warming is caused by a rising temperature of the earth's atmosphere. As humans release gases such as carbon dioxide and methane into the atmosphere, these gases trap heat radiation from the earth's surface and cause the earth's temperature to slowly increase.

The destruction of earth's vegetative cover, which absorbs carbon dioxide from the air, can also cause climate change.

Effects of Global Warming:

1. Rising sea level – ice sheets melt and increase the volume of the water in oceans
2. Reduces humidity – creates unfavorable conditions for farming
3. Health problems – increasing temperature can allow conditions for the spread of malaria and other illnesses
4. Animal lives – if the temperature of the environment increases and plants die as a result, then many animals will no longer be able to eat the plants that they need to survive
5. Desertification – the top layer of soil is blown off or removed from a piece of land, resulting in a desert

OZONE LAYER

The ozone layer is a layer of a type of oxygen present in the atmosphere. The ozone acts as a

shield that absorbs most harmful parts of the sun's radiation called ultraviolet radiation. The ozone filters this light, protecting us from harmful ultraviolet radiation.

Ozone depletion:

>When industries and companies emit gases into the atmosphere, this gas depletes the amount of ozone in the ozone layer. Without this shield, the harmful rays of the sun reach the earth and cause very harmful effects. Exposure to ultraviolet light has been associated with cancer and surface burns.

>When the harmful rays are not shielded by the ozone layer and reach the earth, they produce even more heat. These rays can cause skin rashes and eye problems as well. Ozone depletion also reduces agricultural production and harms marine life.

CASE STUDY

See the editorial "The Climate Change Crisis: a Focus on Ghana's Coastal Communities" by Angelina Ama Tutuah Mensah. The teacher is free to read the entire article to the class, summarize the article or read highlights from the article at his or her discretion. If the teacher finds a better or more current article about how climate change is affecting Ghana, he or she is encouraged to use the different article. Discuss with the class what climate change will mean for Ghana in the years to come. What can we do to delay the effects of climate change?

WASTE

Discussion Questions: Begin by asking the students, "what is waste?" Then discuss how waste is broken down into sub-categories:

1. Solid human waste
2. Animal or vegetable waste (from food)
3. Plastic and processed waste (such as wrappers, bottles and artificial materials)

Ask students to propose methods to reduce waste in Oshiyie. Then, write the following list on the board and discuss each method with students:

1. Source reduction – less waste is created and therefore less waste needs to be disposed
2. Reuse – reusing materials limits how much waste needs to be disposed
3. Recycling – recycling decreases the amount of material that is not reused
4. Composting – composting is defined as the controlled biological degradation of organic materials and allows certain materials to be recovered from the waste system in the form of a valuable product
5. Incineration – incineration (unlike common household burning) is the controlled high-temperature burning of combustible materials that can allow the recovery of some of the energy in solid waste. Incinerators generate power from the resulting heat and can lead to a 90% reduction in the volume of material to be landfilled.
6. Landfilling- landfilling is the practice of burying waste. Each day's waste is covered by a layer of soil.

Have the students suggest types of trash that can be reused. If possible, also arrange for a representative from Zoom Lion or other nonprofit to come and speak to the class about waste disposal and recycling.

COMPOSTING

In nature, organic matter is decomposed by bacteria and exposure to the elements. Decomposition of organic matter releases nutrients that can be used by other organisms.

Composting is a type of natural decomposition in which conditions are controlled to speed up the decomposition process. Composting results in a nutrient-rich soil additive termed compost. Compost can be used to improve soil quality (and thus plant growth) by increasing nutrient saturation and biological activity. Compost can be mixed into soil or applied on topsoil (as mulch). On the whole, only matter of biological origin can be composted, including wood, paper as well as animal and plant wastes.

Home composting can be an effective way to avoid both the expense of having waste removed as well as the expense of purchasing soil additives for farming. When a large compost pile is kept moist and turned frequently can generate enough heat to kill pathogens that can breed when food products decay.

Class Activity: If not done in Form 1, have the class design a compost plot and compost the waste from the school cafeteria.

TRASH BURNING

Class Activity: Begin by asking the students if they or their families regularly burn trash. In Oshiyie, it is expected that most if not all of the students will raise their hands.

