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PUBLIC HEALTH AND EPIDEMIOLOGY

BANS-184

Chapter Wise Reference Book
Including Many Solved Sample Papers

Based on

C.B.C.S. (Choice Based Credit System) Syllabus of

I.G.N.O.U.

& Various Central, State & Other Open Universities

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Content

PUBLIC HEALTH AND EPIDEMIOLOGY

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BLOCK-1: ESSENTIALS IN EPIDEMIOLOGY AND PUBLIC HEALTH

BLOCK-2: PSYCHOLOGICAL, BEHAVIOURAL, AND SOCIAL ISSUES IN PUBLIC HEALTH AND MANAGEMENT

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QUESTION PAPER
June – 2024
(Solved)
PUBLIC HEALTH AND EPIDEMIOLOGY

BANS-184

Time: 2 Hours]   **[Maximum Marks : 50**

*Note: Attempt any **five** questions at least **two** questions from each section. All questions carry equal marks.*

SECTION – A

Q. 1. Briefly discuss the origin and development of public health.

Ans. Ref.: See Chapter-2, Page No. 15, 'Public Health – Origin and Development'.

Q. 2. Write an account on National Health Programmes in India.

Ans. Ref.: See Chapter-7, Page No. 86, 'National Health Programmes in India'.

Q. 3. Briefly describe various types of descriptive studies.

Ans. Ref.: See Chapter-1, Page No. 7, Q. No. 1, Page No. 3, 'Descriptive Studies', 'Case Reports', Page No. 4, 'Case Series'.

Q. 4. Write short notes on any two of the following:

(a) Communicable diseases.

Ans. A communicable disease is one that spreads from one person or animal to another or from a surface to a person. They are the result of pathogens, such as viruses and bacteria. Communicable diseases include colds and flu.

Communicable diseases can transmit through contact with bodily fluids, insect bites, contaminated surfaces, water, and foods, or through the air. A communicable disease is any disease that passes between people or animals. People sometimes refer to communicable diseases as "infectious" or "transmissible" diseases.

Pathogens, including bacteria, viruses, fungi, and protozoa, cause communicable diseases. Once a pathogen has entered a person's body, it often will begin replicating. The individual may then begin to experience symptoms.

Symptoms will vary depending on the disease. Some people will not experience any symptoms. However, they can still transmit the pathogen.

Some symptoms are a direct result of the pathogen damaging the body's cells. Others are due to the body's immune response to the infection. Four main types of pathogens cause infection: Viruses, bacteria, fungi, and protozoa.

(b) Health Care Services.

Ans. Ref.: See Chapter-7, Page No. 83, 'Healthcare: Basic Concepts'.

(c) Vaccination.

Ans. Lister introduced sterilization using carbolic acid (phenol) to exclude air germs in the 1860s, revolutionizing surgical practice. Koch discovered the germs that cause cholera and tuberculosis in the 1880s. The germ hypothesis contributed to a new understanding of the role of particular microorganisms in the development of a particular disease or disease process. In the history of public health, the germ theory is regarded as a turning point in the effort to avoid disease.

Another medical procedure that had an impact on public health was vaccination. Edward Jenner, an English country physician, showed smallpox vaccine in

1796 (Figure). Based on his knowledge of vaccination and associated research, Jenner created immunity to small pox by exposing people to the relatively benign cowpox disease. Jenner hypothesized that a case of cowpox led to protection against smallpox since he was aware that milkmaids were immune to the disease. James Phipps, the son of Jenner's gardener, had an incision made in his arm, and Jenner injected pus from Sarah Nelmes, a milkmaid who had cowpox.

When Jenner exposed the boy to smallpox a few days later, it was discovered that he was immune. In honour of the Latin word for cow, Jenner named his new technique "vaccination" (vacca).

In England and Wales, smallpox immunization became mandated in 1853, 30 years after Jenner's passing. It took more than a century for smallpox, a disease that claimed millions of lives, to be completely eradicated by vaccine. The prevalence of infectious diseases such as measles, whooping cough, tetanus, rubella, flu, polio, yellow fever, pneumococcal disease, and meningococcal disease has significantly decreased because of vaccination.

SECTION – B

Q. 5. Discuss the impact of globalisation on human health.

Ans. Ref.: See Chapter-5, Page No. 60, 'Globalization and Impact on Health'.

Q. 6. Elucidate the role of NGOs in health sector of India.

Ans. Ref.: See Chapter-7, Page No. 88-89, 'Role of NGOs in Health Sector of India'.

