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MODULE 3 ASSIGNMENT

1. Distinguish between descriptive epidemiology and analytical epidemiology

Epidemiology is the study of the dynamics of a medical condition in a population.

Descriptive epidemiology is to organize and analyze data in order to understand the host characteristics (person/animal and time).

It is also the study of the amount and distribution of disease or other health-related characteristics in human populations by person, place and time. Descriptive epidemiology provides away of organizing and analyzing data on health and disease in order to understand the variations in disease frequency geographically and overtime and how disease varies among people based on a host of personal characteristics (person, place and time). Epidemiology had its origins in the desire to understand the determinants of acute infectious diseases but its methods and applicability have expanded to include chronic diseases as well. It searches for patterns by examining characteristics of a person, place and time. These characteristics are carefully considered when a disease outbreaks, occurs because they provide important clues regarding the source of outbreak, meanwhile analytic epidemiology refers to the studies designed to examine associations. These studies usually begin with hypothesis of a causal relationship. They are usually concerned with identifying or measuring the effects of risk factors or are concerned with the health effects of specific exposures.

Within the framework of analytic epidemiology, there are observational and experimental studies e.g. case-control studies, clinical trials, preventive trials and cohort studies.

According to Pan American Health organization, PAHO and WHO, Analytic epidemiology is to organize and analyze data. It also guides additional research into the causes of disease (search for cases and effects) and explains the Q like Why and How. Epidemiologists use analytic epidemiology to quantify the association between exposures and outcomes and test hypotheses about causal relationships. (Khoda Bisht, may-01-2016)

2. Write down and explain the mathematical expression of the following.

i. Incidence is a measure of the number of new cases of a disease (or other health outcome of interest) that develops in a population at risk during a specified time period.

There are two main measures of incidence that includes;

* Risk or cumulative incidence which is related to the population at risk at the beginning of the study of period.
* Rate is the proportion of individuals in a population (initially free of disease) who develop the disease within a specified time interval. It is expressed as a percentage (or if small as per 1000 persons).

Incidence = Number of new cases per population at risk in a given time period.

Sum of the person-time of the at risk population.

ii. Prevalence- measures existing cases of the disease and is expressed as proportion. It measures the proportion of individuals in a defined population that have a disease or other health outcomes of interest at a specified point in time (point prevalence) or during a specified period of time (period prevalence).

It is mathematically expressed as follows;

Point prevalence= Number of cases in a defined population at one point in time.

Number of persons in a defined population at the same point in time

For example;

Of 10,000 Males residents in the town of Cueibet on the 1st of June 2019, 1000 have typhoid.

The prevalence of typhoid among men in Cueibet town on this data is calculated as;

Prevalence= 1000 = 0.1% or 10%

10,000

Prevalence is a useful measure for quantifying the burden of disease in a given time.

In otherwise, the relationship between prevalence and incidence is that the proportion of the population that has a disease at a point in time (prevalence) and the rate of occurrence of new disease during a period of time (incidence) are closely related.

3. Apart from Randomized trials, describe four (4) other epidemiological research designs

In epidemiology, researchers are interested in measuring or assessing the relationship of exposure with a disease or an outcome.

The study designs can be broadly classified as experimental that includes randomized or observational based on the approach used to assess whether exposure and an outcome are associated.

In this chapter, I talk more on observational epidemiological research design; it involves merely observing the patients in a non-controlled environment without actually interfering or manipulating with other aspects of study and therefore is non-experimental. The observation can be prospective, retrospective or current depending on the subtype of an observational study. Observational is divided into five subtypes as follows.

1. Case-control studies are used to determine the degree of associations between various risk factors and outcomes. The factors that affect the risk of a disease are called exposures. Case-control studies can help identify beneficial or harmful exposures. In a case-control study, as the name suggests, there are two groups of patients-cases and controls. Cases are patients who have a particular disease, condition, or disability. Controls are those patients that do not have the disease. Typically, researchers identify appropriate representative controls for the cases that they are studying from the general population. Then they retrospectively look in the past for the possible exposures these patients might have had to a risk factor. Selecting the patients for the control group is a very critical component of research based on case-control studies. Due to the retrospective nature of the study design, case-control studies are subject to recall bias. Case-control studies are inexpensive, efficient, and often less time consuming to conduct. This study design is especially suitable for rare diseases that have longer latency periods

