From Research to Practice: Training Course in Sexual and Reproductive Health Research

Epidemiologic Studies

Dr. A. Karim Abawi

Geneva Foundation for Medical Education and Research

karim.abawi@gfmer.org

Geneva 2013

Objective of Presentation

This presentation provides a short overview of epidemiologic study designs and distinguish between experimental and observational epidemiologic studies.

This presentation will be followed by detailed presentations on each epidemiologic study (cohort, case-control, cross-sectional, clinical trials).

Epidemiology, Definition

- Epidemiology is considered a basic science of public health.
- Epidemiology is: a) a quantitative discipline built on a working knowledge of probability, statistics, and sound research methods; b) a method of causal reasoning based on developing and testing hypotheses pertaining to occurrence and prevention of morbidity and mortality; and c) a tool for public health action to promote and protect the public's health based on science, causal reasoning, and a dose of practical common sense (1).
- “Epidemiology is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems.” (2).

1. Cates WJ. Epidemiology: Applying principles to clinical practice. Contemp Ob/Gyn. 1982; 20:147-161.
2. Last JM, ed. Dictionary of Epidemiology, Third edition. New York: Oxford University Press, 1995.

Epidemiologic Studies

- “The goal of every epidemiologic study is to gather correct and sharply defined data on the relationship between an exposure and a health-related state or event in a population. The main study designs represent different ways of gathering this information. Given the strengths and weaknesses of each design, there are circumstances for which a particular type of study is clearly indicated”.

Aschengrau A, Seage GR. Essentials of Epidemiology in Public Health. Second ed. Jones & Bartlett Publishers; 2008.

Epidemiologic Studies

- There are two main types of epidemiologic studies:
  - Experimental
  - Observational

Experimental Studies

- In experimental studies the investigator assesses the efficacy of an agent or intervention for the treatment or prevention of diseases or health problems.
- He /she enrolls subjects into two groups: those who receive the agent or intervention (**called treatment group**) and those who do not receive it (**called comparison group**).
- He /she controls the exposure.
- If the investigator assigns treatment at random, the study is known as randomized clinical trial (RCT).
- Experimental studies can also be used for non-clinical purposes, for example community-based interventions such as community mobilization and education on family planning.

Experimental Studies

The links below provide access to some examples of experimental studies:

- Krishna S, Balas EA, Francisco BD, Konig P. Effective and Sustainable Multimedia Education for Children With Asthma: A Randomized Controlled Trial. Children's Health Care. 2006;35(1):75–90. http://www.tandfonline.com/doi/abs/10.1207/s15326888chc3501_7

- Müller O, Traoré C, Kouyaté B, Yé Y, Frey C, Coulibaly B, Becher H. Effects of insecticide-treated bednets during early infancy in an African area of intense malaria transmission: a randomized controlled trial. Bull World Health Organ. 2006 Feb;84(2):120-6. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2626534/

Observational Studies

The two principal types of observational studies:

