Prof. Dr.Nisreen Mohammed (Community medicine)
Methodology Lectures/Postgraduate
2023-2024

Research

***Research**: Systematic search for information and new knowledge, it depends on systematic collection, analysis and interpretation of data to answer a question or solve a problem.

***Characteristics of research:**
1. It demands a clear statement of the problem.
2. It requires a plan (it is not aimlessly looking for something in the hope that can you find a solution)
3. It is based on existing data with consideration of positive and negative finding.
4. New data should be collected as required and be organized in such way that they answer the original research question.

***Types of research:**
1. Theoretical research: It is based on theory and observation.
2. Empirical research: It is based on observation and experiments as in biomedical and health system researches. Health research includes epidemiological (biomedical, evidence based medicine), health system research, and behavioral / socio-economic and cultural research.

***Research implementation activities**
1. Choosing a topic.
2. Literature search.
3. Formulate objectives.
4. Determination of sample.
5. Design a questionnaire.
6. Pretest.
7. Data collection.
8. Data analysis.
9. Computing.
10. Writing.
11. Typing.
12. Presentation.
13. Publication.
14. Application.

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Criteria for a good research topic

A good research topic should be feasible (can be done), interesting, novel, ethical and relevant (has an implication)

FINER :
F = feasible
I = interesting
N = novel
E = ethical
R = Relevant

***Feasibility* :**
Before doing a research the researcher must be sure that research can be done and complete according to these factors:
It should be possible in order the time frame of the planned research.
Equipment, supplies and other requirements to undertaken the research should be available.
The researcher must have the required expertise
The cost of doing the research must be affordable and the financial resources available.
The research objectives must not be too many.

Interest :
The research topic must be of interest to investigator and to scientific community.

Novelty :
It is essential that the investigator is familiar with the up – to –date literatures on the topic of research.

Ethics :
General ethical principles:
Ethics are principles of right conduct, there are generally no disagreements on the ethical principles in themselves, since they represent basic human.
The research process begins with the choice research topic, followed by selection of the appropriate research design, development of research protocol, writing and analysis and interpretation of the research results and finally communicating the research; including its publication .ethical consideration apply throughout research process.

***Revelance* :**
Also it called " so-what " test for the research to be considered relevant it must have the potential to advance scientific knowledge policy , or guide further research.

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Objectives

The **OBJECTIVES** of a research project summarizes what is to be achieved by the study. Objectives should be closely related to the statement of the problem.

***Types of objectives**

***1.General objective*:** states what researchers expect to achieve by the study in general terms & why..

***2.Specific objectives*:**

***2*.1**. Identify in greater detail the specific aim of the project . It is a smaller, logically connected parts of general objective. They are the specific aspects of the topic that we want to study within the framework of our study.

2.2. Specific objectives should systematically address the various aspects of the problem and the key factors that are assumed to influence or cause the problem. They should specify what we will do in our study, where and for what purpose.

Aim:

- are broad statements of desired outcomes.
- emphasize what is to be accomplished, not how it is to be accomplished
- address the long-term project outcomes.
- do not need to be numbered

Objectives:

- are the steps you are going to take to answer your research questions or a specific list of tasks needed to accomplish the goals of the project
- emphasize how aims are to be accomplished.
- address the more immediate project outcomes
- make accurate use of concepts and be sensible and precisely described
- are usually numbered so that each objective reads as an 'individual' statement .
- For each specific objective you must have a method to attempt to achieve it.

Why should research objectives be developed? The formulation of objectives will help you to:

- Focus the study (narrowing it down to essentials);
- Avoid the collection of data which are not strictly necessary for understanding and solving the problem you have identified;
- Organize the study in clearly defined parts or phases.

*** Criteria of objectives**

Once objective stated, the researcher should work within this stated objectives.
Feasible in community & within the resources available to him.
Should not be changed half the way through the study.

It should be:

SMART

S= SPECIFIC

M= MEASUREABLE

A= APPLICABLE

R = RELEVANT

T= TIME BUOND

SPECIFIC OBJECTIVES may be one of 3 main types:

Estimation objective.
Association objectives.
Evaluation objectives

Example:

General objective (aim): Effects of Television Viewing Reduction on Energy Intake and Expenditure in Overweight and Obese Adults.

Specific objectives:

1. Clarify the relation between BMI & age
2. Mention the duration of TV viewing per day in obese & overweight.
3. Identify the association between types of TV program & BMI level.
4. Determine the prevalence of eating whilest TV watch in overweight & obese adult.
5. Explain the frequency & amount of food intake in obese & overweight adults during TV watch.
6. Clarify the impact of TV watch reduction time on BMI.
7. Identify the impact of TV watch reduction on physical activity.

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Sample

***Sample:** It is a part of the population. Characteristic of population called parameter, and of sample called statistics. The differences between probability and non probability sampling, the results in probability can be generalized, and in non probability sampling can not.

1. Sample of entities.
2. Sample of value.

***Types of sample:**

A. Probability sample:

A.1. Simple random sampling: Each member of population has an equal possibility of being chosen for the sample with chance alone responsible for selection of any member can be chosen by table of random number. Simple random sampling (not haphazard) selected by the following methods:

1. Lottery method.
2. computer generated random sampling.
3. Using the random number table.

A.2. Systematically sample: A random starting point at the beginning of sample chosen according to the predominant selection schedule e.g. 100 students are ranked by age then begin with 4th students and every 10th student chosen (4th, 14th, 24th,…).