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1. Case-crossover studies are helpful to study triggers within an individual. When the researcher is studying a transient exposure or risk factor, the case-crossover design is useful. This is a relatively new study design where there is a case and a control component both of which come from the same individual. Each case is self-matched by serving as its own control. Determining the period of the control and case components is a critical and difficult aspect of a case-crossover study.
2. Cohort studies initially classify patients into two groups based on their exposure status. Cohorts are followed over time to see who develops the disease in the exposed and non-exposed groups. Cohort studies can be retrospective or prospective. Incidence can be directly calculated from a cohort study as you begin with exposed and unexposed patients, unlike a case-control study where you start with diseased and non-diseased patients. Relative risk is the measure of effect for a cohort study. Cohort studies are subject to very low recall bias, and multiple outcomes can be studied simultaneously. One of the disadvantages of cohort studies is that they are more prone to selection bias. Studying rare diseases and outcomes that have long follow-up periods can be very expensive and time-consuming using cohort studies.
3. Cross-sectional studies are observational in nature and give a snapshot of the characteristics of study subjects in a single point of time. Unlike cohort studies, cross-sectional studies do not have a follow-up period and therefore are relatively simple to conduct. As the exposure status and outcome of interest information is collected in a single moment in time often by surveys, cross-sectional study design cannot provide cause-effect relationship and is the weakest of the observational designs. This study design is generally used to assess the prevalence of a disease in a population.

4. Data from hospital records are one of the most important sources of information in

epidemiologic studies.

1. Outline the limitations of using hospital data.

* Avoid the averages; most claim data sets are not normally distributed, so the averages do not provide relevant information. In most discussions today, employers evaluate the average cost of employees with specific conditions E.g. diabetes or high blood pleasure.
* Follow the money; a superior use of claims data is to look at distributions of spending. In most plans today, roughly 8% of enrollees are consuming 80% of planned money and these 8% typically change every 12 to 18 months.
* Realize the limitations for equality designations, yet another big error is trying to use claims data to determine the best quality doctors. You had better be really, really talented to try that one. Why? We are making their quality and outcomes look better by referring their most complex and riskiest patients to someone else.
* Misdiagnoses are a real cost driver. Another huge shortcoming of claims data is one that readers of cracking health costs know about namely, a large number of patients with complex health problems are simply misdiagnosed. Today, that is about 20% of the outliers in benefits plan, accounting for 18% of claim money. Thus you cannot rely on diagnoses in claims data.
* Coding can affect the data analysis; during data analysis for every larger employer with more that covered lives, executives told me they had not paid for a solid organ transplant in a number of years. Based on their size they should have been paying for 25 years. After further detective work, we discovered their consultant was using a DRG grouper that coded all transplants as ventilator cases, who knows why but huge error.
* Reversion to the mean; one thing we`ve learned from years of claim data. It all looks about the same ie it reverts to the mean. If the workforce is comparatively older, they will have somewhat more high cost claims.

1. Describe the possible sources of error in interview surveys

* Interview as a source of error affects interview surveys in three ways.

1. Failure to read the question as written;
2. Variation in interviewers' ability to perform the other tasks associated with interviewing, for example, probing insufficient responses, selecting appropriate respondents, or recording information provided by the respondent; and
3. Demographic and socioeconomic characteristics as well as voice characteristics that influence the behavior and responses provided by the respondent.

All three factors suggest that interviewer effects contribute through an increase in variable error across interviewers. If all interviewers make a mistake in the same direction (or their characteristics resulted in errors of the same direction and magnitude), interviewer prejudice would result. For the most part, the literature indicates that among well-trained interviewing staff, interviewer error contributes to the overall variance of estimates as opposed to resulting in prejudiced estimates. (Kasprzyk, 1991).

* Error of observation refers to the degree to which individual responses deviate from the true value for the measure of interest. They are the errors of interest for this research, to be referred to as measurement errors. Observational errors can arise from any of the elements directly engaged in the measurement process including the questionnaire, the respondent and the interviewer, as well as the characteristic that define the measurement process eg the mode and the method of data collection.
* Errors of non-observational refer to errors related to the lack of measurement for some portion of the sample and can be classified as arising from three sources, coverage: non-response (both unit and item non-response) and sampling. Errors of non-observation are the focus of other papers presented in this volume.
* Questionnaire as source of error; ideally a question will convey to the respondent the meaning of interest to the researcher. However, several linguistic, structural, and environmental factors affect the interpretation of the question by the respondent. These factors include the specific question wording, the structure of each question (open versus closed), and the order in which the questions are presented. Question wording is often seen as one of the major problems in survey research; although one can standardize the language read by the respondent or the interviewer, standardizing the language does not imply standardization of the meaning. In addition, a respondent's perception of the intent or meaning of a question can be shaped by the sponsorship of the survey, the overall topic of the questionnaire, or the environment more immediate to the question of interest, such as the context of the previous question or set of questions or the specific response options associated with the question.
* Respond as a source of measurement error; once the respondent comprehends the question, he or she must retrieve the relevant information from memory, make a judgment as to whether the retrieved information matches the requested information, and communicate a response. The retrieval process is potentially fraught with error, including errors of omission and commission. As part of the communication of the response, the respondent must determine whether he or she wishes to reveal the information. Survey instruments often ask questions about socially and personally sensitive topics. It is widely believed, and well documented, that such questions elicit patterns of underreporting (for socially undesirable behaviors and attitudes) as well as over-reporting (for socially desirable behaviors and attitudes). (Micheal Ver Ploeg, 2002)

5. Explain the main determinants of health

Determinants of health are factors such as where we live, genetics, income and education greatly contributes to our health.

