School of Epidemiology and Public Health
Datta Meghe Institute of Medical Sciences
(Deemed to be University), Wardha

NAAC Re-accredited Grade 'A+'

Updated Curriculum of Epidemiology for AIPHDCET under DMIMS (DU)

(Theme based)

Submitted for BOS approval: 24 /07/2021

Date of approval :

Applicable for year/ batch :

Content :

Updated Curriculum of Epidemiology for AIPHDCET, DMIMS(DU)

Background:

Epidemiology is defined as the distribution and determinants of disease frequency or health events in man. Modern day epidemiology is different from the earlier period where it just referred to as study of epidemics. It now includes comprehensive methods for control of diseases, including non-communicable diseases. Distribution refers to the time; place and person characteristics of disease while the determinants (what determines disease) are generally characterized as agent, host and environmental factors. Since freedom from disease allows an individual to remain healthy, it is also important to find out how and why individuals do not suffer from disease and remain healthy. Such analyses will help in finding solutions to disease and maintaining good health.

THEME 1: BASICS OF EPIDEMIOLOGY

- Introduction to Epidemiology/Science of Public Health ,
- Basic Terminology, Historical Aspects ,
- **Definition of Epidemiology,** Aims and Uses.
- **Disease frequency**
- **Distribution of disease**
- **Determinants of disease**
- History of health programs and strategies
- Objectives of Epidemiology
- Scope of Epidemiology
- **Measurement in epidemiology:** Rate ratio, proportion, standardised rates,
- **Measurement of morbidity and mortality**: Incidence, Prevalence, Relationship between Prevalnce and Incidence (P= I x Duration of illness) , Attack rate, Secondary Attack Rate, Age-adjustment, and survival analysis, Mortality Indicators – Crude Death Rate, Infant Mortality rate, Maternal mortality rate , Case Fatality Rate, Specific death rate , Survival rate
- Characteristic of health indicators / SMART indicator approach
- **Uses of Epidemiology**
    - To assess the magnitude or burden of disease in a community. It, therefore, helps in studying the occurrence of disease in a population.
    - b. To assess the health status of communities. It, therefore, helps in establishing a community diagnosis.
    - c. To search for determinants of disease. To find out how and why disease is caused is a major use of epidemiology.
    - d. To estimate an individual's risks and chances of suffering from a disease and to establish the prognosis in an individual suffering from disease.
    - e. To plan comprehensive health services, including specific strategies and ways and means of implementation.
    - f. To evaluate strategies and interventions for disease control. Such evaluation helps in identifying weaknesses and to suggest remedial measures for the future. Evaluation of costs and benefits or effectiveness of specific interventions is also an integral use.
    - g. To complete the natural history of disease. In a hospital setting only the terminal cases are seen and how disease starts and presents in its initial stages is only possible by studying disease in the community.

- h. To forecast future disease trends.
- i. To identify syndromes.

- **Screening of disease :**
  - Epidemiologic and Public Health Basis of Screening for Diseases
  - Define screening
  - Difference between screening and diagnostic test
  - Lead time
  - Uses of screening
  - Criteria for screening test
  - Validity of screening test (sensitivity, specificity, predictive value)
  - High-risk screening

THEME 2- EPIDEMIOLOGICAL STUDY DESIGNS AND APPROACHES

- Classification of epidemiological methods
- Descriptive Epidemiology and cross-sectional studies- Seasonal trend, Cyclical Trend, Spot Map,.etc
- Analytical Epidemiology - Case-control Studies & Cohort studies
- Experimental Epidemiology- Intervention designs, Community and field trials
- Clinical trials – History, types, phases, Recruitment and retention of participants, Standard Operating Procedures (SOP's) etc.
- Bias, confounding and effect modification, Validity (accuracy) and reliability (precision)- Selection Bias, Measurement bias,..etc
- Association & Causation- Types of association, Bradford Hill/ Additional criteria for judging causality
- Risk assessment in epidemiology – relative risk, odds ratio, attributable risk, population attributable risk, hazards ratio
- Survival analysis
- Data reduction methodologies – etc principal component analysis
- Systematic review and meta-analysis

THEME 3- EPIDEMIOLOGY, PREVENTION AND CONTROL OF EPIDEMIC-PRONE COMMUNICABLE DISEASES AND NON-COMMUNICABLE DISEASES AND RESPECTIVE NATIONAL HEALTH PROGRAMME

☐ **Theory of Disease causation**

Epidemiological Triad
Multifactorial causation
Iceberg phenomenon of disease
Natural history of disease,

☐ **Epidemiology of Infectious Diseases**

- Epidemiological transition of communicable diseases of public health significance like Tuberculosis, HIV/AIDS, Leprosy, Poliomyelitis, Measles, ARI, Gastroenteritis and respective National Health program