According to the United States of America Environmental Protection Agency (EPA), burning trash in the open produces many pollutants, including:

- dioxins – backyard burning releases significant quantities of dioxins. These are highly toxic compounds. Dioxins are also produced in industrial processes. Much of the dioxins released into the air through backyard burning settle on plants. These plants are then eaten by animals that store the dioxins in their fat. When humans eat these animals (including meat, fish and dairy products) humans ingest these toxic chemicals. Dioxins remain in the environment for a long time, and can accumulate within humans. Dioxins can cause people to be sterile (unable to have children), supress the immune system, disrupt hormone systems and even cause cancer.
- particle pollution – burning trash releases tiny particles that can be absorbed into the lungs. Particles can aggravate respiratory conditions such as asthma and bronchtis, and has been associated with irregular heartbeats as well as heart attacks.
- polycyclic aromatic hydrocarbons – these compounds are commonly found in smoke and soot. Some of these compounds are cancer-causing (carcinogenic).
- volatile organic compounds – these contributed to ground-level ozone pollution (also known as smog), which can worsen respiratory, heart and other preexisting conditions. Inhaling certain volatile organic compounds can lead to eye, nose and throat irritation; headache; loss of coordination; nausea; and damage to bodily systems.
- carbon monoxide – backyard burning also releases carbon monoxide, which causes humans to experience headaches, fatigue, nausea and vomiting.
- Hexachlorobenzene – this compound is particularly dangerous because it accumulates in fish and animals that feed on fish. Low-level and low-term exposure can damage a developing fetus, cause cancer, damage your liver and kidneys, and cause fatigue and skin irritation. This is a suspected carcinogen and is toxic regardless of how it enters the body.
- Ash – backyard burning lastly leaves behind an ash residue. This ash residue can be dangerous because it can contain toxic metals such as mercury, lead, chromium and arsenic. These metals can be toxic when ingested. When a person ingests even small amounts of lead, for example, he or she may experience brain damage. Unaware of the potential danger, some people scatter the ash in their gardens or bury it in their property. Garden vegetables can absorb and accumulate these metals, which can make them dangerous for humans to eat. Children playing outside can also accidentally ingest

soil containing these compounds. Rain can also wash the ash into local water sources, contaminating drinking water as well as food.

MATERIALS AND AIDS:
>See *Global Series: Social Studies for Senior high schools*, pages 316-352
>Zoom Lion or other nonprofit visitor
>Shovel, cafeteria waste, wood for compost sign and paint for compost sign

TEACHING AND LEARNING ACTIVITIES

- Teacher will review the concept of climate change with the class
- Teacher will review the dangers posed by climate change and its effects on the environment
- Teacher will review the concept of the ozone layer
- Teacher will explain the dangers of depleting the ozone layer
- Teacher will clarify the definition of waste
- Teacher will lastly review the benefits and techniques of composting.
- Teacher will explain why burning trash at home can be dangerous
- Teacher will distinguish between the different types of toxins and carcinogens that are produced by burning trash
- Teacher will introduce and explain the diseases that can result from burning trash at home

EVALUATION

Sample homework

1. What are five effects of global warming?
2. What is the ozone layer?
3. Why is depleting the ozone layer a bad thing?
4. What are three categories of waste?
5. Which of the following is NOT a safe method of reducing waste in Oshiyie?

6. Is trash burning a safe and healthy way of disposing of trash?
7. Name three health conditions that can result from ingesting the compounds produced by trash burning.

RESOURCES / REFERENCES:

Global Series: Social Studies for Senior high schools
Mastering Social Studies for Senior High Schools by Isaac Ayertey
Social Studies for Senior High Schools by Joseph Kojo Boahene
Aki-Ola Series Social Studies for Senior High Schools Past Questions with Answers by Kwesi H. Klutsey
Understanding Garbage and Our Environment by Andrea J. Nolan
Mensah, Angelina Ama Tutuah. "The Climate Change Crisis: a Focus on Ghana's Coastal Communities." The Daily Graphic 09 June 2014. http://graphic.com.gh/features/opinion/24689-the-climate-change-crisis-a-focus-on-ghana-s-coastal-communities.html
"Human Health." *Wastes – Non-Hazardous Waste – Municipal Solid Waste*. United States Environmental Protection Agency, 25 June 2014. Web.

