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| SUBJECT | GENERAL EPIDEMIOLOGY AND HEALTH DEMOGRAPHICS | | | | | |
| CREDITS | Total | 4 | Theory | 2 | Practical | 2 |

GENERAL OBJECTIVES

To enable students to use basic demographic principles in population diagnosis as applied to public health.

To provide students with the basic scientific principles and knowledge of epidemiological methodology as applied to the professional needs of the general physician.

SPECIFIC OBJECTIVES

At the end of the course, students should be able to:

Identify types of demographic study and the main differences between period and cohort studies.

- Use the basic tools of quantitative demography in order to describe a population and recognize the influence of demographic factors on health and disease.

Given a demographic pattern, identify the population model it refers to and the main health problems associated with the individuals in it.

Define the links between demography and other areas of scientific knowledge, with emphasis on links with the practice and needs of medicine.

- Given a demographic summary measure (e.g. index, proportion, rate or ratio), identify the components used in the calculation. Likewise, they must be able to calculate a demographic measure as requested on the basis of sufficient data.

Knowing how a set of demographic data has been collected, identify its limitations and the errors and/or bias which may be present.

Explain the concept of population volume or size and define the different kinds of population in a given geographical area.

Given a set of distribution data by age and a second variable (sex, ethnicity, etc.), construct the corresponding pyramid for the population in question.

Given an age pyramid, with or without a second variable, identify the type of society from which it comes, the events which will have occurred in order to produce the distribution in question and the health implications associated with the distribution.

Identify the particular demographic and health characteristics of a migrating population and define the concept and types of migration.

Given a set of data referring to the natality, mortality and migratory equilibrium of a population, assess these data and offer a projection of this population. Distinguish between the following concepts and describe the information provided by each one: fertility, fecundity, fecundability and reproduction.

Given data on fecundity, natality and nuptiality, calculate the different indicators and recognize the information they provide and the health problems they reflect.

Given fecundity cohort data, draw up fertility tables and calculate the specific fertility indices by age and the totals.

Given overall and specific mortality rates, identify the elements used to calculate them.

Given infant mortality data, calculate and distinguish between the components of infant mortality, highlighting the meaning of each one in terms of health.

Given overall (gross or crude) rates for a given demographic phenomenon, identify and correct the distortions caused by age, sex and other variables as regards the data interpretation.

Given overall rates for two populations, apply the standardization methods (direct and indirect) required to compare and homogenize them.

Given overall rates for a population and mortality by age, or specific mortality rates by age, apply the concept of longitudinal mortality to calculate the functions required to draw up a life table.

Given a life table, interpret correctly the different components or columns, with special emphasis on the calculation and interpretation of life expectancy at birth and at different ages.

Describe the historical development of epidemiology.

Define the current concept of epidemiology.

List the applications of epidemiology.

Distinguish between the concepts of incidence and prevalence.

Distinguish between the concepts of accumulative incidence and incidence density.

Define the concept of epidemiological method.

Describe the stages of the epidemiological method.

Understand the need to apply the epidemiological method in order to study human populations.

Distinguish between the statistical and epidemiological methods.

List the variables which define a health problem.

Describe the variables linked to people.

Describe the variables linked to the time factor.

Describe the variables linked to geographical area.

Understand the importance of descriptive variables in formulating an epidemiological hypothesis.

Classify descriptive epidemiological studies.

Explain the characteristics of descriptive studies of morbidity and mortality.

Explain the characteristics of temporal correlations.

Explain the characteristics of ecological correlations.

Explain the characteristics of cross-sectional or prevalence studies.

Describe the objectives of cohort studies.

Explain the design of a cohort study.

Identify the criteria for choosing comparison groups.

Indicate the advantages of cohort studies.

Indicate the disadvantages of cohort studies.

Describe the objectives of a case-control study.

Explain the design of a case-control study.

Identify the criteria for choosing the case group and the control group.

Indicate the advantages of case-control studies.

Indicate the disadvantages of case-control studies.

Be familiar with the characteristics of other observational epidemiological designs. Hybrid studies.

Define the concept of relative risk.

Describe the characteristics of relative risk.

Define the concept of attributable risk.

Define the concept of odds ratio.

Indicate the conditions for comparing odds ratio and relative risk.

Define the concept of population attributable risk.

Define the concept of population attributable fraction.

