DESCRIPTIVE EPIDEMIOLOGY

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EPIDEMIOLOGY:-
“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”

Epidemiological studies (methods)
1. Observational.
2. Experimental.

Observational:-
Based on field observation made on the experiments carried out by nature.
1. Descriptive.
2. Analytic.

Descriptive Epidemiology/Studies:-
Observation of the distribution of a disease or health related characteristics in a community, with reference to time, place and person and identifying the associated characteristics of the disease to formulate an etiological hypothesis.

Procedures:-
1. Defining the population of the community
2. Defining the disease under study
3. Describing the distribution disease with reference to time, place and person
4. Measurement of disease
5. Making comparison with known indices
6. Formulation of etiological hypothesis.

1. Defining the population under study:-
This means specifying the type of population under study, i.e.
- Whether the entire population of the area, or a
- A representative sample or a
- Particular group of population like children, all hostilities, industrial workers, pregnant mothers, etc.
- The population must also be defined in terms of area (place) and time.
- It becomes the denominator and helps in calculating the rates, i.e. in measuring the disease frequency.
2. Defining the disease under study:
-The disease which is taken up for study has to be defined in such a way that the epidemiologist is able to identify those not only with disease and without the disease, but also able to measure it with accuracy. (“Operational definition”)
Example: leprosy is defined as a case with hypopigmented patch/patches with partial or total loss of sensation, with thickening of nerves and demonstration of acid-fast bacilli in the skin smear examination.

3. Describing the distribution of the disease with reference to time, place and person.

TIME DISTRIBUTION
Describing the time of occurrence/onset of the disease with reference to year, month, week, day, hour of onset, season, atmospheric temperature, climate, etc.
Three kinds of time trends or fluctuations:
I. Short-term fluctuations.
II. Periodic fluctuations.
III. Long-term fluctuations.

1. Short-term fluctuations (An epidemic disease)
A. Common source epidemics.
   (a) Single source or “Point source” epidemic
   (b) Continuous or multiple exposure epidemic
B. Propagated epidemics.
   (a) Person to person
   (b) Arthropode vector.
   (c) Animal reservoir.
C. Slow (Modern) epidemics

2. Common Source Repeated/Continuous Exposure Epidemic:
-Disease occurs from a common source, but the exposure occurs continuously or intermittently or repeatedly.
-Epidemic is not explosive.
-Example: A professional sex worker as a source of gonorrhea, infecting all her clients over a period of time, well with contaminated water similar to outbreak of cholera.
-There is sudden rise and gradual fall of the curve.

A. Common source epidemics:-
Occurring from a common source, either by single exposure or by repeated exposure.
1. Common source single exposure epidemic (Point source epidemic): This means all the cases develop almost simultaneously following single exposure. For example, food poisoning, Bhopal Gas tragedy, fire accident in an industry.
   -There is sudden rise and sudden fall
   -There are no secondary curves
   -Large number of cases occur with a narrow interval of time
   -All cases have the same incubation period
   -Exposure is almost simultaneous and brief.

B. Propagated Epidemic
-Epidemic does not originate from a common source like food or water, but spreads from person-to-person until all the susceptible are affected.

C. Modern or Slow Epidemic
-This is with reference to non-communicable diseases, e.g. cancer, hypertension, diabetes, etc. These diseases have been increasing in number compared to the previous century because of changes in the life-style and quality of life.
II. Periodic Fluctuations
occurrence of a disease in a community during a
definite period, either in a particular season or
periodically in a cyclic form. Accordingly, there are
two types: Seasonal trend and cyclic trend.

a. Seasonal Trend:- Occur in a definite season.
- Measles and chickenpox in the early spring season.
- Upper respiratory infection in the winter season.
- Diarrheal diseases during summer months.

b. Cyclic Trend
Disease to occur cyclically once in several days,
weeks, months or years.
Examples: - Measles once in 2 to 3 years,
- Rubella once in 6 to 9 years, influenza once in 7 to 10 years.

III. Long-term Fluctuations (Secular Trend )
- Changes in the occurrence over a long period
  of time, several years or decades.
Example: - CHD, diabetes, lung cancer upward trend
during the last 50 years,
- Downward trend of disease like leprosy, T.B., Typhoid, amoebiasis etc.