http://www.epa.gov/osw/nonhaz/municipal/backyard/health.htm

PAN AFRICAN GLOBAL ACADEMY

WEEKLY LESSON PLAN

UNIT 2

INSTRUCTOR: David Lamptey	WEEK: 9th Ending: XX – XX – XX

SUBJECT: Public Health

SPECIFIC TOPIC: *The Environment and Malaria*

INSTRUCTIONAL GOAL:

Students should be able to:

- Understand the life cycle of a malarial infection
- Review the life cycle of *Plasmodium*
- Recognize the signs and symptoms of malaria as well as how these signs and symptoms relate to the life cycle of *Plasmodium*
- Understand the concept of evolution
- Understand the evolution of the *Plasmodium* parasite
- Understand the concept of resistance in relation to evolution
- Understand how the evolution of the *Plasmodium* has allowed it to become resistant to treatment
- Understand why drug resistance makes some strains of malaria difficult to treat

LESSON CONTENT

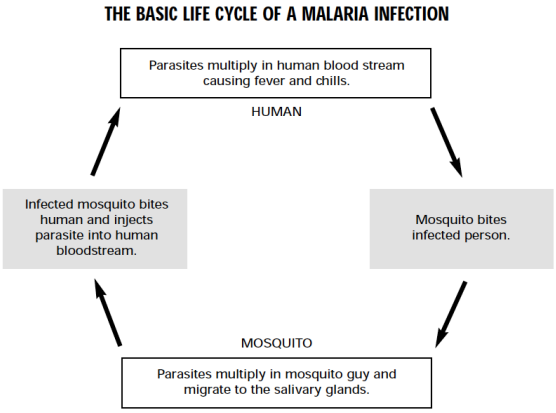
MALARIA

Malaria affects approximately 500 million and kills more than 1 million people each year. The first symptoms of malaria appear approximately 10 to 15 days after infection and include fever, headache, chills and vomiting. Fevers are often intermittent in infected humans. A typical malaria "episode" often starts with sudden, violent chills followed by an extreme fever and sweating. Repeated infection can lead to anemia (decrease in concentration of red blood cells in the body) and exhaustion. If left untreated, malaria can cause severe illness and is often fatal. Malaria contributes to 20 percent (1 in every 5) of all deaths among children under the age of five in Sub-Saharan Africa.

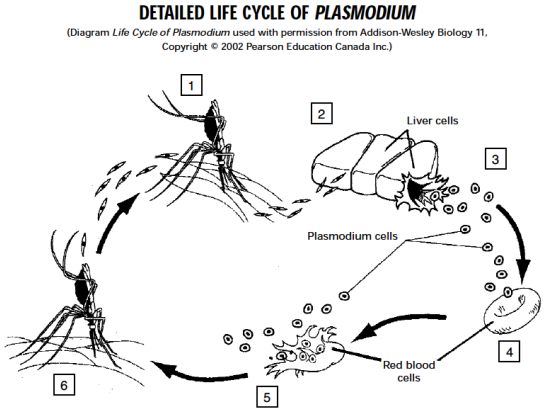
Many children can have malaria several times in a few months, and some receive treatment but still show signs of malarial infection. If a person is repeatedly exposed to malaria, he or she may develop immunity in a similar way that people develop immunity to certain cold viruses with previous exposure. Alternatively, if a person has never been exposed to the malaria parasite, then the impact of the infection is often much worse. This is one of the reasons that malaria is most prevalent in young children. Pregnant women are also at high risk of contracting malaria. Contracting malaria during pregnancy often results in a low birth weight, which is a leading risk factor for infant death as well as sub-optimal growth and development. A child dies of malaria every 30 seconds despite the fact that malaria is both preventable and treatable. Using

insecticide-treated bed nets is both an effective and affordable method of preventing the spread of malaria. It has been found that insecticide-treated bed nets reduce the spread of malaria by 50% and reduce overall mortality by 20%.

Malaria is caused by a parasite of the genus *Plasmodium*. *Plasmodium* spreads from person to person through the bite of an infected mosquito. *Plasmodium* invades the red blood cells of mosquitoes and uses the mosquitoes as a vector to spread from person to person. *Plasmodium* attacks the liver as well as a person's red blood cells, which allow it to travel to the spleen and the kidneys as well as occasionally the brain. There are four species of *Plasmodium* that result in human disease: *Plasmodium falciparum (P. falciparum)*, *P. vivax*, *P. malariae* and *P. ovale*. *P. falciparum* results in the most deadly form of malaria. Transmission differs in intensity depending on local rainfall patterns, the location of mosquito breeding sites and how many species of mosquito are present in a particular area. Some regions are malaria zones throughout the whole year, while others have malaria seasons that often coincide with the local rainy season. There is a need for new and effective drugs that are affordable to all people around the world. In many regions in Africa and Asia, *Plasmodium* has become increasingly resistant to traditional treatments.



