2024
SUMMARY

COMMUNITY MEDICINE

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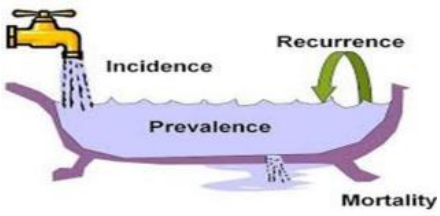
ARKAN ACADEMY

Measures of Association

- Quantitative descriptors to measure disease occurrence are:
  - **Numbers:** Use of actual number of events
  - **Ratios:** Quantifies the magnitude of one occurrence X, in relation to another event Y as X/Y
  - **Proportions:** a ratio in which the numerator is included in the denominator (percentage)
  - **Rates:** a proportion with time element (an event overtime)

- Morbidity rates are used to quantify the magnitude/frequency of diseases, include:
  - **Incidence rates**, and include:
    - ✓ The proportion of a population that *develops a disease overtime*
    - ✓ The risk/*probability of an individual developing* a disease overtime
    - ✓ The rapidity with which *new cases* of a disease develop overtime
    - ✓ The proportion of *unaffected individuals* who on average will contract the disease overtime
    - ✓ Case *fatality rate and attack rate* are incidence
    - ✓ **Cumulative incidence** = Number of new cases during a specific period / population at risk
    - ✓ **Incidence Density** = Number of new cases during a specific period / person-year
    - ✓ **Attack rate** = number of new cases / total population at risk
      - Used for a disease outbreak in a narrow population over a short period
      - Often due to very specific exposure (such as food poisoning in a party)
      - Secondary attack rate Special form of incidence measure spread of infection within a family or household following exposure to the first primary case in the family
    - ✓ **Case fatality:** percentage of cases with a specified disease who die within a specified time
      - It measures disease severity
    - ✓ Challenges to calculate incidence rate are: Identification of population at risk, Population is not static (fluctuates), People are at risk only until they get the disease
  - **Prevalence** (Period prevalence, point prevalence)
    - ✓ Measures the proportion of a population with a disease at a point in time
    - ✓ **Prevalence** = All persons with a disease / Total population = Incidence x duration
    - ✓ It can increase due to increased incidence, increased duration or decreased recovery and death rates
    - ✓ During a constant duration, **preventive** measures decrease incidence and prevalence
    - ✓ During a constant duration, **curative** measures unchanged incidence, decrease prevalence
    - ✓ Out flow of cases (dye and recovery) affect prevalence not incidence



- **Association:** the concurrence of two variables more often than would be expected by chance
- Types of Associations:
  - **Spurious Association:** (Shoe size and reading performance for elementary school children)
  - **Indirect Association**

- **Direct (causal) Association**
  - ✓ One to one causal association
  - ✓ Multi-factorial causal association

- If an association is observed, the first question asked must always be "Is it real?"
  - Some association can be due to alternative explanation due to bias results in spurious results

- **Bias:** systematic error (can't be fixed) in the design results in a mistaken estimate of an exposure's effect on the risk of disease which affects the validity of the study
  - **Selection bias** is a method of participant **selection**
  - **Information bias** results from systematic differences in the way **data (information)** on exposure or outcome are **obtained** from the various study groups

- **Confounding:** occurs when the observed association between exposure and disease differs from the truth because of the **influence of the third variable**
- Confounder criteria:
  - Risk factor for the disease **independently**
  - **Associated** with exposure under study
  - The variable should **not lie on the causal** pathway between exposure and disease
- It can be controlled on:
  - **Design stage:** restriction, matching and **randomization**
  - **Analysis stage:** stratification, multivariate analysis, and **standardization**

- Hill's Criteria: Nine criteria useful in establishing epidemiologic evidence of a causal relationship between a presumed cause and an effect (association)
  - Temporality: cause precedes effect
  - Strength of association
  - Consistency: repeatedly observed by different persons, in different places, circumstances
  - Biological gradient (dose response): larger exposures to cause associated with higher rates of disease. And reduction in exposure is followed by lower rates of disease (reversibility)
  - Biological plausibility: makes sense, according to biologic knowledge of the time
  - Experimental evidence
  - Analogy (cause & effect relationship already established for a similar exposure or disease)
  - Specificity (one cause leads to one effect)
  - Coherence (not seriously conflict with the generally known facts of the natural history and biology of the disease)