Q. 7. Define environmental health. Discuss the effects of biological, chemical and physical agents in air on human health.

Ans. Ref.: See Chapter-3, Page No. 36, Q. No. 1, Page No. 31, 'Effects of Biological, Chemical and Physical Agents in Air on Human Health'.

Q. 8. Write short notes on any two of the following:

(a) t-test.

Ans. Ref: See Chapter-8, Page No. 104, Tes for Means (t-test)'.

(b) SPSS.

Ans. Ref.: See Chapter-9, Page No. 125, 'Creating Data Files in SPSS'.

(c) ANOVA.

Ans. Ref.: See Chapter-10, Page No. 149, 'Analysis of Variance (ANOVA)'.

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PUBLIC HEALTH AND EPIDEMIOLOGY

BLOCK 1: ESSENTIALS IN EPIDEMIOLOGY AND PUBLIC HEALTH

Epidemiology

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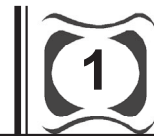
INTRODUCTION

The word "epidemiology" comes from three Greek words: "epi," which means "upon," "demos," which means "people," and "logos," which means "study." Together, these terms imply "study upon people."

This subfield of medicine investigates everything having to do with human illness and health. The study of the distribution and determinants of health-related states or occurrences in specified populations, as well as the application of this study to the prevention and control of health problems, is what epidemiology is defined as.

CHAPTER AT A GLANCE

HISTORY OF EPIDEMIOLOGY

Epidemiology has a long history that dates back to 400 B.C. Indian context is highlighted in this chapter. Historical turning points are discussed in relation to each time frame/year.

Period/year	Milestone
400 B.C.	Greek physician Hippocrates discussed how the environment might affect health. Outlined what "endemic" and "epidemic" mean.
1334	Petrach proposed the clinical trial concept.
1543	An Italian doctor named Girolamo Fracastoro proposed that sickness is brought on by living, invisible tiny particles.
1546	Girolamo Fracastoro's book "De Contagiosis Morbis" introduced the germ hypothesis of disease.
1646	French scientist Rene Descartes proposed reductionism, which holds that is focusing on one aspect at a time and using the evidence instead of imagination.

Period/year	Milestone
1662	In his book "His Natural and Political Observations Upon the Bills of Mortality," Johan Graunt discussed specific deaths and their causes in London. Additionally, he proposed Life tables and used a quantitative approach to study patterns of birth, death, and disease prevalence.
1668	Englishman Thomas Sydenham introduced the idea of generic diseases.
1675	A Dutch scientist named Antonie von Leeuwenhoeck provided support for the germ theory of disease by constructing the microscope.
1700	In his book "De Morbis Artificum Diatriba," Italian doctor Bernardino Ramazzini detailed the incidence of similar occurrences among employees who shared a workspace.
1707-1777	The classification of disease was first attempted by François Bossier de Lacroix.
1707	In his work "De Subitaneis Mortibus," Giovanni Maria Lancisi outlined the pathological examinations of a number of unexpected deaths that occurred in Rome, Italy.
1713	Bernardino Ramazzini reported higher rate of breast cancer in runs than in married women.
1747	A Scottish doctor named James Lind established through the first clinical experiment that consuming citrus fruits can treat the scurvy disease.

Period/year	Milestone
1775	Percivall Pott, an English surgeon, suggested that exposure to soot was causally linked to a higher prevalence of scrotal cancer.
1780	Chennai was where the first dengue-like disease in India was reported.
1798	Edward Jenner, an English doctor, hypothesised that cow pox could protect against smallpox.
1801	In England, death registration was implemented.
1802	In India, the smallpox vaccine was first introduced.
1838	The national system of death causes in England was started by William Farr.
1842	Edwin Chadwik published a report on the sanitation problems of the working people in Great Britain.
1842	In Massachusetts, United States, a system for registering births, deaths, and marriages was developed.
1847	Ignaz Philipp Semmelweis, a Hungarian doctor, established that treating pregnant patients in obstetric clinics with clean hands will prevent the occurrence of Puerparel fever.
1850	Lemuel Shattuck published the Sanitary Commission of the State of Massachusetts Report in the United States. An essay on communicable diseases was presented in 1853 by English doctor John Snow.
1854	John Snow reported source of Cholera outbreak in London.
1893	The International Statistical Institute adopted the First International Classification of Diseases.
1894	A Swiss/French bacteriologist named Alexander Yersin made the discovery of Yersina Pestis.
1897	Dr. Waldemar Mordecai Haffkine created the first vaccine for the plague in India.
1911	Indian Council of Medical Research was established.
1915	In Switzerland, the use of iodized salt to treat goitre was suggested.