UNICEF: *An Introduction to Malaria*



UNICEF: *An Introduction to Malaria*

<u>Detailed Life Cycle of Plasmodium Diagram:</u>

1. A mosquito infected with the *Plasmodium* parasite bites a human. Normally when a mosquito bites a human, the saliva of the mosquito makes the bite itchy and red. When an infected mosquito bites a human, it injects its saliva, which contains the *Plasmodium* parasite. The *Plasmodium* parasite is then left behind in the human after the mosquito flies away.
2. The *Plasmodium* parasite, after entering a human, then travels to the liver first. The liver is where the red blood cells of the body are produced. The parasite then multiplies in the liver cells.
3. The *Plasmodium* parasites then infect the human's red blood cells after invading the liver. Red blood cells contain iron and carry oxygen throughout the body.
4. The *Plasmodium* parasite then multiplies in the red blood cells of the body. As the body's immune system (white blood cells) recognizes the malaria infection, they begin to work hard and cause the human to have a fever.
5. After prolonged infection, the human's red blood cells burst and release the *Plasmodium* parasite into the human's blood stream.
6. Another mosquito then comes and feeds on the infected human. After sucking some of the blood of the human into its belly, the mosquito then becomes infected with malaria.

Eventually the *Plasmodium* parasites spread to the saliva of the mosquito, which allows the mosquito to transmit the disease to other humans as the cycle repeats.

EVOLUTION AND RESISTANCE

Over the last several decades, the use of malarial medicines has increased across the world as efforts to treat malaria have increased. However, this has also coincided with the rapid spread of antimalarial drug resistance. When a human uses an antimalarial medicine, the *Plasmodium* parasites that are vulnerable to the medicine are killed, allowing the person to get better. However, because there is a small amount of natural variation within the *Plasmodium* population, some of the *Plasmodium* parasites in a human may not be able to be killed by the medicine. This is called **resistance**. Those *Plasmodium* parasites can then multiply within the human and spread via mosquitoes to other humans. This process of natural selection is called **evolution**. Those *Plasmodium* parasites that are resistant to the medicine then become the most common within a population because the other *Plasmodium* parasites that can be killed by the medicine are killed off as people are treated. Drug resistance becomes a problem for treating malaria because it causes the medicines used to treat people to become ineffective. Thus there is a need for new medicines to be discovered that can treat malaria caused by the drug resistant types of *Plasmodium*.

CASE STUDY #1

Willie and Jennifer have been married for two years and live close to Cape Town in South Africa, an area not typically affected by malaria. Jennifer is pregnant with the couple's first child, and in order to spend some time together before the child is born, the couple is planning a trip to Accra in the coming month. When Jennifer is making the couple's last-minute travel plans, she reads a World Health Organization (WHO) report about Accra. The report indicates that Accra's climate favors year-round transmission of malaria. Malaria rates are very high and are the primary cause of death in the city, particularly among young children. Pregnant women are also at high risk, particularly in the rural areas surrounding the city where many people do not have convenient access to healthcare.

1. Knowing what you do about malaria infection, what makes Willie and Jennifer especially at risk for contracting malaria? What makes Jennifer particularly at risk?
2. What precautions should the couple take before the trip?

CASE STUDY #2

In Oshiyie, there is a family consisting of a father, a mother and 6 children. The family does not have a lot of money. During election season, a candidate came and gave the family as well as several other families in the village bed nets to use to prevent the spread of malaria. The father did not think that the children needed to sleep under the net because he was the one working all day for money to take care of the family so he was the one who needed to stay strong. One by one, the children of the family became sick, however, the father still did not believe that he was doing anything wrong. The mother became very worried when all of her children became sick, so she took them to a nearby health clinic and learned that the children all had malaria. However, it was too late – the youngest child died of malaria despite the clinic's efforts to treat her. She was only 7 years old. The mother and father were devastated, and cried and cried over their lost child.