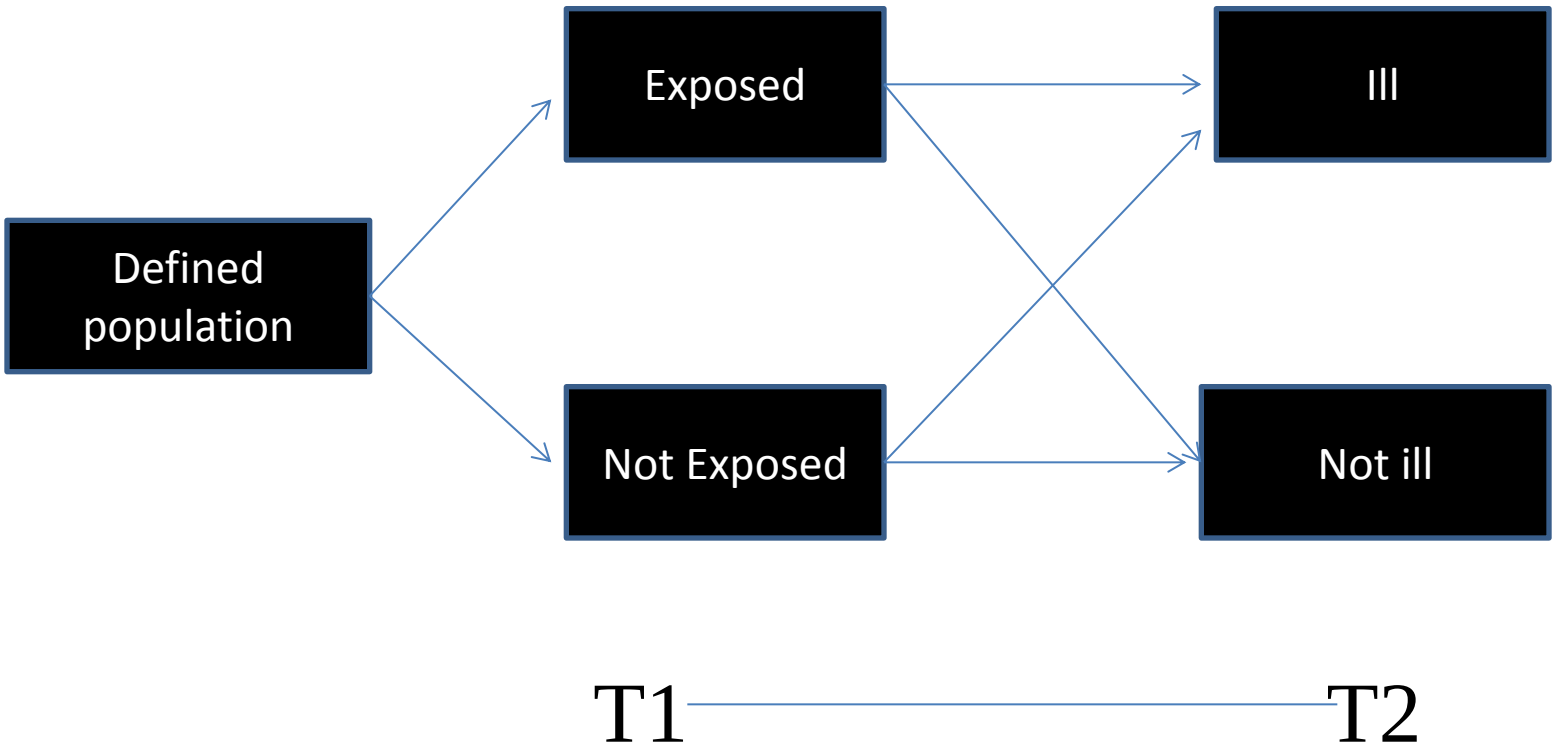
1. Cohort and
2. Case–control

Cohort Study

- In cohort the study population is composed of individuals classified as exposed and not-exposed to a particular agent or condition.

- Both groups are followed for a specific time period to estimate the occurrence of an outcome or development of a health problem.

Cohort Study



Cohort Study

The links below provide access some examples of cohort study:

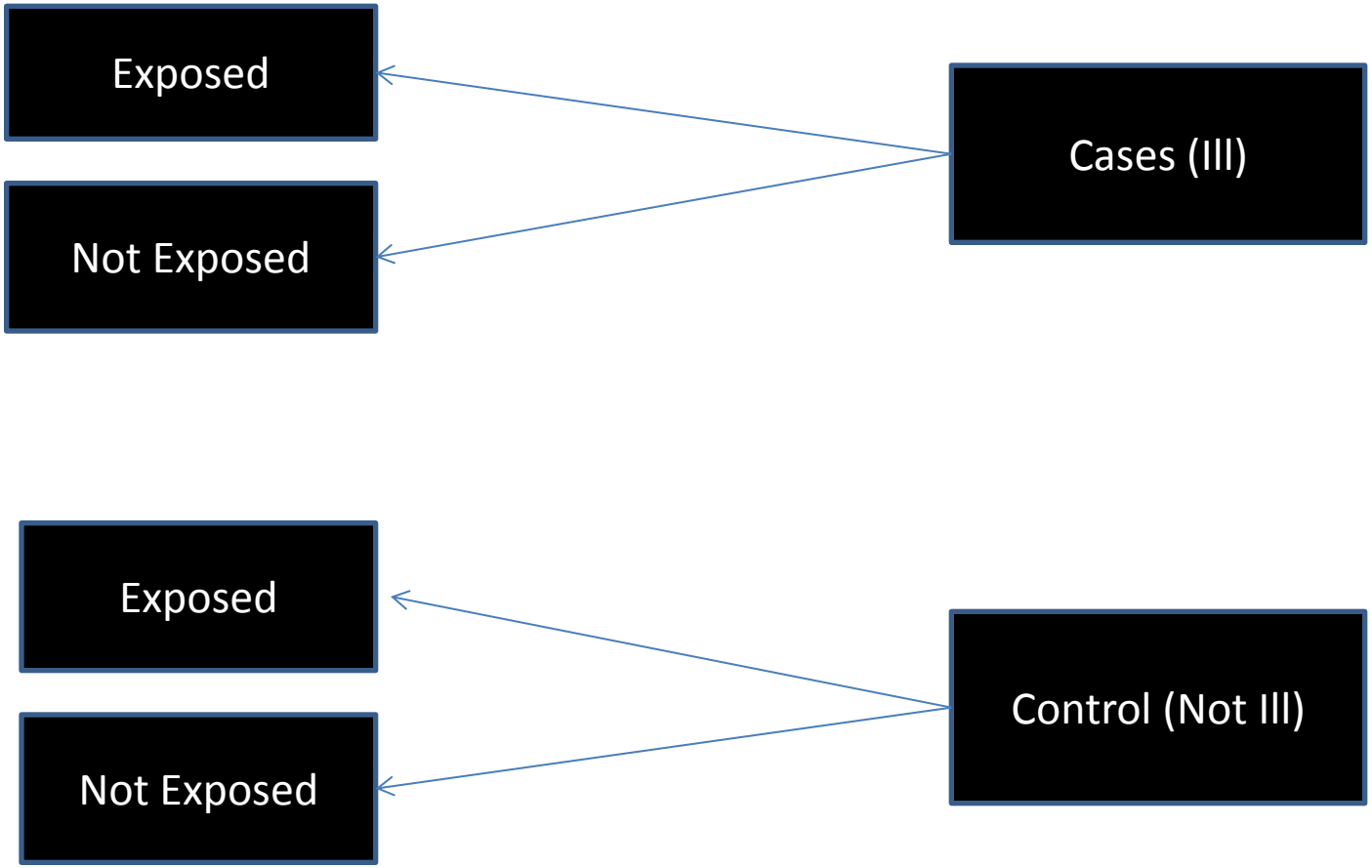
- de Oliveira RV, Martins MD, Rios LT, Araujo Júnior E, Simões VM, Nardozza LM, Moron AF. Predictive model for spontaneous preterm labor among pregnant women with contractions and intact amniotic membranes. Arch Gynecol Obstet. 2012 Jun 7. http://www.ncbi.nlm.nih.gov/pubmed/22674420

