Post-graduate Diploma in Public Health assignment six

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1. **Define the following terms as used in Public Health**

***An epidemic*** is defined as the occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time **(Texier et al., 2016).**

***Epidemiology*** is the study of the distribution and determinants of health-related states or events (including disease), and the application of this study to the control of diseases and other health problems ***(*Centers for Disease control and Prevention*, n.d.).***

**Chronic disease** is defined as a condition that last one year or more and requires ongoing medical attention or limits activities of daily living or both **(Centers for Disease control and Prevention[CDC], 2019).**

***Morbidity*** is any departure, subjective or objective from a state of physiological or psychological health and well-being.

**2. Discuss the five objectives of epidemiology**

* To identify the etiology or cause of disease.
* To determine the extent of disease.
* To study the progression of disease.
* To evaluate preventive and therapeutic measures for a disease or condition.
* To develop public health policy**.(Gabriela E.,2019)**

**3. Using examples explain three types of epidemiologic studies**

**Epidemiologic studies are as discussed below;**

**Experimental studies:** In an experimental study, the investigator determines through a controlled process the exposure for each individual and then tracks the individuals or communities over time to detect the effects of the exposure. For example when a clinical officer carry out clinical trial of a new vaccine, the investigator can pick randomly and assign some of the participants to receive the new vaccine, while others receive a placebo shot. The investigator then tracks all participants, observes who gets the disease that the new vaccine is intended to prevent, and compares the two groups (new vaccine vs. placebo) to see whether the vaccine group has a lower rate of disease. Similarly, in a trial to prevent onset of diabetes among high-risk individuals, investigators randomly assigned enrollees to one of three groups — placebo, an anti-diabetes drug, or lifestyle intervention. At the end of the follow-up period, investigators found the lowest incidence of diabetes in the lifestyle intervention group, the next lowest in the anti-diabetic drug group, and the highest in the placebo group.

**Observational studies:** In an observational study, the epidemiologist simply observes the exposure and disease status of each study participant. For example John Snow’s studies of cholera in London are one of the best examples of observational studies. The two most common types of observational studies are cohort studies and case-control studies; a third type is cross-sectional studies.

**Cohort study:**A cohort study is similar in concept to the experimental study. In a cohort study the epidemiologist records whether each study participant is exposed or not, and then tracks the participants to see if they have developed the disease of interest. After a period of time, the investigator compares the disease rate in the exposed group with the disease rate in the unexposed group. The unexposed group serves as the comparison group, providing an estimate of the baseline or expected amount of disease occurrence in the community. If the disease rate is substantively different in the exposed group compared to the unexposed group, the exposure is said to be associated with illness.

The following are some of the examples of cohort study; the Framingham study is one of a well-known cohort study that has followed over 5,000 residents of Framingham, Massachusetts, since the early 1950s to establish the rates and risk factors for heart disease.

The example of cohort study is the Nurses’ Health Study and the Nurses’ Health Study II which were established in 1976 and 1989, respectively that have followed over 100,000 nurses each and have provided useful information on oral contraceptives, diet, and lifestyle risk factors. These studies are sometimes called **follow-up** or **prospective** cohort studies, because participants are enrolled as the study begins and are then followed prospectively over time to find out occurrence of the outcomes of interest.

An alternative type of cohort study is a **retrospective** cohort study. In this type of study both the exposure and the outcomes have already occurred. Just as in a prospective cohort study, the investigator calculates and compares rates of disease in the exposed and unexposed groups. Retrospective cohort studies are commonly used in investigations of disease in groups of easily identified people such as workers at a particular factory or attendees at a wedding. For example, a retrospective cohort study was used to determine the source of infection of cyclosporiasis, a parasitic disease that caused an outbreak among members of a residential facility in Pennsylvania in 2004. The investigation indicated that consumption of snow peas was implicated as the vehicle of the cyclosporiasis outbreak.

***Case-control study:*** In a case-control study, investigators start by enrolling a group of people with disease (at CDC such persons are called case-patients rather than cases, because case refers to occurrence of disease, not a person). As a comparison group, the investigator then enrolls a group of people without disease (controls). Investigators then compare previous exposures between the two groups. The control group provides an estimate of the baseline or expected amount of exposure in that population. If the amount of exposure among the case group is substantially higher than the amount you would expect based on the control group, then illness is said to be associated with that exposure. The study of hepatitis A traced to green onions, described above, is an example of a case-control study. The key in a case-control study is to identify an appropriate control group, comparable to the case group in most respects, in order to provide a reasonable estimate of the baseline or expected exposure.

***Cross-sectional study:***  In this third type of observational study, a sample of persons from a population is enrolled and their exposures and health outcomes are measured simultaneously. The cross-sectional study tends to assess the presence (prevalence) of the health outcome at that point of time without regard to duration. For example, in a cross-sectional study of diabetes, some of the enrollees with diabetes may have lived with their diabetes for many years, while others may have been recently diagnosed.

