ACTIVITY: MALARIA LESSON PLAN – SCIENCE SHS

Lesson Title: The Life Cycle and Transmission of the Malaria Parasite
Date:

School/Community/Region: PCV Name(s):

GOALS OF THE LESSON (OBJECTIVES):
By the end of the lesson the student should be able to:

• Name the species of mosquito that transmits malaria in Ghana
• Describe the life cycle of the parasite that causes malaria
• Explain how malaria is transmitted from person to person
• Name three common misconceptions about malaria transmission and prevention

METHODOLOGY:

• Lecture along with Question and Answer throughout lesson
• Group diagram drawing of Malaria parasite life cycle
• Post-lecture worksheet

LESSON FORMAT:

• Introduction to introduce malaria as a dangerous disease that can be prevented with proper knowledge.
• Evaluate Relevant Previous Knowledge (RPK) by asking the following questions:
  o Is malaria caused by a virus, bacteria, or parasite?
  o Is malaria contagious in the same way as the common cold, for example?
  o What do you know about preventing yourself from contracting malaria?
• Main lesson points
  o Define Malaria:
    ▪ Malaria is a mosquito-borne parasitic infection most common in tropical and sub-tropical regions of the world (such as Ghana)
    ▪ Initial symptoms usually occur within 7-14 days of inoculation and include headache, fever, chills, joint aches, and vomiting. A classic symptom of malaria is also cyclic fever in which fever is present, then goes away and reoccurs in a distinct pattern. Without treatment malaria can be fatal.
    ▪ Note: In Ghana, if someone is sick with a fever, it does not mean they have malaria! Other illnesses can cause fever, but if a fever occurs, that person should always go to the nearest clinic immediately, get tested for malaria and seek treatment.
  o Differences between bacterial, viral, and parasitic infections (malaria is parasitic)
    ▪ Bacterial infections are caused by microorganisms called bacteria and these types of infections can usually be treated and cured with
medicines known as antibiotics. It is common for bacterial infections to be spread by person to person contact and exchange of body fluids such as blood, saliva, or contact with the infected area. The disease Tuberculosis, commonly known as TB, is an example of a disease caused by a bacterial infection.

- Viral infections are caused by small biological agents called viruses. Viruses are not living organisms but they depend on living organisms to reproduce. Transmission of viral infections is complex and depends on the type of virus. Viral infections are difficult to treat and often cannot be cured. An example of a viral infection is HIV.
- A parasitic infection is one caused by a living organism which depends on a host for its survival. Parasites may be multi- or unicellular. The organism that is infected by the parasite is known as a 'host'. Transmission as well as treatment for parasitic infections varies depending on the type of parasite. An example of a parasitic infection is malaria.

- Explanation of the life cycle and transmission of the malaria parasite
  - Malaria is caused by a parasitic protest (a type of microorganism) under the genus *Plasmodium*.
  - *Plasmodium* has a complex life cycle in which it changes form and structure throughout the stages of infection.
  - A mosquito may carry an infectious form of *Plasmodium*, known as a sporozoite, in its saliva. A mosquito can transfer these sporozoites through its saliva into the blood of a human host when it bites a human to feed. In this case the mosquito is known as a **vector** for the disease. Vectors are organisms that carry a pathogen from one organism to another.
  - The sporozoite then travels through the blood of the human to the liver where it reproduces and forms primary tissue schizonts before rupturing into thousands of merozoites. These merozoites infect red blood cells and travel throughout the body. They reproduce within the cell and destroy the cell when the new merozoites are released. This is the stage responsible for most malaria symptoms.
  - Some of the merozoites in the blood stream will form fertile gametocyte.
  - If a mosquito bites a person infected with the *Plasmodium* parasite, the mosquito will ingest gametocytes and they will lodge in the gut tissues.
  - These gametocytes then form sporozoites in the body of the mosquito. They travel to the salivary glands and can now be transferred to the next person the mosquito bites.
  - The life cycle is now repeated in the body of a new human host, and a new case of malaria is born.

- Differences between species and sexes of mosquitoes that can and cannot transmit malaria
There are many different genus of mosquitos, but only the Anopheles mosquito carries the *Plasmodium* parasite that causes malaria.

- Male Anopheles mosquitoes DO NOT carry the *Plasmodium* parasite because they DO NOT feed on humans. Male mosquitos drink water and flower nectar. Only female mosquitos carry the parasite because they are the ones that feed on human blood. They consume blood for the development of their eggs.

  - Explain the most effective modes of preventing malaria
    - The Anopheles mosquito is most active from dusk till dawn, so screening doors and windows and remaining indoors after dark will reduce the chance of an infection.
    - One of the best ways to avoid a malaria infection is to sleep under a mosquito net, most importantly, a LLIN (Long Lasting Insecticide-Treated Net).
    - If you must be outdoors after dark it is recommended that you use a topical insect repellent and/or wear long sleeves and pants.
    - Mosquitos will typically rest on the upper 1/3 of a wall after a blood meal; ergo, using IRS (Indoor Residual Spraying) is effective for killing and preventing parasite transmission by mosquitos that may have already picked up the parasite.
    - Many countries, including the United States have completely eliminated malaria in their country by implementing these strict preventative measures. If people stop getting malaria, mosquitos will stop spreading it. If we all do this we can eliminate malaria from Ghana!
    - If you think you may have malaria you should seek medical care and treatment immediately. Medications known as ACTs taken shortly after showing symptoms will kill the parasite and stop the spreading of infection.

  - Post lesson discussion and Q and A
  - Activity: Break students into groups and have each group come up with a drawing illustrating either how malaria is transmitted from person to person, or the life cycle of the parasite. Students can get creative, if they want to do a table, arrow diagram, etc. Anyway that they feel comfortable illustrating the transmission or life cycle.
Attached is an activity sheet that can be used to monitor students retained knowledge and understanding of the lesson.
**MALARIA WORKSHEET**

**Part A:** If the statement is true, write a ‘T’ in the blank, if the statement is false, write an ‘F’ in the blank

1.) _____ If someone with malaria sneezes next to you, you may get malaria.
2.) _____ Male Anopheles mosquitos can transmit malaria.
3.) _____ Always sleeping under a mosquito net is one of the best ways to avoid malaria.
4.) _____ If a person has a fever, it means they have malaria.
5.) _____ Malaria is a parasitic infection.

**Part B.** Match the word with the definition by writing the appropriate letter in the blank

1.) _____ *Plasmodium*  
   A. Long lasting insecticide-treated net
2.) _____ Malaria  
   B. An infectious, sometimes fatal disease spread by mosquitos
3.) _____ Vector  
   C. The genus name of the parasite that causes malaria
4.) _____ LLIN  
   D. An organism that lives on or inside another organism and is dependent upon that organism for at least one life stage.
5.) _____ Parasite  
   E. An organism that transmits a pathogen, such as a parasite, to another organism.

**Part C.** Fill in the blanks with the appropriate words to complete the sentence.

1.) Symptoms of malaria include ________, ________, and ________.
2.) It is only ________ *Anopheles* mosquitos that will bite and transmit malaria.
3.) The time frame in which malaria carrying mosquitos are most active is from ________ till ________.
4.) The *Plasmodium* parasite infects the ________ & ________ cells of humans.
5.) Some of the species in the genus *Plasmodium* and humans share a host-parasite relationship in which the human is the ________ and *Plasmodium* is the ________.