Distinguish between the different applications of epidemiological measures of association and impact.

Describe the objective of epidemiological intervention studies.

Distinguish between the concepts of epidemiological efficacy and effectiveness.

Classify the different types of experimental study.

Describe the design and stages of a clinical trial.

Describe the design of a community trial.

Describe the characteristics of meta-analysis.

Describe the characteristics of different experimental studies.

Indicate the types of association between variables.

Explain the concept of cause in epidemiology.

Describe causal models.

Define the phenomenon of interaction between causes.

Explain the criteria of epidemiological causality.

- Explain the characteristics of selection bias, information bias and confounding factors.

Identify the possible forms of bias in an epidemiological study.

Develop strategies for controlling bias at both the design level and when analysing study results.

Describe and calculate the epidemiological parameters that measure the reproducibility of results.

Analyse the scientific validity and reliability of an epidemiological study.

Design an epidemiological study according to a given health problem.

Distinguish between the concepts of sensitivity and specificity of a screening test.

Define the concept of predictive value of a screening program.

Calculate the epidemiological parameters of a disease detection program.

Develop the epidemiological techniques required to formulate an explanatory hypothesis with respect to an exceptional epidemic situation.

SYLLABUS

Theory

Basic demographic concepts

Definition. History. Applications. Relationship with other disciplines. Demographic events and phenomena. Basic measures: Ratio; proportion; index; percentage; rate. Types of demographic study. Importance of demography in the health sciences.

Sources of information

Background. Censuses and registers. Registers of demographic events: births, deaths and marriages. The natural movement of a population. Other sources of demographic, social and health information. Validity and reliability of demographic data.

Demographic structure of a population

Volume Population distribution according to age and sex: age pyramids. Population distribution according to other parameters. Population and territory: density and urban concentration. Health implications.

Population dynamics

Measures of population change. Demographic analysis: natality, nuptiality, fecundity, ageing, migratory movements and mortality. Natural growth. Total growth. Techniques for making demographic projections: uses and limitations.

Natality and fecundity

Definition, calculation and interpretation of natality, nuptiality and fecundity rates. Synthetic fecundity index. Fecundability. Reproduction. Health applications. Population policy.

Mortality

Definition, calculation and interpretation of different mortality indicators. Overall and specific rates. Infant mortality: concept, calculation and importance in terms of health. Studies of mortality according to levels and trends: applications to health planning. Definition, calculation and interpretation of morbidity indicators.

Standardization

Concept. Importance of standardizing rates in the field of health sciences. Uses and limitations. Direct method: objective, elements, conditions of application and interpretation. Indirect method: objective, elements, conditions of application and interpretation. Medical and health examples.

Life tables

Concept, how to draw them up and different types. Calculation and interpretation of life expectancy at birth and at certain ages. Clinical and health applications of these techniques. Life expectancy at birth and the human development index.

General epidemiology: Introduction and basic definitions

Concept of epidemiology and its current applications

Quantification of epidemiological parameters. Measures of morbidity and mortality

Research with human populations. The epidemiological method

Descriptive epidemiology

Descriptive epidemiological variables

Descriptive epidemiological studies

Analytic and experimental epidemiology

Observational epidemiological studies: cohorts

Observational epidemiological studies: case–control designs

Epidemiological measures of association and impact

Epidemiological intervention studies: experimental designs

Hybrid designs. Meta-analysis

Epidemiological causality

Theory of epidemiological causality

Practical

Seminars

1. Internal and external validity. Concept of bias or systematic error. Classification
 2. Bias control strategies.
 3. Epidemiological reliability. Measures of concordance.
 4. Planning and carrying out an epidemiological study
 5. Epidemiological bases of early detection of diseases
 6. Calculating measures of frequency, association and impact
- Analysing and carrying out a study of an epidemic outbreak

Laboratory

1. Describing populations and types of population pyramids
2. Population dynamics. Models of growth and methods of stimulation
3. Calculating fecundity and mortality rates
4. Methods for standardizing rates
5. Drawing up life tables

LEARNING RESOURCES AND TEACHING METHODS

Theory classes

These introduce and describe the basic concepts and content of the program in a structured and systematic way

Seminars

These aim to enable discussion and analysis of various methodological aspects of the syllabus.

Laboratory work

Solving problems by calculating the main demographic and epidemiological indicators.

Tutorials

Classroom-based and online.