From an analytic viewpoint the cross-sectional study is weaker than either a cohort or a case-control study because a cross-sectional study usually cannot disentangle risk factors for occurrence of disease (incidence) from risk factors for survival with the disease. (Incidence and prevalence are discussed in more detail in Lesson 3.) On the other hand, a cross-sectional study is a perfectly fine tool for descriptive epidemiology purposes. Cross-sectional studies are used routinely to document the prevalence in a community of health behaviors (prevalence of smoking), health states (prevalence of vaccination against measles), and health outcomes, particularly chronic conditions (hypertension, diabetes) **(Centers for Disease control and Prevention [CDC], 2012).**

**4.**

**a. Identify the problems associated with epidemiologic studies involving humans**

Informed consent is another important aspect in Epidemiological Research. It is important to explain the procedures carefully and preferably in local vernacular, keeping in mind local customs and traditions. The risk and hazards of any procedure if involve in the study should be properly explained, and every effort should be made so that the expected participants clearly understand it. The purpose of the research, any scientific procedure involved, any inconveniences or discomfort that can arise should also be explained to the expected participants. After this, the participants right to refusal for participation or withdraw at any time should be respected. This is an important ethical aspect. It should be kept in mind that, there are certain researches where Informed consent need not be taken. It is virtually imp-possible to obtained informed consent in researches that involve data from certain International, National or Regional Surveys.

**Confidentiality**: Confidentiality of any data obtained should be guaranteed. It should be explicitly explained to the participants. During the course of the study, if any participants are found be having any problems, medical ill-nesses, proper mechanism should be made so that the participants get a forum for redressal of it. The study in order to test the hypothesis required that relevant in-formation are collected from selected persons from a population and these information, if disclosed to third parties, may cause harm or distress [7,8].

**Analysis**: Plan for analysis of the study should be meticulously develop ahead before the study commence based on the distribution and characteristic of the data likely to be obtained. This will prevent manipulation of data later on. Data manipulation usually occurs when the data obtained are not conforming to the desired result and this is an ethical challenge. Researchers are not always honest. Fabrication of data are done to arrive at selective results so as to validate the hypothesis being pursued and at the same time certain valid results contradictory to it are omitted. Sometime intentional changes are made in the analysis to obtain a pre de-sired outcome (Kumar et al., 2018).

**b. Explain three guiding principles of ethical research involving humans**

All research involving human subjects should be conducted in accordance with four basic ethical principles as summarized below:

**Respect for persons;** thisincorporates at least two other fundamental ethical principles, namely: Autonomy, which requires that those who are capable of deliberation about their personal goals should be treated with respect for their capacity for self-determination; and protection of persons with impaired or diminished autonomy, which requires that those who are dependent or vulnerable be afforded security against harm or abuse.

**Beneficence**; this is the ethical obligation to maximize possible benefits and to minimize possible harms and wrongs. This principle gives rise to norms requiring that the risks of research be reasonable in the light of the expected benefits, that the research design be sound, and that the investigators be competent both to conduct the research and to assure the well-being of the research subjects.

**Non-maleficence (“Do no harm”); it** holds a central position in the tradition of medical ethics, and guards against avoidable harm to research subjects.

**Justice**, this principle requires that cases considered to be alike be treated alike, and that cases considered to be different be treated in ways that acknowledge the difference. When the principle of justice is applied to dependent or vulnerable subjects, its main concern is with the rules of distributive justice. Studies should be designed to obtain knowledge that benefits the class of persons of which the subjects are representative: the class of persons bearing the burden should receive an appropriate benefit, and the class primarily intended to benefit should bear a fair proportion of the risks and burdens of the study.

The rules of distributive justice are applicable within and among communities. Weaker members of communities should not bear disproportionate burdens of studies from which all members of the community are intended to benefit, and more dependent communities and countries should not bear disproportionate burdens of studies from which all communities or countries are intended to benefit.

It is usually assumed that these principles guide the conscientious preparation of proposals for scientific studies. In varying circumstances, they may be expressed differently and given different weight, and their application, in all good faith, may have different effects and lead to different decisions or courses of action.

**5. What does it mean when an epidemiologist says there is “interdependence’ between factors?**

Epidemiologist says there is “interdependence’ between factors when factors work together in a given causal mechanism are said to be interdependent or interact causally. For example when person develops an infectious disease, the infectious agent interacts with lack of immunity to cause disease. Falling or some forms of trauma interacts with osteoporosis to cause hip fractures in the elderly. Smoking interacts with generic susceptibility and other environmental carcinogens to cause lung cancer and lastly dietary factors interact with lack of exercise, genetic susceptibility, and arterial thromboembolism to cause a heart attack.