These determinants of health include; the social and economic environment, the physical environment and the person`s individual characteristics and behaviors.

* Social and economic environment determinants of health reflect on the social factors and physical conditions of the environment in which people are born, live, learn, play, work and age. Also known as social and physical determinants of health, they impact a wide range of health, functioning and quality of life outcome. Social and economic environment also includes availability of resources to meet daily needs like safe housing, local food market, access to educational, economic and job opportunities and lastly access to health care services.
* The factors in the physical environment that are important to health include harmful substance such as air, pollution or proximity to toxic sites(the focus of classic environmental epidemiology); access to various health related resources E.g. healthy or unhealthy foods, recreational resources medical care and community design and the built environment E.g. land use mix, street connectivity, transport systems. The environment can affect health through physical exposures, such as air pollution. A large body of work has documented the effects of exposure to particles like solid particles and liquid droplets found in the air on cardiovascular and respiratory mortality and morbidity.
* The person`s individual characteristics and behavior determinant is divided into two basic kind;

1. Biological and genetic determinants are fixed individual characteristics that we cannot control. These include things like age, sex, family history of diseases and inherited conditions like sickle cell disease. Some of these factors affect the health of certain populations more than others. For example sickle cell disease is particularly common among people whose ancestors came from sub-Saharan Africa.
2. Behavioral determinants are modifiable individual characteristics that we have some control over such as diet, exercise tobacco use, unprotected sex and alcohol use. Behavioral factors can increase our risk of both chronic diseases and infectious disease for example cigarettes smoking increases an individual risk of chronic diseases such as heart diseases and lung cancer, while unprotected sex increases an individual`s risk of sexually transmitted infection such as HIV. (Tom, 2010-2019)

## References;

1. *OECD. Paris: OECD; OECD environmental outlook to 2050: consequences of inaction 2012*
2. *WHO: Health Impact Assessment 2019 (HIA).*
3. *Study.com: what are Health Determinants?*
4. *Health 302: Health Services Policy/Science courses 2003-2019.*
5. *Insurance Thought Leadership by Tom Emerick 2010-2019*
6. *Studies of Welfare Populations: Data Collection and Research Issue, 06/01/2002.*
7. 1998 Providing National Statistics on Health and Social Welfare Programs in an Era of Change, Summary of a Workshop. Committee on National Statistics. Constance F. Citro, Charles F. Manski, and John Pepper, eds. Washington, DC: National Academy Press.
8. 1999 Evaluating Welfare Reform: A Framework and Review of Current Work. Panel on Data and Methods for Measuring the Effects of Changes in Social Welfare Programs. Robert A. Moffitt and Michele Ver Ploeg, eds. Washington, DC: National Academy Press.
9. 2001 Evaluating Welfare Reform in an Era of Transition. Panel on Data and Methods for Measuring the Effects of Changes in Social Welfare Programs. Robert A. Moffitt and Michele Ver Ploeg, eds. Washington, DC: National Academy Pre
10. "[incidence](https://web.archive.org/web/20090628224336/http:/www.mercksource.com/pp/us/cns/cns_hl_dorlands_split.jsp?pg=/ppdocs/us/common/dorlands/dorland/four/000052861.htm)" at [*Dorland's Medical Dictionary*](https://en.wikipedia.org/wiki/Dorland%27s_medical_reference_works)
11.  Rothman, Kenneth J., Lash, Timothy L., Greenland, Sander. Modern Epidemiology. [ISBN](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [9780781755641](https://en.wikipedia.org/wiki/Special:BookSources/9780781755641) [ISBN](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [0781755646](https://en.wikipedia.org/wiki/Special:BookSources/0781755646)>"[incidence rate](https://web.archive.org/web/20090628224336/http:/www.mercksource.com/pp/us/cns/cns_hl_dorlands_split.jsp?pg=/ppdocs/us/common/dorlands/dorland/seven/000090534.htm)" at [*Dorland's Medical Dictionary*](https://en.wikipedia.org/wiki/Dorland%27s_medical_reference_works)
12.  Last, John M., ed. (2001). A Dictionary of Epidemiology (4 ed.). New York, NY: [*Oxford University Press*](https://en.wikipedia.org/wiki/Oxford_University_Press). [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*978-0-19-514169-6*](https://en.wikipedia.org/wiki/Special:BookSources/978-0-19-514169-6).
13. Coggon D, Rose G, Barker DJ (1997). [*"Quantifying diseases in populations"*](http://www.bmj.com/about-bmj/resources-readers/publications/epidemiology-uninitiated/2-quantifying-disease-populations). [*Epidemiology for the Uninitiated*](http://www.bmj.com/about-bmj/resources-readers/publications/epidemiology-uninitiated) (4th ed.). BMJ. [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*978-0-7279-1102-5*](https://en.wikipedia.org/wiki/Special:BookSources/978-0-7279-1102-5).