A.3.Stratified sampling: The population is divided into sampling unites that contain individuals and then a random sample of individuals proportionate to the size of the sampling unites. E.g. in your college four classes then chose 20% from each class.

A.4. Clustered sampling: The population is divided into unites (or groups) not individuals , then a random sample of these clusters will be chosen, clusters include e.g. schools, districts, hospitals, villages, clinics, factories….

A.5. Multistage sampling: This procedure is carried out in phases (stages) and can involve more than one of the above sampling methods. It is used or a very large number of population. E.g. as if we study Iraqi people so we divide them into governments, then districts, village, and so on

B. Non probability sample:

B.1. Convenience sample: Members of population are chosen for the sample, or e.g. If a doctor wants to study typhoid he will not study each patient with typhoid, but chose cases that reach him in his clinic.

B.2. Quota sampling: The composition of the sample regarding certain characteristics is decided from the beginning, & the only requirement is to find the right number of people to fill these quotas.

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Questionnaire design

A questionnaire: It is most frequently used data collection method in educational and evaluation researches, also it is designed for the purpose of seeking specific information from the respondents. Questionnaire help gather information on knowledge, attitude, opinions, behaviors, facts, and other information.

Types: The questionnaire may be
1-self-administered : It is cheap, less susceptible to interviewer bias and can be administered by mail. At the same time, the rate of non-response may be high, and may bias the results. Also, answers may be incomplete
2- Administered by interviewers.
3- Mail-questionnaires or telephone interview .
***A questionnaire typically includes the following components:** Information collected in a questionnaire should be based on and limited to the objectives of the study.
• **An introductory** statement by the interviewer to introduce herself/himself and explain the purpose of the questionnaire; the respondents should also be informed about the confidentiality of their responses;
• **Demographic** questions to collect relevant information about the background of the respondent;
• **Factual** questions; opinion questions: opinion questions require reflection; it is generally easier for the respondent to answer factual questions; putting the factual questions first serves as a "warm up" to the opinion questions;
• **Closing** statement by the interviewer to thank the respondents, and where appropriate to ask if she/he wants to provide any additional comment.

*** Questions** should be well worded to avoid any ambiguity. Questions should not be phrased in a way that influences the response in one direction or another. The questionnaire should always be pre-tested in a pilot study before the main survey. Interviewers should be trained to make sure that the questionnaire is administered in a uniform way.
***Types of questions:** There are two major question formats:
1- The open-ended: Open questions elicit more detailed responses, but the responses require more effort to encode for data analysis.
2- closed-response question, the respondent is provided with a list of pre-determined response options. Closed questions may be used to elicit attitudes of the respondents to a certain statement as strongly agree, agree, disagree, and strongly disagree. This format does not allow an undecided answer.

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Proposal

***Steps in development of health system research proposal:**

Step 1: Statement of the problem: What is the problem, what to be studied.

Step 2: Literature Review: Literature and other available information.
Step 3: formulation of objectives: Include research questions or hypotheses

Step 4: Research methodology: Include type of study, place, expected time, sampling, data collection (technique, plan), data analysis plan, ethical consideration, and pilot or pretest study.

Step 5: Plan for utilization and dissemination of the results.

Step 6: Work plan: man power, time table, administration, monitoring and evaluation.

Step 7: Resources required and budget: Material support, equipment and money.

Step 8: Summary of proposal: Proposal presentation to authorities

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Components of thesis

1. Title:

A good title should adequately describe the contents of the paper in the fewest possible words.
It should not be too long or too short generally, it should consist of 10–12 words.
should not include any unnecessary words, nor waste space with phrases such as "Observations on" or "A study of".
It should not contain abbreviations

2.Summary or Abstract:

should be included at the beginning of the thesis.
Abstracts are generally written in the past tense.
it should not include references to literature or to figures and tables in the body of thesis.
should not include information that is not in the paper.
should not contain abbreviations or acronyms unless standard or very well known.
The abstract should state
*the purposes of the study or investigation,
basic procedures (selection of study subjects or laboratory animals; observational and analytical methods),
*main findings (giving specific data and their statistical significance, if possible) and the principal conclusions.
*It should emphasize the new and important aspects of the study or observations.
*Many may read it only.
*Not more than 2 pages.
*Should contain: why, what, where, and how of your work.
*It must include some important findings.
*Conclusion must be clear in the last line

3. Acknowledgment: contributions that need acknowledging but do not justify authorship, such as general support by a department chair; acknowledgement of technical help; acknowledgements of financial or material support, which should specify the nature of the support; and relationships that may pose a conflict of interest.

Technical help is better acknowledged in a paragraph separate from that acknowledging other contributions. It written in simple sentences. includes supervisor, typist, and people who helped in work

4. Contents

Must be clear, use separate headings for the text, figures, & tables

5. Abbreviations: Arranged in alphabetical order

6. *Introduction*: The introduction should:

• Tell the reader why the research was started, and make clear what question the research was designed to answer. It is designed with a specific question in mind.