- Epidemiology of vaccine preventable diseases and National Immunization programme
- Epidemiology of Vector borne diseases- Malaria, Dengue, Japanese Encephalitis, ..etc and National Vector Borne Disease Control program

- Principles of prevention & control of communicable diseases
- Emerging & re-emerging infectious diseases

☐ **Epidemiology of Non-communicable Diseases**

- Modifiable and non-modifiable risk factors

- Epidemiological transition of NCDS

- Non-communicable Diseases of Public Health Importance like- Diabetes Mellitus, Hypertension, Stroke, Coronary Heart Disease, Cancer, Blindness

- National programme for prevention and control of NCDs

- Nosocomial Infection, Emerging non communicable diseases due to changing life styles

- Modifiable and non-modifiable risk factors for non-communicable disease, changing trends of risk factors

- Trends and current status key NCDs globally and in India - cardiovascular diseases, diabetes, blindness, accidents, cancers, Stress

THEME 4- INVESTIGATION OF EPIDEMIC/OUTBREAK

- **Dynamics of disease transmission**

  Components of chain of infection :
  Source of Infection - Case , Carrier, Subclinical cases, latent infection
  Reservoir- Human, Animal , Environment
  Modes of disease transmission -Direct and Indirect
  Susceptible host

- Determinants influencing disease transmission
- **Key terminologies and its meaning :**
  Epidemic/Outbreak, Endemic, Sporadic, Pandemic, Slow or modern epidemic
  Single exposure or 'Point source' epidemics, Common source', continuous or repeated exposure epidemics, Propagated epidemic
  Rapid Response Team ,
  Period of communicability
  Incubation period , Median Incubation Period
  Serial Interval, Generation Time,
  Epidemic curve, primary Case, Index case, Secondary case
  Opportunistic infection, physician induced disease ,
  Dead end infection

- **Immunity and Cold chain** – Concept of Immunity, Herd Immunity, Active and Passive Immunity, Immunizing agents, DALYs, May-Anderson equation , National immunization program, Vaccine Vial Monitor (VVM)

- **Disease surveillance** (approaches/ types / sampling methodologies) and Integrated Diseases Surveillance Program
- **Disease Control Measures** :

  Disease Control, Elimination, Eradication

  Quarantine, isolation, Screening, Early Diagnosis of Case/carrier and treatment

- **Epidemic act -** Salient features of Epidemic Act, 1986
- **Objectives and Steps of investigation of Outbreak**
  Objectives :
  - To define magnitude or involvement (time, place, person)
  - To determine responsible conditions and factors
  - To identify causes, source(s) and modes of transmission
  - To make recommendations to prevent reoccurrence

  Steps :

  1) Verification of diagnosis
  2) Confirmation of the existence of an epidemic

3) Defining the population at risk
4) Rapid search for all cases and their characteristics
5) Data analysis
6) Formulation of hypotheses
7) Testing of hypothesis
8) Evaluation of ecological factors
9) Further investigation of population at risk
10) Writing the report

THEME 5- ETHICS IN EPIDEMIOLOGICAL RESEARCH & PUBLIC HEALTH

- Bioethics, Clinical Ethics, Research Ethics Versus Public Health Ethics
- UNESCO Universal Decleration on Bioethics and Human Rights
- Principles of ethics
- Informed Consent
- Ethical issues in health care sector in India
- Ethical challenges in conduct of Field intervention trials
- Importance of ethics in epidemiological research
- Principles of ethics
- International Declarations
- Nuremberg code, Helsinki declaration, ICMR guidelines, accepted ethical principles concerning research on human subjects, confidentiality, obtaining communal consent for field trials; ICMR guidelines on ethics-2017
- Informed consent, Verbal Consent, Written consent , Assent
- Institutional review board / ethics committee – approval
- Animal ethics committee – approval
- Good clinical practice (GCP)
    - Ethical Basis of the Practice of Public Health
    - Justice and Resource Allocation
    - Ethics and Health Disparities
    - Individual and Social Responsibility for Health

RECOMMENDED BOOKS FOR REFERENCE :

1. R. Bonita, R. Beaglehole, T. Kjellström. Basic Epidemiology, 2nd edition World Health Organization. 2006
2. CDC - Principles of Epidemiology in Public Health Practice, Third Edition: An introduction to Applied Epidemiology and Biostatistics U.S.
3. The Basic Practice of Statistics, Fourth Edition. David S. Moore
4. Epidemiology, Fourth Edition, by Leon Gordis, W.B. Saunders Company, Philadelphia, 2004.
5. Epidemiology in Medicine, by Charles H. Hennekins and Julie E. Buring, Lippincott Williams & Wilkins, Philadelphia, 1987.
6. Essentials of Epidemiology in Public Health, by Ann Aschengrau and George R. Seage III. 2003. (ISBN 0-7637-2537-4)

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