**AFRICA CENTER FOR PROJECT MANAGEMENT**

**ASSIGNMENT**

**Student Name:** Samuel Silvestre Tinho

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**Module:** Communicable Diseases

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**Introduction**

Diseases are categorized as communicable or non-communicable depending on their main cause and mode transmission. Non-communicable diseases are not infectious, they are either hereditary or caused by other factors related to individual lifestyle or environment. Communicable diseases are infectious and mostly caused by pathogens.

This assignment on communicable diseases provides a basic classification of diabetes mellitus as a non-communicable disease. It also gives an epidemiologic classification of pulmonary tuberculosis as a communicable disease and the importance of using an epidemiologic classification in preventing or controlling diseases.

Some considerable attention is given in describing some vaccine preventable bacterial diseases such as tuberculosis, diphtheria, pertussis and pneumonia including their symptoms, mode of transmission and methods of prevention.

The main causes and most common methods of preventing bacterial meningitis which is considered a dangerous yet vaccine preventable diseases are listed and elaborated.

The difference in characteristics of an Anepheles larvae and the larvae of other types of mosquitos are illustrated.

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**QUESTION N° 1**

*Consider a disease known as diabetes mellitus, which is characterized by an increase in the blood sugar level. Infectious agents may contribute to the development of the disease in early childhood, but are not the main cause of the disease. Can it be classified as communicable? Explain your reasons*

**Answer to question n° 1**

Non-communicable diseases are those diseases which are not infectious and are not caused by pathogens. Their main cause can be genetic or other lifestyle factors including the environment and personal behavior. Such diseases are spread by heredity and or unhealthy environments and behavior such as smoking and improper diet[[1]](#footnote-1).

Diabetes mellitus is referred to as a condition when a person has high blood sugar level resulting from insufficient or no production of insulin by the body or when the body fails to respond properly to the insulin produced by the body. This dysfunction disables the body cells from absorbing glucose into energy needed by the body, therefore forcing the glucose to accumulate in the blood a condition also known as hyperglycemia. Hyperglycemia can lead to medical complications. The two common types of diabetes are Types 1 diabetes and Type 2 diabetes[[2]](#footnote-2).

Type 1 diabetes is caused by the body´s inability to produce insulin, it occurs at childhood and at middle age. People with this problem are usually required to inject insulin. Type 2 diabetes results from body cells failing to properly use the insulin produced by the body or a combination of insufficient insulin and inability to absorb it into energy.

Diabetes mellitus is listed among non-communicable chronic diseases. It is not caused by any pathogen and it’s not an infectious disease. One cannot get diabetes mellitus by living or having contact with a sick person. It a hereditary disease or can be caused by personal living habits including dietary habits. Both the root causes and ways of transmission of diabetes mellitus does not qualify it as a communicable disease.

**QUESTION N° 2**

*How would you classify pulmonary tuberculosis using the epidemiologic method? What is the main importance of such classification?*

**Answer to question n° 2**

Communicable diseases are classified by putting them into groups of diseases that have similar characteristics and or share the same type of infectious agents or pathogens. Classification of communicable diseases helps health practitioners in determining and applying the most appropriate measures for preventing and controlling of communicable diseases that fall under the same class or manifest the same characteristics[[3]](#footnote-3).

The two main ways of classification of communicable diseases are clinical and epidemiologic. Clinical classification considers the main symptoms and signs of a disease which are also known as clinical manifestations. It helps health workers to the symptoms and signs that are common to people who suffer from different diseases. An example of clinical classification is a group of diarrheal diseases like cholera, whose main symptom is diarrhea[[4]](#footnote-4). Treating such diseases may include using fluid solutions to treat the main symptom of the diseases, which is diarrhea.

The second way of classifying communicable diseases is epidemiologic, which is based on the mode of transmission of the infectious agent or the disease. Epidemiologic classification is important to public health workers as it enables them to select and implement the most appropriate prevention and control measures for such diseases that share similar characteristics and same mode of transmission[[5]](#footnote-5). Prevention and control mechanisms will avoid the spread of transmission of the disease in a given area. An example is typhoid fever and cholera which are different diseases that share the same mode of transmission – contaminated water. These can epidemiologically be classified as waterborne diseases and can be prevented by treating drinking water or applying other measures to ensure drinking water is free from contamination.

Communicable diseases are commonly classified into the following four main groups depending the mode of transmission of the disease or the infectious agent.

**Waterborne diseases** – are transmitted by drinking contaminated water.

**Foodborne diseases –** are diseases that are transmitted by eating food.

**Airborne diseases –** aretransmitted through the air.

**Vector-borne diseases –** are transmitted by vectors, such as mosquitoes and flies.

Pulmonary tuberculosis is an infectious disease caused by Mycobacterium tuberculosis[[6]](#footnote-6). It most commonly affects the lungs but in some cases may affect other body organ systems such as liver bones and gastrointestinal tract. It is associated with coughs and is highly transmitted by breathing in the infectious agent that may have been released by an infected person though coughing or by getting into contact with throat secretion carrying the infectious agent[[7]](#footnote-7) Pulmonary tuberculosis is infectious particularly when treatment has not begun, therefore preventive and control measures are essential to avoid the spreading of the disease.