• Raise the interest of the reader. The first few lines in the paper may attract or put off the reader. Investigators are advised to convey their enthusiasm but not to exaggerate.

The introduction should not:

*Explain what can be found in any textbook in the field
*Be over-referenced; it should give only strictly important references
*include data or conclusions from the work being reported.
*Start with scientific bases of the work.
*State the major facts and means related to the subject.
*What other people discovered.
*Aim of your work clearly.
*Should include definition, bases, history, & progress.

7.Methods:

*The methods section should provide a detailed exposition of the research design.
*The methods section should be organized under meaningful subheadings and describe techniques used in sufficient detail to allow others to replicate the study.
*New or substantially modified methods should be clearly described, with reasons given for using them and with their limitations outlined.
*Sample details should be explained in detail (size, gender, age, included and excluded criteria of sample)
* Time and place of work should be clearly identified.
**The methods section should not:* refer to patients and animals as material; patients and animals are living things; not inanimate "material". The term "material" should be used only if inanimate specimens have been used.
* use proprietary names of drugs; generic names should be used.
*Where , & when was the work conducted?

*What was the source of your sample?
*How was the procedure?
*What was done?
*No results, no conclusions, no reference

Statistics: statistical methods should be to standard works when possible
Any computer programs used should be identified.
Statistical terms, abbreviations, and symbols should be defined.
It is recommended to include the word "considered" in descriptions of statistical significance such as "a *P* value of less than 0.05 was considered statistically significant"

8.Results

Results that do not relate to the research objective should not be mentioned.
Sufficient detail should be given to allow other scientists to assess the validity and accuracy of the results.

Tables:
A table should be readily understood without reference to the text.
A table should be cited in the text,
be numbered, and have a title which exactly describes the content of the table.
It should have short or abbreviated headings for columns and rows and, if necessary, a footnote for explanation of non-standard abbreviations that are used, and for identification of statistical measures of variations.
Columns should be arranged from left to right in a logical sequence.
Rows should be arranged from top to bottom in a logical order.

Illustrations
Graphs are used to illustrate relationships.
Titles and detailed explanations belong in the legends for illustrations not on the illustrations themselves.
Figures should be numbered consecutively according to the order in which they have been first cited in the text.
When symbols, arrows, numbers, or letters are used to identify parts of the illustrations, each one should be explained clearly in the legend.
Clear exposition of findings.

(Tables & figures should be clear, simple, proper numbering & proper title)

9.Discussion

*statement of principal findings.
*This should not normally be more than a few sentences.
*strengths and weaknesses of the study, strengths and weaknesses in relation to other studies meaning of the study.
*possible mechanisms and implications for clinicians and policymakers, unanswered questions and future research.
*Clear, factual, supported by findings from results.
*Correlate your findings to findings of other people.

10.Conclusions

*Should be linked with the goals of the study.
*Should be limited to the boundaries of the study.
*Avoid unqualified statements and conclusions not completely supported by the data.
*Logical argument interpreting facts as you see them

11. Recommendations: Suggestion for future work

12.References

*The number of references should be restricted to those that have a direct bearing on the work described.
*In the Harvard system, the order of references at the end of the paper is strictly alphabetical, regardless of the chronology.
*In Vancouver system references should be numbered consecutively in the order in which they are first mentioned in the text. References in text, tables and legends should be identified by Arabic numerals (1,2,3…) in parentheses. References cited only in tables or figure legends should be numbered in accordance with the sequence established by the first identification in the text of the particular table or figure.

13. Appendix.

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Health studies (research)

Epidemiological Studies:

Epidemiological Design Strategies

A. Descriptive:

A.1: Population:

*Correlation studies.

A.2: Individuals:

*Case report and case series.

*Cross section

B. Analytic:

B.1: Observational studies:

*Case control.

*Cohort.

B.2: Interventional studies: Experimental (clinical trial, lab. Animal)

Descriptive studies: Describe pattern of disease as person, place, time.

A. Descriptive

A.1. Population:

A.1.1: Correlation studies: Describe the disease in the entire population in relation to factor of interest, it describe the relation as linear association, but sometime may be U shape or J shape. It uses the correlation coefficient, which is measure of association and lies between (1-,1+) which means strong association, but (0) means no association.

Advantage:

.Quick.

. Not expensive.

. It is the first step in searching for exposure-disease relationship.

* Limitation:

. The true in population (correlation between disease and exposure) may be not true on individuals.

A.2. Individuals

A.2.1: Case report and case series: Describe the experience of a single patient or small group of patients with a similar diagnosis, it reflecting unusual representation of a disease(unusual cases e.g. polyvinyl chloride factory that cause liver angiosarcoma).

*Advantage:
. Formulate hypothesis.
*Limitation:
-Not population based that means not represent population (no generalization).
A.2. Individuals:
1:A.2. Cross sectional (prevalence- transverse): Most important
The presence of disease and factor (exposure) are assessed among individuals in our sample at same present time.
Advantage:
1. Measure prevalence.
2. Rapid, easy, inexpensive.
Limitation:
. Do not know which come first disease or exposure.

