**STRATEGIA NETHERLANDS, INTERNATIONAL MANAGEMENT ORGANIZATION**

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**COURSE: ONLINE -POST GRADUATE DIPLOMA**

**IN**

**WATER, HYGIENE AND SANITATION**

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**Assignment**

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
2. How would you classify pulmonary tuberculosis using the epidemiologic method? What is the main importance of such classification?
3. Describe four or more bacterial vaccine-preventable diseases that have the same modes of transmission.
4. What are the causes and methods for preventing bacterial meningitis?
5. Explain two characteristics that illustrate how the Anopheles larvae are different from other mosquito larvae. Using illustration is advised

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**Answers to Assignment Two**

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

Diabetes is one of the major noncommunicable diseases; with three being cardiovascular, cancer and chronic respiratory diseases.

Diabetes is a condition, in which the glucose (simple blood sugar) level is poorly controlled, where sometimes it rises too high and sometimes falling too low. Both these extremes have serious health consequences for the diabetic person.

Diabetes mellitus has been known a thousand years after being described by the Ancient Egyptians and Romans. The word Mellitus comes from the Latin word for ‘’Honeyed’’, meaning ‘sweet’. Diabetes Mellitus therefore, describes the condition where there is sweet urine production. Sweet urine production occurs when there is too much glucose in the blood that forces glucose to leak into urine, whenever kidneys filter the blood to remove impurities.

Therefore, diabetes mellitus is the disease that affects our body’s ability to produce or use insulin. It a metabolic disease in which the person has high blood glucose (blood sugar), either because the insulin production is inadequate or the body’s cells don’t respond properly to insulin or both. Insulin helps in transporting the energy / glucose to the cells. Whenever one’s body produces little insulin, or no insulin, or is insulin resistant, too much sugar remains in the body, hence increase the blood sugar level.

There are two main types of diabetes; and they are type 1 and type 2.

In type 1, the person who is affected with diabetes has pancreas that does not produce insulin. This type is very common in children and teens, although it affects adults too. It accounts, for almost 5-10 percent, of diabetes cases.

Type 2 diabetes occurs when the body cannot produce enough insulin or when the cells cannot use the insulin properly and this is called the insulin resistant.

The most common symptoms of diabetes include; frequent urination (polyuria), intense thirst and hunger, weight gain, and sometimes, unusual weight loss, fatigue, cuts and bruises that don’t heal, male sexual dysfunction, numbness and tingling in hands and feet.

Diabetes mellitus cannot be classified as communicable disease.

Sincerely speaking, diabetes mellitus causes are unknown. All debates rotate around common proximal physiological risk factors such as high cholesterol, high blood glucose, and obesity, behavioral risk factors such as smoking, alcohol, lack of physical exercise, diet, and environment factors.

Genetically, some people become diabetic due to family diabetes history. In this scenario, genes are interplayed, inherited and passed from one generation to the next. And this is type 1 diabetes mellitus. BUT this does not mean that the disease is communicable since there is not direct/ physical mode of transmission.

Type 2 is believed to be as a result of interplayed between genetic, family history, old age, heavy weights, obesity, unhealthy diet, physical inactivity and smoking.

Excess body fat due to unhealthy diet, physical inactivity is the strongest risk factor for type 2 diabetes mellitus, according to Global diabetes report 2016.

However on a personal observation, relationship can be considered as another factor of transferring this disease. Although, there is no scientific facts, having a marriage partner who likes to eat too much fatty food, may end up making the other partner diabetic. If a woman likes preparing fatty food, a man will definitely get addicted to fatty food, and hence both will develop health complication. Simply, if a woman has been a diabetic person, due to her life style of eating fatty food, and she continues to prepare for her children and husband fatty food, there is likelihood that will be indirect transfer of this disease through fatty food to her household members.

Still on life style, if a mother loves to watch television for long time, there is possibility that she will indirectly transfer this habit to her kids, and equally if she developed diabetes due to inactive or lack of physical exercise, because she sits before the television for long, her kids will develop the same health condition due to lack of exercise.

Also indirectly, one can transfer diabetes through psychological factor. Example, 2017, in Uganda, a man was believed to have developed diabetes because his has a diabetic woman. The woman had too much weights that she could not walk alone without support; hence all the household burdens were shouldered by the man. This forced this man to start smoking and over sleeping, and become stressed throughout. Lack of physical exercise, with too much smoking ended up causing diabetes in the man. One would therefore conclude that to some extent, diabetes can be indirectly transferred among the married people.