**QUESTION N° 3**

*Describe four or more bacterial vaccine-preventable diseases that have the same modes of transmission.*

**Answer to question n° 3**

Bacterial diseases are any type of illness that is caused by an infectious bacteria. Not all types of bacteria are harmful to human health. These tiny infectious microorganisms internally produce toxins which are released when the bacteria disintegrates[[8]](#footnote-8). They also cause diseases by secreting and / or excreting toxins that are harmful to the human body. Some diseases originate as the bacteria induces sensitivity to its antigenic properties. There are many bacterial diseases or infections of some are deadly such as cholera and bacterial meningitis and some may not be a very harmful especially when treated on time such as typhoid fever.

Vaccine-preventable diseases are considered as infectious disease for which effective preventive vaccines exists[[9]](#footnote-9). Vaccines reduce the incidences of people getting a specific infectious disease which results in better health and reduced socio-economic burden to communities and governments at large.

There are a number of bacterial disease which can be prevented by vaccines in the modern world and many of them have the same mode of transmission, therefore falling under the same epidemiologic classification. Such bacterial vaccine-preventable diseases with similar mode of transmission include:

**Diphtheria** is a serious bacterial infection caused by toxins produced by a Corynebacterium diphtheriae bacteria. Diphtheria is usually associated with infected nose and throat. The bacteria is commonly released by coughing or sneezing[[10]](#footnote-10). One can also get infected by sharing personal items with an infected person. Common symptoms of the disease are runny nose, watery eyes, fever, and persistent cough and vomiting. Diphtheria can be prevented through a combination of diphtheria vaccine, BCG, tetanus vaccine and pertussis vaccine[[11]](#footnote-11).

**Tuberculosis** is a highly contagious infection caused by a bacteria called Mycobacterium tuberculosis. It primarily affects lungs although in some cases it can spread other parts of the body including the brain and spine[[12]](#footnote-12). Tuberculosis is commonly transmitted by droplets released while coughing or sneezing. Common symptoms of the disease are chronic cough, fever, weight loss and loss of appetite. It can be prevented through BCG vaccine and early treatment with antibiotics is recommended once the disease is diagnosed to avoid it transmission to others[[13]](#footnote-13).

**Pertussis,** also known as whopping cough is a highly contagious disease caused by the Bordetella pertussis bacteria[[14]](#footnote-14). It is associated with upper respiratory infection and its symptoms include violent cough, runny nose, fever and difficulties in breathing resulting in a whooping sound. The bacterial infection can affect people of any age group and it can cause permanent disabilities or even death in infants[[15]](#footnote-15). Pertussis is a respiratory transmitted disease as the bacteria is carried into the air through droplets released when an infected person sneezes or coughs. The disease can be prevented by a combination of Pertussis vaccine and two or more other vaccines such as BCG, vaccine against diphtheria or vaccine against tetanus[[16]](#footnote-16).

**Pneumonia** is an infection that affects one of both lungs of an individual[[17]](#footnote-17). Although bacterial pneumonia is most common, pneumonia can have viral or fungal origins. Bacterial pneumonia is attributed to either the Streptococcus pneumoniae bacteria[[18]](#footnote-18) or the Haemophilus influenza bacteria. Pneumonia results in the inflammation of the alveoli (airspaces) of the infected lung. As the alveoli get filled with fluid or pus, normal breathing becomes difficult for the person[[19]](#footnote-19). Pneumonia can be life threatening depending on the severity of the infection. Symptoms of pneumonia can include coughing, fever, chest pain and difficulties in breathing. The most common mode of transmission is coughing or sneezing. Bacterial pneumonia can be prevented by a pneumococcal conjugate vaccine or by antibiotics treatment.

**QUESTION N° 4**

*What are the causes and methods for preventing bacterial meningitis?*

**Answer to question n° 4**

Bacterial meningitis is classified as a very dangerous and deadly disease. People who recover from bacterial meningitis infection usually sustain permanent disabilities including; brain damage, hearing loss, learning disabilities and organ failure particularly when the disease is associated with sepsis. It is a contagious disease that is caused by many different types of bacteria depending on age group.

**Most common types of meningitis causing bacteria[[20]](#footnote-20):**

**Streptococcus pneumoniae bacteria** - This bacteria is usually associated with pneumococcal meningitis and it is found in the respiratory tract, sinuses, and nasal cavity. It is a common cause of bacterial meningitis in all age groups from newborn babies to older adults. This bacteria is usually spread out by coughing or sneezing while close to other people.

**Neisseria meningitides bacteria** – It causes meningitis in children, youth and older adults and is usually spread out through respiratory fluids, throat secretions including saliva. This bacteria is the main cause of meningococcal meningitis.