B. Analytic studies:
B.1.Observational:
B.1.1. Case control (retrospective, trohoc): Begin with group of patient (cases) and comparable group without diseases
*Advantage:
1. Easy, not expensive.
2.Used in a rare disease.
3. Proves association.
*Limitation:
1. Selective survival.
2. Bias: recall (person not remember)
3. Difficult to select control (control must be has the same sociodemographic and other characteristic with the case to minimize bias)
4. Direct measures of risk is not possible, but odds ratio is used as indirect risk measures.
Odd ratio=(a/c)/(d/b)=a/c X d/b=ad/cb
Odd ratio= Percentage of event among cases
Percentage of same event among control group
B.1.Observational:
B.1.2.Cohort (longitudinal, incidence): These are observational analytic studies where group(s) of individuals are defined on the basis of presence or absence of exposure to a

suspected risk factor o a disease, then followed for a period of time to assess the occurrence of a disease. Start with free from disease individuals.

*Types of cohort:

1. Retrospective cohort: .
2. Prospective cohort.
3.Ambidirectional cohort: Combination of both retrospective and prospective cohort.

RR=Ie/Io

RR=a/a+b
c/c+d

AR=Ie-Io

RR= relative risk, risk ratio.

AR= attributable risk, risk reduction.

Ie= No. of cases in exposed (a)
Total population exposed (a+b)

Io= No. of cases in non exposed (c)
Total population in non exposed (c+d)

Attributable Risk %={(Ie-Io)/Ie } X100

Advantage:

1. Measures incidence.
2. Risk is directly measured by relative risk and attributable risk.
3. Proves causation.

Limitation:

1. Long time and costly.
2. Not for rare disease but for rare exposure.
3. Loss to follow up (migration, or death).

B.2: Interventional studies:

Like cohort studies but investigators themselves allocate the exposure.

B.2:A. Lab animal: Infect animal or give a carcinogen or new drugs.

B.2:B. Clinical trial: On human, either therapeutic on a diseased people as evaluating the effect of a certain drugs , or preventive on a healthy people as giving a vaccine (prophylactic).

* Advantage:
. It is a golden type of the epidemiological studies.
*Limitation:
1.Expensive, long time.
2. Ethical problem.

*** Confounding factor:** It is a third factor which is associated with the exposure and affect the outcome. Confounder can lead to over and under estimation of the true association and can change the direction of the observation effect.
*** Generalization:** The relation between exposure and outcome among individual true in a population, in other word we can generalize the results on a population.

Examples:
In a sample of 150 persons, there were 100 persons had angina from those with angina 80 persons had history of smoking. While 50 persons didn`t have angina and from those 30 persons not smokers.
A. What is the type of study?
B. Calculate epidemiological measurements in this type of study.
C. What are the advantages and limitation of this type of study?

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Evidence Based Medicine

***Evidence based medicine (EBM):** In simple term, integrating the current best evidence with expertise or experience, and expectation & values of patients, people, medicine, health care is evidence based medicine. Some experts think that the word "medicine" in EBM relates to doctors` profession, and distinguish EBM from evidence based nursing or EB public health, evidence based health care. Etc…

***Goal of EBM:**
EBM has one goal : To improve the health of people through decision that maximize their health related quality of life and life span. The decision may be in relation to public health, health care, clinical care, nursing care or health policy.

***Components of EBM:**
Evidence.
Expertise of decision makers.
Expectation and values of patient/people.

***Steps in practicing EBM:**
The main (but not only) objectives o EBM is the application of the right and complete information by health care professionals in decision making. To meet this objective four keys are necessary:
Step -1: Ask for the needed information.
Step-2: Acquire(find) the information by searching resources.
Step-3: Assess or appraise the relevance, quality importance and applicability of the information this done by critical appraisal which need **4** issues:
Relevance.
Validity.
Consistency.
Importance or significance of results.
Step-4: Applying the results to your patient.

***Clinical question:**
To summarize, you need to specify the following in your clinical question(PICO):
Patient or population: type of patient.
Intervention :the new approach or strategy of treatment, or observation.

Comparison: the control intervention.
Outcome: clinically meaningful outcome that are important for the patients.

Classification of Evidence Levels:

Grade I
Ia: Meta analysis*** of randomized controlled trials.
Ib: At least one randomized controlled trial.

Grade II:
IIa: At least one well designed controlled study without randomization.
IIb: At least one other type of well designed experimental study.

Grade III: Well designed non experimental descriptive studies, comparative studies, correlation studies, and case (report, series) studies.
Grade IV: Expert committee reports or opinions and/or clinical experience of respected authorities.
Grade V: I always do it in this way.
Grade VI: I was told so.

***Meta analysis:** Meaning "analysis among" , is a statistical method in which the results of several trials or studies devoted to the same topic or research question are combined . It is being used increasingly in medicine to try to obtain a qualitative or a quantitative synthesis of the research literature on a particular issue , and to obtain greater statistical power or more accurate estimates in other sentence meta analysis can be defined as a systematic, organized and structured evaluation and synthesis of a problem of interest based on the results of many independent studies of that problem (disease cause, treatment effect, diagnostic method, and prognosis, etc) .