PLACE DISTRIBUTION
I. International Variations
- Cancer of stomach common in Japan, unusual in US.
- Ca cervix common in India, less in UK, US, etc.
- Breast cancer low in Japan, high in Western Countries, etc.

II. National Variations
- Goiter is more in sub Himalayan region,
- Lathyris in Madhya Pradesh,
- Leprosy in Tamil Nadu and Andha Pradesh,
- Filariasis in coastal areas etc.

III. Rural-Urban Variations
- Noncommunicable diseases more in urban
- Zoonotic diseases and soil borne diseases are
  more in rural areas.
- Variations help to identify the risk factors and the
  risk-groups,

IV. Local Distribution
“Geographic spot map” or “Shaded map”
Area of high frequency (Cluster of spots) gives a clue
about the common source of infection. John show of
England in 1854 - able to know common water pump
in the Broad street of London was the source of
infection of cholera epidemic.

PERSON DISTRIBUTION
I. Age
- Measles and diphtheria among preschool children,
- Cancer in the middle age,
- Atherosclerosis among elderly.
- Hodgkin’s disease and leukemia, more between 15 and
  35 years and between 70 and 90 years. ('Bimodality
  Phenomenon') - Tuberculosis ('Trimodality distribution')

II. Sex
- Lung cancer, TB, coronary heart more common in men.
- Diabetes, obesity, hyper thyroidism more common in
  women.

III. Marital Status
- Cancer cervix is rare in nuns compared to married
  women.

IV. Occupation
Persons working in particular occupations are
exposed to particular types of risks. Example:

V. Social Class
- Hypertension, diabetes, CHD are common among
  higher socioeconomic class and diseases like
  malnutrition, rheumatic heart disease and
  communicable diseases are common among lower
  socioeconomic class.

VI. Behavior
- Smoking, alcoholism, over eating, multiple sexual
  partnership, drug abuse, etc. influence the
  development of the disease.

VII. Stress, VII. Migration
4. Measurement of Disease

'Disease load' or magnitude of the problem in terms of morbidity, disability, etc.
- Mortality is measured directly in terms of death rates.
- Morbidity is expressed in terms of incidence (Longitudinal study) and prevalence (Cross-sectional study) rates.

<table>
<thead>
<tr>
<th>Longitudinal studies</th>
<th>Cross-sectional studies</th>
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<tbody>
<tr>
<td>Observations are repeated by means of follow-up examinations, in a population</td>
<td>Observations are done only once in the population</td>
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<tr>
<td>Carried over a long period of time (minimum one year)</td>
<td>Carried over a given point of time or period of time</td>
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<tr>
<td>This is compared to a running cine film</td>
<td>This is compared to a still photograph</td>
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<tr>
<td>This helps to find out the occurrence of new cases (Incidence rate)</td>
<td>This helps to find out the existence of both old and new cases (Prevalence rate)</td>
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<tr>
<td>This helps to study the natural history of the disease and the risk factors</td>
<td>This does not help to study the natural history of the disease and the risk factors</td>
</tr>
<tr>
<td>This study is time consuming, difficult and costly</td>
<td>This is not time consuming, not difficult and cheap</td>
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</tbody>
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5. Making Comparison with Known Indices

The observations are compared with different groups.

6. Formulation of Etiological Hypothesis
- Formulate an etiological hypothesis (supposition).
- The hypothesis must be correct and complete.
  Eg.-
  - 'Chronic alcoholism causes cirrhosis of liver' - is an incomplete hypothesis.
  - Better statement would be 'Drinking 200 to 300 mL of alcohol per day causes cirrhosis.'

Uses of Descriptive Epidemiology
1. It helps to know the extent/magnitude of the disease in the community, in terms of morbidity and mortality rates.
2. It helps to know the distribution of the disease with reference to time, place and person.
3. It helps to identify the risk-group.
4. It helps to formulate an etiological hypothesis.
5. It helps to plan, organize and implement curative and preventive services.
6. It helps in doing research.

THANKS