Conclusively, there is no single thread, that unites all, Noncommunicable diseases and perhaps, separate them from other classic infectious diseases. It would be fair to term diabetes mellitus as a socially transmitted condition, since it will be more transparent, accurate and tractable, than being term noncommuicable with has vague explanation. Important to note, is that all disease are influenced social factors, and there integrating diabetes mellitus as a socially transmitted condition, makes it easy to have a comprehensive prevention and control measures, hence reducing the global burdens being imposed by these diseases.

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

Pulmonary tuberculosis is the bacterial vaccine preventable disease that is caused by mycobacterium. People who have TB in their lungs can release tiny particles (which are not seen by naked eyes) into the air by singing, laughing, coughing, and sneezing. These tiny particles which are commonly call air droplet nuclei, can remain in the air, space or room for many hours, unless they are removed by natural or mechanical ventilation.

Therefore, Tuberculosis is spread from a person to another, through the air droplet nuclei/ tiny particles. As earlier on noted, when these tiny particles are produced by a person with pulmonary releases laryngeal tuberculosis after coughing, sneezing, laughing or singing, they are inhaled by un infected person, which eventually are carried down to the wall of upper airways, where they are trapped by mucus blanket and later implants in a respiratory bronchiole or alveolus.

Common symptoms are; persistent cough for weeks or more, night sweats, fever, low or complete loss of appetite, weight loss, chest pains and fatigue, among others.

Tuberculosis is one of the ten deadliest diseases in the world, according to World Health Organization. 2017 report. According to World Health Organization, in 2017, there were a total of 1600,000 tuberculosis related deaths, of which 234000 deaths were children.

Still in 2017, there were total of 10 million new tuberculosis cases reported globally. 90% of these deaths occurred in developing countries. Tuberculosis is a social disease with medication implication. It occurs disproportionally among disadvantaged population such as homeless, malnourished; people infected with HIV and overcrowded areas.

There are some factors that facilitate the likelihood of mycobacterium from one person to another. And they include;

* The amount or the number of organism being expelled or produced in the air, the
* Level of concentration of the expelled organization which is always determined by the space and ventilation,
* The immunity of the exposed individuals, example HIV infected persons have highest chance of being infected, because they don’t have strong immunity to resist the infection.
* The length of time an exposed person(s) breathes or inhales the contaminated air released by an infected person(s).

Therefore classifying pulmonary tuberculosis using epidemiologic method is very important. But first and fore, it’s vital to define Epidemiology, as basic science of public health that provides a variety of tools that can be used in prevention and control.

Classifying Pulmonary Tuberculosis using Epidemiologic methods helps to explore and understand patterns of morbidity and mortality within and between populations, using statistical methods to try clear these patterns. Having clear data about the current and evolving trends in regards to TB morbidity, risk groups, helps, key persons such as disease investigators, health care workers and TB program mangers, to make practical use of the data, on how to determine and allocate staff and resources. Understanding how diseases are distributed in a population and the factors that determine who gets the disease is very important in identifying ways to prevent and control.

Descriptively, Epidemiological method, helps to identify people, where and time when the disease is most likely to affect. This will definitely be the basis of prevention and control.

The data collected, analyzed, will always be interpreted and disseminated, which is importance in planning, implementation and evaluation of the health policies by those who know or are linked to preventive and control measures.

If data shows that a place or an area has unusually cases of TB, much resources and staffs will be sent to prevent the further spread of the disease.

Descriptive epidemiologic method (by place, time, and by person) are used to create summaries of intervention strategies and resource planning.

Analytic epidemiologic method, explains how and why some health problems occur. This is very important for researchers in try to identify the underlying factors. Example, researchers will always try to identify the best treatment, and as well as identify why some people are not adhering to the treatment.