1. Should the father have allowed the children to sleep under the bed nets?
2. Why is it important for all of the members of the family to sleep under the bed net at night?
3. Why is it particularly important for young children to sleep under a bed net at night?
4. How did malaria affect the life of this family?

CASE STUDY #3

There was a class of 30 students at Pan-African Global Academy. Two of the students in the class were named David and Henry. One day, Henry noticed that David did not show up for school. When David did not show up for school for three days in a row, Henry went to David's house to ask him why he was missing school. When Henry arrived at David's house, David's mother told Henry that David was sick with malaria. Henry became very worried and wondered how this could have happened to his friend. David's mother explained that the malaria started with a hot body and headaches. David's mother told Henry that David now had medicine for the malaria, but that he would not be able to go to school for many more days.

1. If you got malaria, how would that affect your education?
2. Does malaria affect us in more than just biological ways?

MATERIALS AND AIDS:

- Lecture Notes
- Pen and Paper

TEACHING AND LEARNING ACTIVITIES:

Teacher will explain:

- The life cycle of a malarial infection as well as the life cycle of *Plasmodium*
- The signs and symptoms of malaria as well as how these signs and symptoms relate to the life cycle of *Plasmodium*
- The concept of evolution in the context of malarial infection
- The concept of resistance in relation to the evolution of *Plasmodium*
- How the evolution of *Plasmodium* has allowed it to become resistant to malarial treatments
- Why drug resistance makes some strains of malaria difficult to treat

EVALUATION : one class Assignment, one homework

Sample Homework

1. Place the following events of the life cycle of *Plasmodium* after an infected mosquito bites a human in the proper order:
    1. *Plasmodium* reproduces in the human's red blood cells
    2. The human's red blood cells burst, allowing *Plasmodium* to travel through the blood stream
    3. Red blood cells in the human's liver are infected by *Plasmodium*
    4. An uninfected mosquito bites an infected human and sucks in blood, causing the mosquito to become infected
    5. The *Plasmodium* parasites travel to the human's liver
2. Name two groups that are especially vulnerable to malarial infection.
3. Which of the following is not a typical sign or symptom of malaria?
    A. fever
    B. chills
    C. diarrhea
    D. vomiting
4. How does drug resistance make treatment of malaria more difficult?

RESOURCES / REFERENCES:

Pitt, Claire and Erin Sperling. *An Introduction to Malaria: A Curriculum Resource for Secondary Teachers.* The United Nations Children's Fund (UNICEF) Canada, 2007. http://www.acgc.ca/09/images/file/*developmentinabox/P5- UNICEFmalaria.pdf*

PAN AFRICAN GLOBAL ACADEMY

WEEKLY LESSON PLAN

UNIT 2

INSTRUCTOR: David Lamptey	WEEK: 10th Ending: XX – XX – XX

SUBJECT: Public Health

SPECIFIC TOPIC: *Malaria (continued), Diarrheal Illnesses, Tuberculosis and Trash Burning*

INSTRUCTIONAL GOAL:

Students will:

- Understand and explain how evolution contributes to the emergence of drug resistant strains of *Plasmodium*
- Understand the definition of diarrheal illness
- Understand how diarrheal illnesses are spread as well as how they can be prevented and treated
- Understand what causes tuberculosis (TB) and how it is spread
- Be able to recognize the signs of TB infection and why it is important to seek medical care if you are infected

LESSON CONTENT

MALARIA: EVOLUTION AND RESISTANCE (CONTINUED)

Class Activity

Draw the following diagrams on the blackboard, or make the pictures into posters to display to the class:

x = nonresistant *Plasmodium*

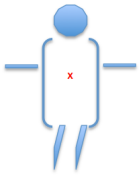
x = resistant *Plasmodium*

A person who is not infected by *Plasmodium*

A person who is infected with nonresistant *Plasmodium*

A person who is infected with *Plasmodium* where one parasite evolves to be drug resistant

This person then takes antimalarial drugs, which kill all of the nonresistant *Plasmodium*



The resistent Plasmodium then multiply within the person, causing him or her to be sick with malaria again

The resistant strain of *Plasmodium* can then spread from person to person. Reinforce the concepts of evolution and resistance within the context of malaria infection.