*Objectives:
1: To confirm information.
2: To fined errors.
3: To search for additional findings (induction).
4: To find new ideas for further research (deduction).

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Screening Test

Definition: Application of simple test on asymptomatic people (have no sings and symptoms) to sort out the apparently healthy from those had illness. It important in prevention and control, after screening we should confirm diagnosis by golden test for positive cases in screening and treat them.

Criteria for good screening test:
1: Easy and quick test.
2: Acceptable and safe to people.
3: Not expensive.
4: Used for searching serious problems.
5: Treatment should be available for the problem.
6. Valid (accurate) : ability of test to separate those who have disease from those do not. It depend on sensitivity and specificity.
7. Reliable (repeatable, reproducible): Repeating test give similar results (observer, biological, instrument)

Criteria for disease or problem suitable for screening:
1. Highly prevalent.
2. Serious consequence of a disease.
3. No symptoms or signs at early stage.
4. Can be detected at relatively low cost before the clinical stage starts.
5. Early treatment is available and accessible that has been shown to reduce morbidity and mortality.

Types of screening:
1. Mass screening: involve screening of whole population e.g. chest X-ray to detect T.B. in Iraq in 1980.
2. Multiple or multiphasic screening involve the use of a variety of screening tests on the same occasion e.g. to detect peptic ulcer use Ba-meal then endoscopy
3.Targeted screening: involve screening of a group of people with specific exposure e.g. workers in high noise environment to detect hearing defect (this type of screening used to detect environmental and occupational hazards).
4. Case finding screening or opportunistic screening: is restricted type to patients who consult health practitioner for other purpose (screening for ca-breast in female who come for urinary tract infection).
***Sensitivity:** It is the ability of a test to give a positive finding when the person tested truly had a disease.

$$= \frac{a}{a+c}$$

***Specificity:** It is the ability of the test to give a negative finding when the person tested is free of the disease.

$= \frac{d}{b+d}$

***False positive**: Person without a disease who were positive in the test.

$= \frac{b}{b+d}$

***False negative**: Person with a disease who were negative to test.

$= \frac{c}{a+c}$

***Predictive value positive test:** Percentage of persons with a positive test who have the disease $= \frac{a}{a+b} * 100$

***Predictive value negative test:** Percentage of persons with a negative test who do not have the disease $= \frac{d}{c+d} * 100$

Golden Test (diagnostic)

	Diseased	Non diseased	Total
Screening test			
+Ve	a	b	a+b
-Ve	c	d	c+d
Total	a+c	b+d	a+b+c +d

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Representation of Data

1-Mathemetical Representation of Data.
2-Tabular Representation.
3-Graphical Representation.
4-Pictorial Representation.

1- Math representation:

1.a. Measures of central tendency.

1.b. Measures of dispersion.

2.Tabular presentation

Its principles

2.1. Table should be understandable this achieved by:

a. Abbreviations or symbols should be explained in detail at a footnote.

b. Row and column should be labeled clearly.

c. Title should be clear, concise, and written separated from the body of table by lines or spaces.

d. Total should be shown.

2.2. Table should be simple; therefore; simple two or three tables preferred on single large table, data can be summarized in simple method by master table.

Table-4- Relation between body mass index (before pregnancy) and preeclampsia

Body mass index(Kg/m^2)	Number	%
<18	3	3.3
18-24.9	19	20.9
25-29.9	28	30.8
30-34.9	36	39.6
35-39.9	2	2.2
≥ 40	2	2.2
Total	91	100

Table-7- Relation between antenatal care and complications (maternal and fetal)

Antenatal care	Maternal complications		Fetal complications	
	Number	%	Number	%
Adequate	Zero	0	1	3.3
Intermediate	3	11.1	7	23.3
Inadequate	8	29.6	9	30
No care	16	59.3	13	43.3
Total	27	100	30	100

3. Graphical presentation

Graphs used to display a quantitative data using coordinate system where X the horizontal axis (method of classification), and Y is the vertical axis (frequency or rate of occurrence). Its principles include:

3.1. Graph should be self explanatory.

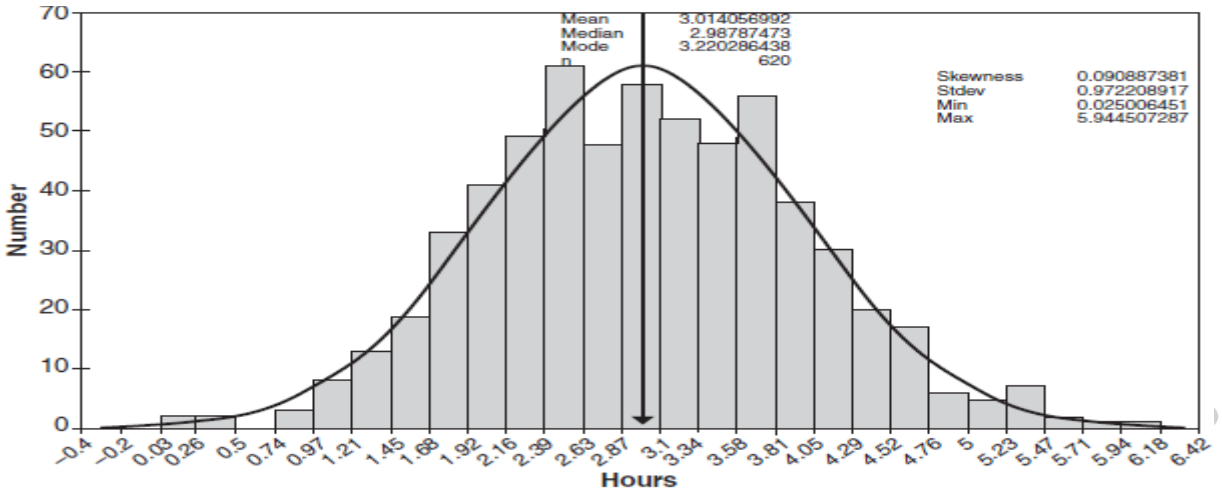
3.2. The simplest graphs are the most effective.