Specifically tuberculosis can be prevented through the followings;

* Prompt identification of people with TB infectious symptoms and request them to use separate rooms.
* Provision of complete package of prevention and care interventions by health workers.
* Application of environmentally controlling source of infections by providing adequate ventilation such as using tents/ booths and hoods. This will help to dilute and remove contaminated air
* Other alternative environmental control involving the use of ultraviolent Germicidal Irradiation (UVGI) fixtures, whenever there is inadequate ventilation. This will help in controlling the airflow to prevent contaminated air in the areas adjacent to the airborne source.
* Education of public about the dangers of some social habits such as sharing of drinking and food utensils/ cups and spoons, smoking, etc.
* Educating public and patients about the benefit of respiratory hygiene at all time. This includes coughing, sneezing, splitting and disposing of solid waste in open areas.

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

* Diphtheria is a bacterial disease that is caused by corynebacterium diphtheria. The infection usually affects the throat and may lead to obstruction in the airways and death. Transmission is from infected person to another person through droplets, and other physical contacts due to cough, sneeze, kissing and even singing. The droplet nuclei is inhaled and channeled down into the bronchiole tree and eventually to the heart. Diphtheria is very common in the developing countries compared to industrialized countries due to long-term vaccination
* Pertussis, commonly known as whooping cough is a highly contagious acute bacterial disease that involves respiratory tract infection; and it is caused by bordetella pertussis. Just like Diphtheria, pertussis is transmitted through direct contact with airborne discharges from the respiratory mucous membranes of an infected person. Similarly, these discharges are from cough, salvia, mucus or droplets after sneezing etc.

Pertussis causes severe cough for weeks, a duration which is termed as whoop, it also causes cyanosis and malnutrition due to constant vomiting. Although, pertussis affects, all ages, but many cases are common in infants. Globally, many pertussis cases are in developing countries.

Pertussis is preventable through vaccination; vaccines such as whole-cell (Wp) and Accellular (Ap) pertussis vaccines provide good protection. Both wP and aP are administered in combination with Diphtheria and Tetanus toxoids (DTwp or DTaP).

* Tuberculosis is a bacterial disease that is caused by mycobacterium; and just like other bacterial diseases, tuberculosis is transmitted through respiratory tract mode. It is transmitted from an infected person to other people when droplets nuclei from cough, sneeze etc, produced by tuberculosis infected person are inhaled.

Commonest symptoms of tuberculosis are weight loss, general body weakness, constant night sweats, loss of appetite, constant cough at times with blood, and chest pains

In countries with high tuberculosis prevalence, infants are given BCG vaccines immediately after their births

* Pneumonia (infection of the lungs) is one of the bacterial diseases being caused by Streptococcus pneumoniae. This Pneumonia is transmitted respiratory by coughing and sneezing
* Meningitis is a disease that affects the meninges, the membranes that surround the brain and spinal cord, which also protect the central nervous system together with the cerebrospinal fluid. And this can lead to permanent disability or death.

Just like the other four diseases above, meningitis is transmitted from one person to another person through the respiratory droplets or throat secretions of a carrier.

The disease is caused by several bacteria types and they include Streptococcus pneumonae, Neisseria meningitides, Group B Streptococcus, Haemophilus Influenzae, and Listeria Monocytogenes.

Early signs include, fever, neck stiffness, headache, nausea, confusion, vomiting and increase high sensitivity to light, loss of consciousness

Meningitis can be prevented and controlled through;

Vaccination and treatment by antibiotics; vaccine may be PVC

Educating public about, the dangers of some social habits, such as sharing of drinking, and food utensils/ cups and spoons, smoking, etc.

Educating public and patients about the benefit of respiratory hygiene at all time. This includes coughing, sneezing, splitting and disposing of solid waste in open areas.

Educating the public about, the early signs and symptoms of meningitis, to help in detecting and early referral of the suspected persons.

1. What are the causes and methods for preventing bacterial meningitis?

Bacterial meningitis is a disease that affects the meninges, the membranes that surround the brain and spinal cord, which also protect the central nervous system together with the cerebrospinal fluid. And this can lead to permanent disability or death.

The disease is caused by several bacteria types and they include Streptococcus pneumonae, Neisseria meningitides, Group B Streptococcus, Haemophilus Influenzae, and Listeria Monocytogenes.

Early signs include, fever, neck stiffness, headache, nausea, confusion, vomiting and increase high sensitivity to light. .

It’s transmitted from one person to another person through the respiratory droplets or throat secretions of a carrier.