DIARRHEAL ILLNESSES
Definition:
Discussion Question: Begin by asking the students if they know why diarrhea is dangerous. Then inform them that according to the WHO, diarrheal illness is the second leading cause of death in children less than 5 years of age. However, diarrheal illnesses are both preventable and treatable. Drinking clean water and practicing adequate personal sanitation and hygiene can prevent diarrheal illnesses.

Details of Diarrhea:
Diarrhea is defined as the passage of three or more loose or liquid stools per day (or more frequent passage than what is normal for that individual). Diarrhea is usually a symptom of an infection of the intestinal tract, which can be caused by any number of bacteria, viruses and parasites. *Rotavirus* and *E. Coli* are the two very common agents of infection. Infection is spread through contaminated food or drinking water, as well as from person-to-person as a result of poor hygiene. Diarrhea can last for several days, and can leave the body without the water and the salts that it needs to be healthy. Most people who die from diarrhea actually die from severe dehydration and loss of fluids. During a diarrheal episode, water and electrolytes (sodium, chloride, potassium and bicarbonate) are lost through liquid stools, vomit, sweat, urine and breathing. Dehydration occurs when these are not replaced. Death can follow severe dehydration if body fluids and electrolytes are not replenished.

Prevention and Treatment:
One can prevent diarrhea by:

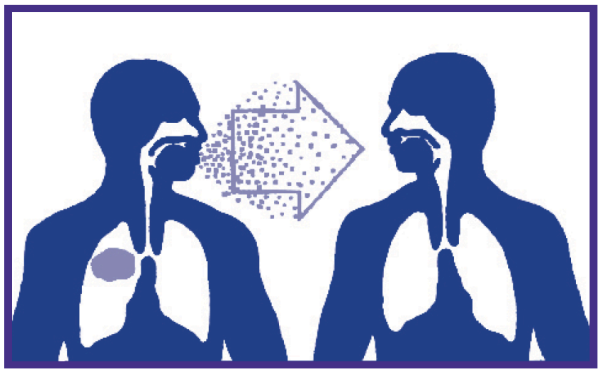
- drinking clean water
- using sanitary practice to keep clean (washing, etc)
- washing your hands with soap and water
- not feeding infants anything except for breastmilk for the first 6 months of life
- *rotavirus vaccination*

Diarrhea can be treated with a solution of clean water, sugar and salt and zinc tablets. Diarrhea can also be treated with oral rehydration salts (ORS), which include clean water, salt and sugar. ORS is absorbed in your small intestine and replaces the lost water and electrolytes. Zinc tablets reduce the duration of a diarrheal episode as well as the volume lost in each episode.

TUBERCULOSIS

Discussion Question: Begin by asking the students if they know what tuberculosis is. Ask if they know anyone who has had tuberculosis (or TB). TB is a serious disease that can cause a person to become very sick if not treated with medicine.

According to the Center for Disease Control (CDC), tuberculosis is a disease caused by germs that are spread from person to person through the air. TB ususally affects the lungs, but can also affect other parts of the body. If you breath air that has TB germs, you may get TB infection. Fresh air and sunlight make it harder for TB germs to stay alive in the air. The fresh air scatters the germs, and the sunlight kills them. Making sure that breezes can enter your house and other living spaces can reduce the chances of you and your family getting TB.



CDC: Image of how TB is transmitted from one person to another person

You have a higher chance of getting TB disease if you:

- have HIV infection
- have other health problems, like diabetes, that make it hard for your body to fight germs

Signs of TB disease include:

- a bad cough lasting three weeks or longer
- pain in the chest
- coughing up blood or phlegm from deep inside the lungs
- weakness or feeling very tired
- losing weight
- having no appetite
- chills and fever
- sweating at night and soaking the sheets or when you are sleeping

If you or someone you know might have TB, encourage them to seek medical care immediately! There is a very simple test that can be used to detect TB infection, including a skin test and a blood test. *TB can lead to death if left untreated by medicines, and you can infect your family and loved ones if you do not seek help.* Treatment for TB includes taking medicines that typically last for 6 months.