Activities

- Epidemiology
- Healthy mind in healthy body: **Hippocrates**
- **John snow** (1854) detected the origin of cholera in London
  - Farr and snow disagreed (Farr: miasmatic theory / Snow: transmission by contaminated water)

- **Incidence** is the number of new cases per number of individuals at risk
- **Prevalence:** is the number of all active cases per number of individuals at risk

- **Chi-square** tests whether there is an association between two categorical variables in cross sectional studies to tell us whether there is association (doesn't tell about association strength)
- Relative risk (RR) or **Risk Ratio (RR)** In a cohort study and we can calculate Incidence
  - RR= risk among exposed / risk among non-exposed
  - RR of 2 means Risk in exposed = doubled Risk in non-exposed

- **Odd ratio (OR)** used in analysis in case-control
- **Attributable risk percent (AR%)**
  - The amount of disease that might be eliminated if the cause could be controlled or eliminated
  - Represent the percentage of the disease caused by a specific cause exposure
- Strength of association:
  - Positive association RR=1 , AR>0
    - ✓ High association if RR>3
    - ✓ Moderate if RR is between 1.5 & 2.9
    - ✓ Weak association if RR is between 1.2 & 1.4
  - No association exists if RR = 1 , AR = 0
  - Negative association (protective effect) if RR < 1, AR < 0

- Maternal and Child health care
  - Pregnancy-Related Death: The death of a woman while pregnant or within 42 days of termination of pregnancy (by s birth, abortion or miscarriage), irrespective its cause
    - ✓ When death cause is not available it is also known pregnancy related
  - Maternal Death: similar to the above but due to a cause aggravated or related to pregnancy and not from incidental or accidental causes (more specific)
    - ✓ **Direct Maternal Deaths:** Due to obstetric complications of pregnancy during delivery and 42 days postpartum such as **hemorrhage, eclampsia, sepsis**
    - ✓ **Indirect Maternal Deaths:** Due to other diseases or conditions when aggravated by the physiological effects of pregnancy such as **Malaria, cancer and HIV**

Scenarios	Pregnancy-Related or Maternal Death?
A woman dies from eclampsia after giving birth	Maternal (direct)
A woman dies one month after delivery from cancer	Maternal (indirect)
A pregnant woman dies in a car accident on her way to the hospital to deliver a baby	Pregnancy-Related
A woman dies one day after delivery	Pregnancy-Related (cause unknown)
A woman dies 3 months after delivery from complications related to her caesarian operation	Neither – 3 months is beyond the time frame for Pregnancy-related and Maternal Death definition

- Primary Health Care:
  - Key Points from the Astana Declaration 2018
    - ✓ Fundamental Health Rights (Section I)
    - ✓ Primary Health Care (PHC) as the Foundation (Section II)
    - ✓ Addressing Health Inequities (Section III)
    - ✓ Political Action for Health (Section IV)
    - ✓ Sustainable PHC Systems (Section V)
    - ✓ Empowering Individuals and Communities (Section VI)
    - ✓ Aligning Stakeholders to National Health Policies (Section VII)
  - Key Drivers for Successful Primary Health Care (PHC):
    - ✓ Knowledge and Capacity-Building:
    - ✓ Human Resources for Health
    - ✓ Technology and finance

- Health Management:
  - Effectiveness of an organization depends on its structure, main ones are:
    - ✓ Functional structural: **Clear hierarchy** and distribution causing a fast operation
      - Levels depend on skills, roles and specialty with well-defined boundaries
      - The main leader is Chief Executive Officer (CEO)
      - Used in many clinical environments
      - Divided into distinct departments but they offer comprehensive care
    - ✓ Service-line: Effective in **hospitals**
      - No departments, where each line has financial, operational and strategic aspects
      - Each line provide service to patients with the same attributes and needs
    - ✓ Matrix: Integrates function and results which is efficient
      - High flexibility, working is teams overseeing a specific area such as cariology
      - Leader is accountable for the whole organization
      - Services are fast and patient oriented which is exhaustive
    - ✓ Flat: decentralized clinical environment and decision making
      - Inexpensive services
      - No hierarchies, which overcomes bureaucracy

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