- Maman D, Glynn JR, Crampin AC, Kranzer K, Saul J, Jahn A, Mwinuka V, Ngwira MH, Mvula H, Munthali F, McGrath N. Very early anthropometric changes after antiretroviral therapy predict subsequent survival, in karonga, Malawi. Open AIDS J. 2012;6:36-44. http://www.ncbi.nlm.nih.gov/pubmed/22670166

Case Control Study

- The case control study determines the association of an exposure to a disease, by identifying a group of individuals with disease and for purpose of comparison, a group of people without disease.
- The investigator collects retrospectively information on exposure history to a risk factor from both groups.
- Subjects with disease are called **cases** and subjects without disease are called **controls**.

Case Control Study



Case control Study

The links below provide access to some examples of case control study:

- Teo KK, Ounpuu S, Hawken S, Pandey MR, Valentin V, Hunt D, Diaz R, Rashed W, Freeman R, Jiang L, Zhang X, Yusuf S; INTERHEART Study Investigators. Tobacco use and risk of myocardial infarction in 52 countries in the INTERHEART study: a case-control study. Lancet. 2006 Aug 19;368(9536):647-58. http://www.ncbi.nlm.nih.gov/pubmed/16920470
- Inumaru LE, Irineu Gomes Duarte Quintanilha M, Aparecida da Silveira E, Veloso Naves MM. Risk and protective factors for breast cancer in midwest of Brazil. J Environ Public Health. 2012;2012:356851. http://www.hindawi.com/journals/jeph/2012/356851/

Cross–Sectional Studies

- “A cross-sectional study examines the relationship between diseases (or other health-related characteristics) and other variables of interest as they exist in a defined population at one particular time.”

Last JM. *A Dictionary of Epidemiology.* 3rd ed. New York, NY: Oxford University Press; 1995.

Cross–Sectional Studies

- Cross sectional studies measure simultaneously the exposure and health outcome in a given population and in a given geographical area at a certain time.
- It provides a snapshot on the prevalence and characteristics of health problem or condition in a population.
- Cross-sectional studies are mostly carried out for public health planning. For example “Knowledge, attitude and practice (KAP) of family planning methods among women attending antenatal clinic in area x” is a cross-sectional study.

Cross–Sectional Studies

The links below provide access to the abstracts of some examples of cross-sectional studies:

- Nguyen PH, Budiharsana MP. Receiving voluntary family planning services has no relationship with the paradoxical situation of high use of contraceptives and abortion in Viet Nam: a cross sectional study. BMC Womens Health. 2012 May 28;12(1):14. http://www.ncbi.nlm.nih.gov/pubmed/22639926
- Udonwa NE, Ogbonna UK. Patient-related factors influencing satisfaction in the patient-doctor encounters at the general outpatient clinic of the university of Calabar teaching hospital, Calabar, Nigeria. Int J Family Med. 2012;2012:517027. http://www.ncbi.nlm.nih.gov/pubmed/22675629

References

- Aschengrau A, Seage GR. Essentials of Epidemiology in Public Health. Second ed. Jones & Bartlett Publishers; 2008.
- Epi Glossary | CDC Reproductive Health. Available from: http://www.cdc.gov/reproductivehealth/epiglossary/glossary.htm
- Clinical Epidemiology Glossary. Evidence Based Medicine Toolkit. Available from: http://www.ebm.med.ualberta.ca/Glossary.html