MATERIALS AND AIDS:

- Lecture Notes
- Posters
- Pen and Paper

TEACHING AND LEARNING ACTIVITIES

Teacher will:

- Explain how evolution contributes to the emergence of drug resistant strains of *Plasmodium*
- Discuss the definition of diarrheal illness
- Explain how diarrheal illnesses are spread as well as how they can be prevented and treated
- Explain what causes tuberculosis (TB) and how it is spread
- List the signs of TB infection and why it is important to seek medical care if you are infected

Class Activity: Draw or have the students draw the four images associated with the emergence of drug resistant strains of Plasmodium. Discuss each picture with the students and ensure that they understand how evolution contributes to the emergence of drug resistant strains of *Plasmodium*.

EVALUATION

Class assignment and a homework

Sample quiz

1. How do antimalarial drugs contribute to the emergence of drug resistant strains of malaria?
2. Why can diarrhea be dangerous?
3. Name two ways to prevent diarrheal illness.
4. Most people who die from diarrheal illness die from:
    A. Infection
    B. Starvation
    C. Dehydration
    D. Exhaustion
5. Can getting the Rotavirus vaccination help prevent diarrheal illness?
6. How can a person spread TB to another person?
7. Name five signs of TB disease.
8. Why is it important to seek medical care if you think that you have TB?

RESOURCES / REFERENCES:

Pitt, Claire and Erin Sperling. *An Introduction to Malaria: A Curriculum Resource for Secondary Teachers.* The United Nations Children's Fund (UNICEF) Canada, 2007. http://www.acgc.ca/09/images/file/*developmentinabox/P5- UNICEFmalaria.pdf*

"Diarrhoeal Disease." *Media Center Fact Sheets*. World Health Organization, 2014. http://www.who.int/mediacentre/factsheets/fs330/en/

"TB Elimination, Tuberculosis: General Information." Centers for Disease Prevention and Control National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, October 2011. http://www.cdc.gov/tb/publications/factsheets/general/tb.pdf

"Protect Your Family and Friends from Tuberculosis: The TB Contact Investigation." Centers for Disease Control and Prevention National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, 2005. http://www.cdc.gov/tb/publications/pamphlets/TB_contact_investigation.pdf

PAN AFRICAN GLOBAL ACADEMY

WEEKLY LESSON PLAN

UNIT 2

INSTRUCTOR: David Lamptey	WEEK: 11th Ending: XX – XX – XX

SUBJECT: Public Health

SPECIFIC TOPIC: *Project: Glo Germ Activity and Propose a New Waste Management System for Oshiyie*

INSTRUCTIONAL GOAL:

Students will be able to;

- Understand why hand washing prevents the spread of disease
- Analyze how waste is currently dealt with in Oshiyie
- Discuss the problems of how waste is currently managed in Oshiyie
- Propose a new waste management system for Oshiyie
- Understand why the new waste management system will be an improvement over the current system

LESSON CONTENT

GLO GERM ACTIVITY

Class Activity: See the Glo germ instructions contained within the package. Have a student come up to the front of the classroom and apply a small amount of the Glo germ hand lotion to his or her hands. Then use a UV light to show the students the bacteria on the student's hands. Then have the student wash his or her hands. After washing, use the UV light to see if there are any bacteria remaining on the student's hands.

NEW WASTE MANAGEMENT SYSTEM FOR OSHIYIE

Class Activity: Take a field trip with the students around Oshiyie where students take note of and discuss the waste management system in Oshiyie. Have the students write down a list of observations that they make about waste in their community. Possible student observations include litter along the road, piles of burned trash and human/animal waste left in inappropriate areas.

Have the students then analyze the negative aspects of this current waste management system. Possible student analyses include piles of burned trash cause serious health conditions such as cancer and infertility. The trash may also attract flies and other animals that can act as vectors to spread disease. Human and animal waste can contaminate water sources and make people sick. Waste that is inappropriately disposed of can also decrease the overall level of hygiene of the villagers and make diarrheal illnesses more likely to spread.

Then have the students suggest a new waste management system (assuming that they had access to any resources they want) for Oshiyie. Provide the students with articles describing waste management systems in other areas of the world. (See "Non-Hazardous Waste Management Hierarchy" by the United States EPA; "Sweden is a Model of Sustainable Waste Management" by

GreenConduct; “WTE in China” by Nickolas Themelis and Zhixiao Zhang; “Trash Planet: India” by Earth Watch; and “Ghana Adopts Chinese Technology for Waste Mangement” by GhanaWeb). Have them debate the pros and cons of instituting different waste management systems, and have them divide into groups and write up a description of a new waste management system for Oshiyie.