* Close and prolonged contact such as kissing, coughing and sneezing on someone can transmit the bacteria. When an infected person kisses, coughs or sneezes, he or she releases some droplets which are inhaled by the non infected person. The most bacteria type that is always transmitted is Haemophilus Influenzae, especially if an infected person coughs or sneezes. Kissing an infected person facilities Neisseria Meningitidis which is always transmitted through salvia
* Living in the close quarters such as dormitory and prisons, facilitates the spread of the diseases. Some people are carriers; they have the bacteria but don’t know. Therefore living in squeezed rooms in prisons and schools, with limited aeration or limited ventilation, increases the concentration of the bacteria, when they are realized by the carriers of infected person, making easy to be inhaled by non infected persons.
* Sharing the drinking or eating utensils with the infected persons equally facilitates the spread of the bacteria. This facilitates listeria monocytogenes which is easily spread through contaminated food. Still through sharing food or drinking utensils there will always be the possibly of droplets or throat secretions to pass into the food or drinking water, which is always ingested by the non-infected person.
* Anatomical defect or trauma such as skull fracture or some surgery can facilitate transmit of the bacteria. Such conditions if not well maintained or addressed will allow the passage of the bacteria
* Certain medical conditions; Working in the laboratories and other settings where meningitis pathogens are present may make the spread of the bacteria possible, although the recurrent may be rare.
* Pregnancy or childbirth to some extent causes the transmission of bacterial meningitis. The common bacterial here is Escherichia Coli (E.Coli), which is passed from mother to the baby, during labor or childbirth, and this always possible if the mother has been eating contaminated food during her pregnancy.

Group B Streptococcus, always known as Group B is transmitted from a mother to the baby during labor or birth, if the mother was infected and treated during pregnancy. During pregnancy, infected mother will always feel fever and flu symptoms such as fatigue and headache. Infection during pregnancy may cause miscarriage, stillbirth and premature delivery or even life threatening.

Bacterial Meningitis can be prevented through the following;

* The most effective preventive measure against bacterial meningitis is vaccination. There are vaccines that can prevent Streptococcus pneumonae, Neisseria meningitides, and Haemophilus Influenzae (Hib).
* Antibiotic helps in preventing transmission: Vaccination may not be 100% percent effective, therefore pregnant women should always be given antibiotics, if tested positive. This will help in passing the Group B Streptococcus infection to the new born babies.

Prophylaxis: One of the ways to prevent further transmission or spread of Bacterial meningitis is by administering antibiotics to person(s) tested positive, to prevent them from infecting other people.

* By avoiding some social habits such as smoking and sharing alcohol straws and utensils, which are common among young people and adolescents. This is possible through health education.
* By avoiding certain types of food that are considered to be the source of contamination. Pregnant mothers should always be conscious of the quality and types of food they eat during pregnancy
* Good hygiene practices such as washing hands with soap, before preparing food or eating: This helps pregnant women from being infected with the bacteria which is always caused by eating contaminated food.
* Keeping babies away from cough and sneeze being released, especially at the household level, if there is an infected person.

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

Among all mosquitoes’ species, Anopheles is the primary vector of malaria parasites, in the sub-Saran Africa. It has four instars stage that involves egg, larva, pupa and adult.

No much research has been conducted about but this specific deadliest species. Much attention has been given to the adult stage, having much information about it breading and different instars duration, could be the basis of containing it from further multiplication. Little information exists about the larval biology, which includes, larval habitat, position,

The all instars last for approximately some weeks. It lays separate eggs compare to other species that tend to lay much compacted eggs.

Anopheles larva and other mosquitos’ larvae can be distinguished by their different resting positions in water. Anopheles larvae rest parallel to and immediately under below the water surface, while other mosquitoes’ larvae such as cures and Aedes rest at a certain angle under the water surface. As shown below.

[Anopheles larvae](http://medent.usyd.edu.au/photos/anopheles_larvae.jpg)

Figure : An Anopheles larvae resting parallel to and immediately below the water surface

[](http://medent.usyd.edu.au/photos/och_camp_larvae_single.jpg) [](http://medent.usyd.edu.au/photos/pupa_larvae.jpg)

Anopheles larva and other mosquitos’ larvae can also be distinguished by siphons (breathing tubes); Anopheles larvae have no siphons, while Aedes and curex larvae have long siphons (breathing tubes), as seen below



Figure : showing siphons as a basis of Distinguishing Anopheles larva from other mosquitoes’' larvae

**REFERENCE**