**Haemophilus influenza bacteria –** The bacteria causes meningitis in children and older adults. It is also a known cause of other health problems and illnesses that include; blood infection, inflammation of the windpipe, cellulitis and infectious arthritis.

**Listeria monocytogenes bacteria** **–** People usually get the listeria infection by eating contaminated food. The bacteria is commonly found in dairy products, meats, melons and raw vegetable. New born babies are likely to get it from their mothers.

**Staphylococcus aureus bacteria** – It is commonly known for causing staph skin infections. Other health problems attributed to it include; pneumonia, food poisoning, toxic shock syndrome and blood poising also known as bacteremia. Staphylococcus aureus found on the skin and respiratory tract. It is the cause of staphylococcal meningitis[[21]](#footnote-21).

Bacterial meningitis can be prevented through many different methods, but the main and most effective prevention method is vaccination against meningitis. There are different vaccines developed and approved for administration to children and adults, depending on the age group to prevent meningitis.

**Methods of preventing bacterial meningitis**

**Haemophilus influenzae type b vaccine** is administered to infants to prevent them from catching Hib disease which is a bacterial infection that leads to meningitis that commonly affects children under five years[[22]](#footnote-22).

**Pneumococcal conjugate vaccine (PCV13)** should be administered to children under 2 years to protect them against the pneumococcus bacteria which is the main cause of bacterial meningitis[[23]](#footnote-23).

**Pneumococcal polysaccharide vaccine (PPSV23)** is used to prevent older children and adults (2 years and 64 years) from developing pneumococcal infections. Older people above 65 years are also recommended to get the PPSV23[[24]](#footnote-24).

**Meningococcal conjugate vaccine** is given to children aged 11 and 12 years to prevent them from getting meningococcal meningitis. In the event of children not getting vaccinated at the age of 11 and 12, it is recommended that they get a booster shot of the vaccine at the age between 16 and 18 years[[25]](#footnote-25).

Apart from vaccination, other prevention methods mainly consist in avoiding the spread of the disease or the spread of the meningitis causing bacteria. Some of the precaution measures include: avoiding sharing personal items, staying away or keeping a safe distance from infected people, personal hygiene and cleanliness including washing hands and keeping a balanced diet to boost the immune system[[26]](#footnote-26).

**QUESTION N° 5**

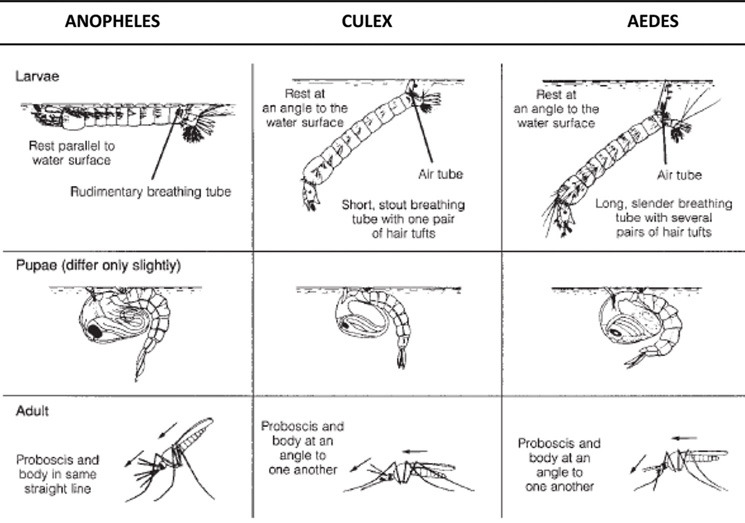
*Explain two characteristics that illustrate how the Anopheles larvae are different from other mosquito larvae. Using illustration is advised*

**Answer to question n° 5**

Mosquitos are classified in two groups, anopheliness which is commonly known as the malaria vector and culiness which does not transmit malaria and both types lay their eggs in water. The two types of mosquitos are different in shape and structure also known as morphology. They also have a different breeding habitat. Knowing these differences helps in identifying the type of mosquito breeding in certain environments so that preventive measures can be taken to destroy the environments that are favorable to mosquito breeding. All species of mosquito have the same life cycle that starts with the egg laying, larvae stage, pupae stage and adult stage. A larva is hatched from the egg in two weeks after the egg laid. Larvae can be identified in standing water bodies by natural eyes without need for any additional equipment and preventive steps taken by destroying the breeding waters[[27]](#footnote-27).

There are two notable differences in characteristics of Anopheles larvae and the larvae of other types of mosquitos which are;

Anopheles larvae rests parallel to and immediately below the water surface and the larvae do not have a siphon for breathing. The culicine larvae has a breathing tube and hangs down the water surface[[28]](#footnote-28). The diagram below illustrates the above mentioned differences.



*Diagram illustrating the differences between anopheles larvae and other mosquitos´ larvae as illustrated by WHO, 1997; source as in Figure 9.2*

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