Period/year	Milestone
1924	In a number of nations, iodine salt was introduced at the local level.
1939	"Principles of Medical Statistics" is a textbook written and published by AB Hill in England.
1948	World Health Organization was established.
1948	In order to determine the risk factors for cardiovascular illnesses, the Framingham Heart Study was started in Framingham, Massachusetts, in the United States with a cohort of 5209 men and women between the ages of 30-62.
1950	Morton L. Levin and colleagues Ernest Ludwig Wynder, Evarts Ambrose Graham, Richard Shaboe Doll, and Austin Bradford Hill published three case-control studies on the link between smoking and lung malignancies.
1950	Methyl mercury poisoning of fish known as Minamata Disease was reported in Japan.
1950	Dengue was first discovered in Philippines and Thailand.
1951	Richard Doll and Austin Broad Ford-Hill started the British Doctors Cohort research in England.
1952	The first human cases of the Zika virus sickness were discovered in Uganda and Tanzania.
1952	Primary Health Centres were started in India.
1953	Harold Dorn ordered a study on US Veterans that included a group of 220000 males.
1953	National malaria control programme was started in India.
1954	In New York, E. Culer Hammond and Daniel Horner started an investigation into the link between smoking and lung cancer.
1954	In order to determine if Salk's dead virus effectively prevents poliomyeolitis, a Salk vaccine experiment was started in the United States.
1955	National Leprosy Control Programme was launched in India.

Period/year	Milestone
1957	The first textbook on non-communicable illness epidemiology, "Uses of Epidemiology," was written by Scottish epidemiologist Jerry Morris.
1957	Seven Countries Study was started by Ancel Keys to investigate the link between food and coronary artery disease.
1962	India started a national tuberculosis control programme.
1963-1964	First clinically proved dengue case was reported in Kolkata, India.
1964	United States Surgeon General's report on smoking and health was submitted.
1965	A Bradford-Hill from England suggested nine ideas to establish the disease's causal relationship.
1966	The last human plague case was reported in India.
1975	Eradication of smallpox was announced in India.
1976	Democratic Republic of the Congo and Sudan both reported cases of the Ebola virus sickness.
1980	The World Health Organization declared smallpox eradicated
1981	In the United States, the first example of a human immunological disorder has been documented.
1983	First National Health Policy was proposed in India.
1984	In India, an effort to eradicate guinea worms was started.
1985	In India, the Universal Immunization Program was launched.
1986	HIV case first reported in India.
1992	The United States Center for Disease Control and Prevention was founded.
1992-1993	India performed its first national family health survey.
1993	India has started its updated national tuberculosis control programme.
1997	In India, a national polio surveillance programme was started.
1999	In India, the National Institute of Epidemiology was founded.

Period/year	Milestone
2002	Two people in South China have been reported to have severe acute respiratory syndrome.
2002	Second National Health Policy was proposed in India.
2005	National Rural Health Mission was initiated in India.
2010	In India, a national programme for the prevention and management of cancer, diabetes, CVD, and stroke was launched.
2017	Third National Health Policy was presented in India.
2017	First outbreak of Zika virus disease reported in India from Gujarat and second outbreak in Tamil Nadu.
2018	International Classification Diseases, version 11, was released.
2018	A national health protection programme called Ayushman Bharat was introduced.
2019	SARS Corona virus-2 was found in Hubei Province's Wuhan in China.

TYPE OF STUDY DESIGNS

Observational studies and Experimental studies are the two basic categories into which epidemiological study designs can be split.

Observational Studies

Observational studies report the frequency and distribution of illnesses or fatalities by time (year/month/week/day/hour/season), location (country/urban-rural/institutions/hospitals/old age homes/schools), and demographic characteristics. (age/sex/income/education/occupation/ marital status/religion/caste).

(i) Descriptive and

(ii) Analytical studies are the two categories into which observational studies fall. In descriptive research (case reports/case series), just the disease is mentioned; in analytical studies (ecological/case-control/cross-sectional/ cohort), the link between variables (causative factors) and diseases is described.

Descriptive Studies: Case reports and case series are the two categories of descriptive research once more.

Case Reports: Case reports describe incidents of unexpected symptoms, signs, or deaths that occurred during clinical practice and include the clinician's presentations that can be used to characterize newly discovered clinical diseases or entities. These case reports are helpful for developing hypothesis in clinical practice and for investigating in epidemiological

studies. Consider a patient with renal insufficiency that has coagulopathy.