3.3. Title may be placed at the top or the bottom of the graph.

Variables should be labeled clearly by means of key

Types of graphs:

1. Arithmetic scale line graph.
2. Semilogarithmic scale line graph.
3. Histogram: Its used only for presenting a frequency distribution of quantitative data. There is No space between the cells, scale break should not be used in the histogram.
4. Frequency polygon: Its used to represent more than one set of data. Its constructed from a histogram by a series of straight lines connecting the midpoints of the class interval.



Source: Jay Arthur: Lean Six Sigma for Hospitals:
Improving Patient Safety, Patient Flow and the Bottom Line, 2e

5. Scatter diagram: In a scatter diagram a pair of measurement is plotted as a single point on the graph.

4. Pictorial presentation (charts)

It can convey many different types of information including length, proportion….

*Types of charts:

1. Charts based on length:

1.1. Pictogram: Its used a series of small identifying symbols to present data. Each symbols represent a fixed number of items. The figure arranged horizontally or vertically. 1.2.Bar chart: Bars should be had the same width, there are spaces between columns. Its used for discontinuous (discrete) data.

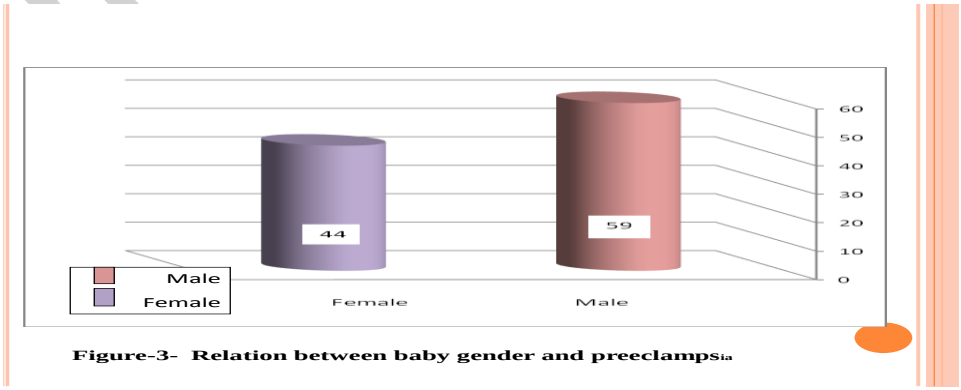


Figure-3- Relation between baby gender and preeclampsia

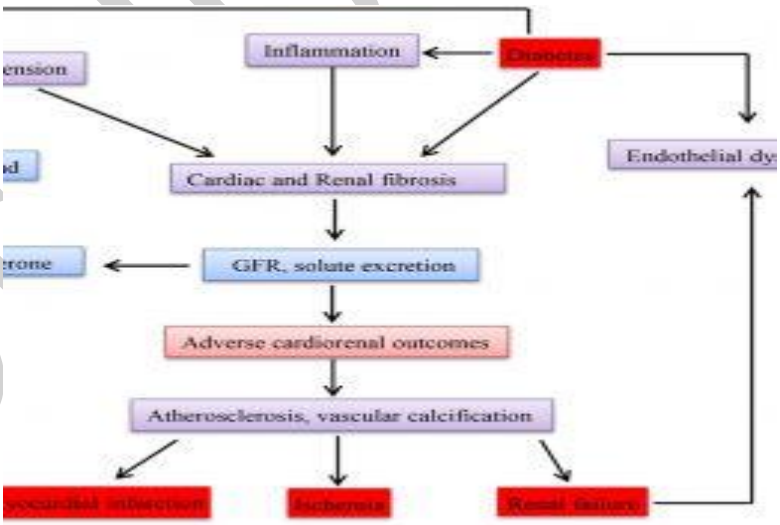
2. Charts based on proportion:

2.1. Component bar charts: They are used bars that are shaded or colored.

2.2. Pie charts: Its use a wedge shaped portions of a circle to illustrate a division of the whole into sements. Start at 12 o`clock position and arrange segments in the order of their magnitude (from largest to smallest proportion). To convert from percentage to degrees, multiply the percentage by 3.6 (360/100).