Thus, causal interdependencies have direct health relevance **(Gerstman, B. n.d).**

**6. Identify factors that can lead to an epidemic**

**Human population dynamics and behavior;** As more people populate the planet, there is a greater possibility someone will encounter any infectious pathogen like virus that will spread to others. And, as we are traveling greater distances today than before, this allows viruses to spread more rapidly over greater distances more quickly. For example, the 2014-2015 Ebola outbreaks, cultural norms also can cause infectious diseases to propagate. For example, as families in West Africa cared for sick relatives unknowingly this exposed them to contract the Ebola virus through contact with contaminated body fluids.

**Changes in insect or reservoir populations;** As a virus finds its way into new carriers, it can reach new ecosystems and populations. This was especially critical to the spread of the West Nile virus. This virus is believed to have been introduced into the Western Hemisphere by people or mosquitoes that originated in Eurasia, where it was a well-known viral disease involving animals, mosquitoes and people. We believe that once the virus established itself in a local site near urban New York City, it found a brand new environment to flourish within species of birds and mosquitoes in the United States. This eventually amplified the virus and allowed it to spread across the entire U.S. reaching a large number of people. From 1999 through 2015, more than 43,000 people contracted West Nile Virus disease in the U.S. Birds in the U.S. maintain the virus, and outbreaks could recur in the future.

**Weather and climate changes;** Changes in weather and the climate can drive some animals carrying viruses to different areas, where they could spread disease to people. A perfect example of this is the 1993 outbreak of Hantavirus in the Four Corners region of the U.S. An El Nino weather event in 1992 brought higher than average rainfall to the area. With more rainfall came more plants, and with more plant life came an increase in the local rodent population. As the weather returned to normal and that new habitat vanished, the enlarged rodent population suddenly needed to find additional sources of food and shelter, finding their ways into homes and spreading Hantavirus to nearby residents. Due in part to raising public awareness of the need to rodent-proof homes in the region, the outbreak ended.

**Technology;** Advances in technology have allowed us to identify outbreaks when before illnesses were believed to have a different origin. Consider an apparent increase in Leptospirosis that was observed in Baltimore in the mid-1990s. It was normally considered an uncommon infection and its prevalence largely went unrecognized because diagnosing it was challenging. When newer technologies and better diagnostic tools became available, the likely “true” prevalence of the disease became better understood, and, suddenly, the number of reported Leptospirosis cases appeared to jump.

**Changes to the viruses themselves;** Sometimes, a change in a virus itself allows it to become an epidemic. The flu virus is a great example of how mutations can allow viruses to spread widely among populations. The influenza virus changes on a regular basis as small mutational changes happen (called genetic drift). This is the basis for why we need to develop a new flu vaccine for general use each season. It is also the challenge that vaccine developers face in creating effective countermeasures to seasonal strains of flu. And, on occasion, the type of change seen in circulating strains of the virus come about from bigger shifts in the virus (called genetic shift) leading to some strains of flu that have the potential to cause pandemics. **(George W, 2016)**

**7. Explain the difference between incidence and prevalence of a disease.**

Prevalence represents existing cases of a disease and can be seen as a measure of disease status; it is the proportion of people in a population having a disease while the incidence reflects the number of new cases of disease within a certain period and can be expressed as a risk or an incidence rate. (Noordzi, M., 2010)

**8. Discuss the importance of data in Public Health.**

Datais use to monitor the progresstowards a goal or target. For example, for the Millennium Development Goals, accurate and up-to-date data is essential in order to record progress and determine what countries are on track to meet the goals.  Data from a World Health Organization publication demonstrated the progress that has been made towards achieving Millennium Development Goal 4, which aims to reduce by two thirds the under 5 mortality rate between 1990 and 2015. The report found that child mortality continues to fall, and in 2008, the total annual number of deaths in children under 5 fell to 8.8 million.  This represents a 30% decrease from the 12.4 million estimated in 1990. Though this demonstrated decrease in mortality rate is encouraging, the data also illustrates the need for public health efforts to continue focusing on combating child mortality since a 30% decrease is far from the goal’s target of a 66.7% decrease

Data is used to track whether the target population have received what has been meant for them and which number have not received for example the distribution of insecticide-treated malaria nets for children in some of the African countries where 2.3 million (1.8%) children living in stable malaria conditions were protected. The number increased to 20.3 million (18.5%) in 2007, leaving 89.6 million children unprotected. Of these unprotected children, 54% were living in only seven African countries (Nigeria, Demographic Republic of Congo, Uganda, Sudan, Mozambique, Côte d’Ivoire, and Cameroon), and 25% were in Nigeria alone.

Data can also be used to influence public policy and to demonstrate the need or potential impact of a policy.   There are a variety of transmission modes for HIV.  In Russia, 83% of HIV infections come from needle sharing.  In Ukraine, 64% of HIV infections occur from needle sharing, while the %ages are 74% in Kazakhstan, and 72% in Malaysia. In the United States, needle sharing directly accounts for more than 25% of AIDS cases. In order to prevent needle sharing, there is a proven solution: needle exchange programs which provide injectors with clean needles in exchange for their used ones **(Unite for Sight, n.d).**

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