Case Series: Case series are new clinical entities, new cases, or new fatalities that share similar traits, symptoms, or signs and are compiled by a single doctor or group of clinicians. They are helpful for defining new cases, for understanding the range of symptoms and indications, and when patients are tracked until their deaths, they are helpful for examining the natural course of disease. In the case of unexpected fatalities within a certain geographic area, the statistics are often gathered from clinicians, however occasionally they are also obtained from populations. The distribution of disease by location, period, socio-economic position, religion, and ethnicity can be determined using data from case series. After case studies of young men who had Kaposi's sarcoma and pneumocystis carinii pneumonia were published, the term "acquired immune deficiency syndrome" was coined. Data from case series can be utilized to create hypothesis. It is simple to gather, affordable, and readily available. Because there is no available denominator, there is no comparison group, there is sampling variation, and only a small number of cases are recruited, case-series data cannot be used to compute illness rates. For instance, case studies on symmetrical acrokeratoderma, (dermatosis).

Analytical Studies

Analytical studies are of four types:

1. Ecological Studies: These kinds of studies examine the relationship between the frequency of an illness or outcome and the amount of exposure in groups within or between populations.

The unit of analysis in this type of study is the population, not the individual. Grouping can be done based on socio-economic level, time, place (birthplace, domicile, factory, or school), or a combination of place and time. Ecological research is used to develop hypothesis.

It is possible to use information from public and private sources, registries, death certification agencies, and past epidemiology surveys. For instance, in this kind of study, which examines the prevalence of cancer in various nations, information on the age distribution and illness status can be found in census data and tumour registries. For instance leprosy's geographic spread in India.

2. Case-Control Studies: These studies look into the causes of disease, are appropriate for studying uncommon and long-lasting (chronic) diseases, are affordable, require fewer subjects, are simple to conduct, don't expose subjects to risk, don't show any sign of subject dropout, have few ethical issues, and can be finished quickly. The individual is the study's unit. Newly diagnosed cases are contrasted with healthy people.

By reviewing case records, speaking with patients, patients' families, or controls, or by running biochemical tests, it is possible to determine how exposed both cases and controls were to potential risk factors. These studies are classified as either retrospective (if the data

collection is still ongoing) or prospective (if the study works backwards from outcome/disease to cause).

Hospitals, patient registries, cross sectional studies, case series, and cohort studies are used to source cases. The controls are recruited from the same region, spouses, friends, the same workplace, factory, or institution, or patients with different diseases who were treated at the same hospital. To lessen selection bias, cases and controls can be matched for age, sex, ethnicity, and social class (income, education, and occupation). The odds ratio is used to assess the relationship between exposure (the causal agent/risk factor) and the disease/outcome. Finding appropriate controls can be challenging, subjects may not be representative of the population, prevalence, incidence, or attributable risk cannot be estimated, therapeutic effectiveness cannot be determined, it is impossible to distinguish between causative and ancillary factors, case-control research suffers from confounding (due to subject mismatch), recall (cases are more likely to recall the presence of events), selection (subjects are not recruited in accordance with standard use of anthropometric characteristics) and indices in a case-control study, for instance.

3. Cross-Sectional Studies: These studies look at exposure and the result (disease) simultaneously. There are no discernible temporal relationships between exposure (risk factors) and results. Individuals make up the study's unit. These studies are helpful for examining chronic illnesses and fixed exposures like age, gender, ethnicity, and genotype, as well as for concurrently examining many risk factors. These investigations are simple to carry out and provide information on illness burden that may be utilized to build health infrastructure and allocate resources and people. It is affordable and easily finished in a short amount of time. Repeating a cross sectional study on the same population can function as a cohort study, and repeating it on a different sample is helpful for examining illness trends. Data on previous and current exposures are kept track of for changeable exposure.

The results are extrapolated to the target group after research on a representative population. These investigations are often known as prevalence studies. The prevalence can be compared to other populations if it is standardized using the information from standard populations. This kind of research can look at the disease as well as its factors. Random sampling methods like simple, systematic, clustered, stratified, multistage, and mixed sampling are employed to prevent sample bias. Typically, the denominator represents the overall population under study or the population at risk. A percentage or per 1000 participants is used to represent prevalence.

According to the amount of time involved, there are three types of prevalence studies. They are lifetime, point, and period prevalence.

Cohort Studies: Longitudinal incidence studies are what these investigations are known as. Cohort refers to a population group. Birth cohorts, marriage