Figure-2- Relation between occupation and preeclampsia

3. Flow charts: The sequence of a series of events is often illustrated by a flow chart.



4. Geographic coordinate charts: Its used by those who show the geographic distribution of disease using maps.

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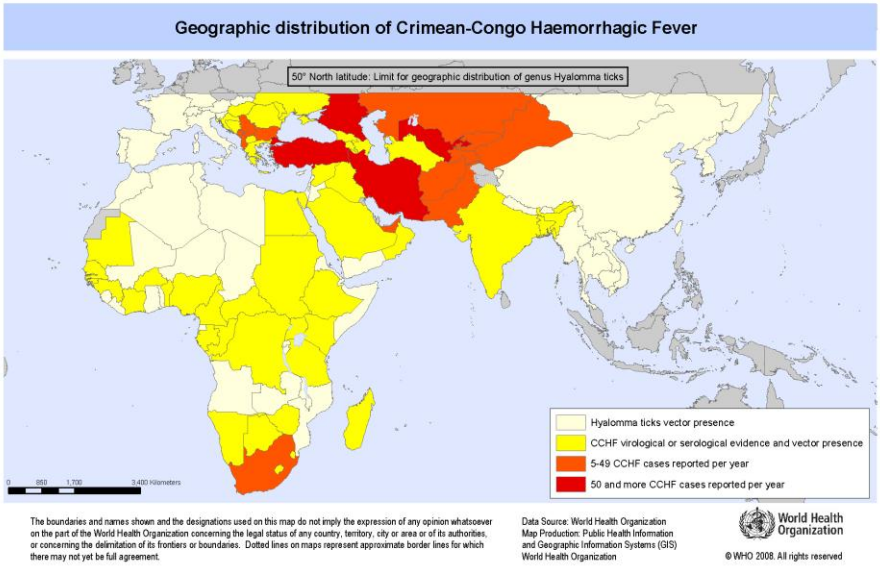

Association & Bias

Association: It is the inference that are gained from observation of a set of cases of illness that are accompanied by a suspected factor, or it means relation between two variables.

***Types of association:**

1- Direct association (causal association-causation): It is the causal relationship, which does not give any doubt. E.g. measles virus cause measles disease.

2- Indirect association: The effect is due to another hidden factor, it is most commonly due to the presence of confounder. E.g. smoking associated with ischemic heart diseases but confounder is coffee drinking.

3- Spurious association: There is no association between the factor and the effect, but the study was not properly conducted. It also called fictitious association.

4- Artifactual association: It is the association that appears due to faulty design or analysis of a study.

THE MAIN CRITERIA (MILL`S CRITERIA) OF CAUSAL SSOCIATION (The major criteria):

1. Strength of association: It is measured by relative risk e.g. relative risk in lung carcinoma among smokers compared to non smokers is 8 times this mean high relative risk then strong association .

2. Temporal relationship (time sequence is logical): This mean the cause precedes the outcome. E.g. H.pylori cause chronic gastritis then duodenal ulcer.

3. Specificity of association: the outcome specifically due to this cause not other, e.g. the prevalence of H.pylori infection in patients with duodenal ulcers is 90%-100%.
4. Consistency: This means different studies in different times on different population by different approach all give the same finding. As e.g. about H.pylori and D.U.
5. Coherence with the existing Knowledge (biological plausibility): e.g. the mucosa that is infected with H.pylori will be weakened and will become susceptible to the damaging effects of the gastric acid.

THE FOLLOWING MINOR CRITERIA:

6. Dose response relationship: It means dose of exposure increases then the risk of disease also increase. E.g. increase cigarette smoking increase risk of lung cancer.
7. The reversibility: If a factor is a cause of a disease, the risk of the disease is expected to decline if the factor reduced or eliminated.
8. Analogy: We analog the findings together.

***THE RELATION BETWEEN FACTOR AND OUTCOME AFFECTED BY**

1. Chance: This means that there is no relationship between the factor and the outcome, and what we had observed was due to chance. This can be excluded by a proper statistical test which is p-value and when it is less than 0.05 what does it mean?
This means that the chance does not have a role of more than 0.05 (5%) in developing the outcome

2. Confounder: It is a third factor sharing with exposure that increased or decreased the probability of outcome occurrence. It is not an error in the study.

3. Bias: It is a systematic error not random in an epidemiological studies that result in an incorrect estimate of association between exposure and outcome

Sources of Bias

1: Selection bias: selection of study group individuals.
2. Observational bias (information): This include:
2.a. Recall bias: case under study not remember information as in case-control study.
2.b. Interviewer bias: It occur in those collecting data
2.c. Loss to follow up: Either by migration, death, or case refuse continuation in study this happened in cohort study.
2.d. Misclassification: It occurs when subjects are wrongly categorized with respect to either exposure or disease state

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Exercises:

Q1: In a health care center which serves a population of 14500 people, you treat number of people with hypertension and others with diabetes mellitus typeII. Since they all come to PHCC for their medicine at least once during 2 months you count the cases which were 135 cases (90 male, 45 female) with hypertension and 115(40 male, 75 female) with diabetes mellitus type II.

A. Calculate the prevalence of hypertension and diabetes mellitus II.
B. Why you are measuring the prevalence more than incidence?

Q2: In an Arabian country with population of 12 millions people, 120000 death occurred during one year ending December 31 2015, these included 40000death from cardiac problems. There were 250000 cases with heart diseases.