MATERIALS AND AIDS:

- Glo germ lotion
- Handheld UV light
- Soap and water
- Field trip around Oshiyie
- Articles describing waste management systems

TEACHING AND LEARNING ACTIVITIES:

Teacher will:

- Explain why hand washing prevents the spread of disease
- Guide the students in analyzing the current waste management system in Oshiyie
- Help the students understand the problems of the current waste management system in Oshiyie
- Encourage the groups of students to propose a new waste management system for Oshiyie
- Help students come to realize why a new waste management system will be an improvement over the current system

EVALUATION

Students can be evaluated on the quality of their waste management system proposals

RESOURCES / REFERENCES:

Glo Germ Company Resources

“Non-Hazardous Waste Management Hierarchy.” United States Environmental Protection Agency, 22 November 2013. http://www.epa.gov/solidwaste/nonhaz/municipal/hierarchy.htm

Matthews, Richard. “Sweden is a Model of Sustainable Waste Management.” *Green Conduct*. Keiser University, n.d. http://greenconduct.com/news/2013/08/01/sweden-is-a-model-of-sustainable-waste-management/

Themelis, Nickolas and Zhixiao Zhang. “WTE in China.” *Waste Management World*. Waste Management World, 2013. http://www.waste-management-world.com/articles/print/volume-11/issue-4/Features/wte-in-china.html

Look, Marie. “Trash Planet: India.” *Earth911: More Ideas, Less Waste*. Disqus, 3 August 2009. http://www.earth911.com/earth-watch/trash-planet-india/

Adoboe, Justice Lee. “Ghana Adopts Chinese Technology for Waste Management.” *GhanaWeb*, 2 April 2011. http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=206166

PAN AFRICAN GLOBAL ACADEMY

WEEKLY LESSON PLAN

UNIT 2

INSTRUCTOR: David Lamptey	WEEK: 12th Ending: XX – XX – XX

SUBJECT: Public Health

SPECIFIC TOPIC: *Unit 2 Test*

INSTRUCTIONAL GOAL:

Teacher will:

- Administer the test to the students

Students will be able to:

- After the test has been completed and graded, go over the questions of the examination after it has been completed and graded with the instructor
- Understand and be able to explain why students missed questions that they missed on the exam in order to gain a better understanding of the course material of Unit 2

LESSON CONTENT

Unit 2 test questions

MATERIALS AND AIDS:

- Test questions
- Answer sheets

TEACHING AND LEARNING ACTIVITIES:

- Class engages in an interactive discussion of the Unit 2 test questions

EVALUATION

Unit 2 exam questions

RESOURCES / REFERENCES:

Mastering Social Studies for Senior High Schools by Isaac Ayertey

Social Studies for Senior High Schools by Joseph Kojo Boahene

Aki-Ola Series Social Studies for Senior High Schools Past Questions with Answers by Kwesi H. Klutsey

Global Series: Social Studies for Senior high schools

Understanding Garbage and Our Environment by Andrea J. Nolan

Mensah, Angelina Ama Tutuah. "The Climate Change Crisis: a Focus on Ghana's Coastal Communities." The Daily Graphic 09 June 2014. http://graphic.com.gh/features/opinion/24689-the-climate-change-crisis-a-focus-on-ghana-s-coastal-communities.html

"Human Health." *Wastes – Non-Hazardous Waste – Municipal Solid Waste*. United States Environmental Protection Agency, 25 June 2014. Web. http://www.epa.gov/osw/nonhaz/municipal/backyard/health.htm

Pitt, Claire and Erin Sperling. *An Introduction to Malaria: A Curriculum Resource for Secondary Teachers.* The United Nations Children's Fund (UNICEF) Canada, 2007.

http://www.acgc.ca/09/images/file/*developmentinabox/P5- UNICEFmalaria.pdf*

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"Protect Your Family and Friends from Tuberculosis: The TB Contact Investigation." Centers for Disease Control and Prevention National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, 2005. http://www.cdc.gov/tb/publications/pamphlets/TB_contact_investigation.pdf

Glo Germ Company Resources

"Non-Hazardous Waste Management Hierarchy." United States Environmental Protection Agency, 22 November 2013. http://www.epa.gov/solidwaste/nonhaz/municipal/hierarchy.htm

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