A. What was the cause specific mortality from heart diseases 2015?
B. What was the case fatality rate from heart diseases 2015?

Q3: In a sample of 150 persons, there were 100 persons had angina from those with angina 80 persons had history of smoking. While 50 persons didn`t have angina and from those 30 persons not smokers. Total population 20000000

A. What is the type of study?
B. Calculate epidemiological measurements in this type of study.

Q4: An epidemiological study started with 50 patients of renal failure and 50 persons free from disease but they had multiple similar socio-demographic characteristics with diseased group, to study the relation between recurrent urinary tract infection and renal failure. There were 35 diseased and 5 persons free from disease both of them had recurrent urinary tract infection..

1. Construct 2x2 table.
2. What is the type of study, and disadvantage of it?
3. What can you measure in this type?
4. Representate above data by a suitable figure.

Q5: Cohort study is conducted to evaluate the relation between family history of breast cancer among 200 women and occurrence of breast cancer among them. 100 women with positive family history, and 100 women without. Both groups start at age 40 years and followed for 10 years during the follow up period, 10 women in positive family history

group diagnosed as breast cancer, and 5 women in negative family history group develop breast cancer.

1. Construct a 2x2 table for above information.
2. Risk of developing breast cancer in positive family history group.
3. Risk ratio for the occurrence of breast cancer.
4. Can you find other indicators from this study? Calculate?

Q6: Screening test done to screen 1000 persons from medical staff to discover respiratory tuberculosis (T.B.) by doing chest x ray, 300 were positive by screening but diagnostic test assure infection among 180 person only. There were 400 persons diagnosed as T.B. by diagnostic test.

1. construct 2x2 table.
2. What is the prevalence of T.B. among those medical staff.
3. What is the sensitivity and specificity of this test?

Formal & informal verbs

Formal	Informal
enquire	ask (about)
request	ask (for)
inform	tell
purchase	buy
attend	go (e.g. to a meeting)
obtain/receive	get
provide	give
assist	help
require	need

للاطلاع:

مواصفات الاطاريح العلمية المقدمة للحصول على شهادة الدكتوراه والماجستير والدبلوم العالي المهني

١.نوعية الورقة وتفاصيل الكتابة:

١.١ . تقديم الاطروحة بشكلها النهائي مطبوعة بالالة الكاتبة ويجب ان يكون الطبع متساوي الحروف ومتناسقا وبلون اسود واضح.

٢.١ . يستعمل ورق ابيض من حجم (٢٩٧X٢١٠)ملم ومن نوعية جيدة وتستعمل صفحة واحدة من الورق للكتابة فقط.

٣.١ . يترك (٤سم) وبضمنها حافة ربط الاوراق. اما الحافات الاخرى فيجب ان يترك لها (٢سم) وبضمنها حافة النصوص المقتبسة والهوامش.

٤.١ . تكون المسافة بين سطر واخر (٥.١سم) فراغ من فراغات الالة الكاتبة عدا الهوامش في اسفل الصفحة والنصوص المقتبسة اينما وردت فيستعمل فراغ واحد فقط.

٥.١ . يبدأ المقطع الجديد بازاحة (٢سم) الى اليسار في اللغة العربية والى اليمين في اللغة الانكليزية.

٢. ترقيم الصفحات:

ترقم الصفحات بصورة متتابعة بالارقام اللاتينية من التشكرات حتى نهاية الخلاصة وبضمنها قائمة المحتويات وقوائم الجداول والاشكال. ترقم الصفحات بالارقام العربية من المقدمةحتى نهاية الاطروحة.توضع الارقام في الجهة العليا اليمنى من الصفحة اذا كانت الاطروحة باللغة الانكليزية.

٣. صفحة العنوان تحتوي على عنوان الاطروحة كما هو مقرر رسميا ويليها اسم الكلية مسبوقة بعبارة (اطروحة مقدمة الى) مجلس الكلية يليها الدرجة العلمية التي يروم مقدم الاطروحة الحصول عليها مسبوقا بعبارة (وهي جزء من متطلبات درجة) يليها الاسم الكامل لمقدم الاطروحة مسبوقا بعبارة (من قبل) يليها الشهر والسنة التي قدمت فيها الاطروحة في التقويمين الهجري والميلادي.

٦. تليها صفحة الاهداء ان وجد اهداء في الرسالة.

٧. تليها صفحة الشكر والتقدير.

٣. عدد صفحات رسالة الماجستير ١٥٠ صفحة واطروحة الدكتوراه ٢٠٠ صفحة.

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General definitions

***Case:** People who afflicted with a disease.
***Risk:** A statement of the likelihood of developing a disease or some health problem it measured by rate.
***Population at risk:** It is a frequent term in epidemiology that denotes to the sharing of a characteristic (biological, environmental, socio-economical) by certain population subgroup that put them at increased risk for development of a health problem (disease, death…), so the population at risk should be susceptible, and exposed to be at risk
***Epidemiology is divided into descriptive & analytic:**
-Descriptive: It describes the disease phenomena in the population in the term of some variable that gather this population in this variable.
The factors that take in consideration in describing most models are:
1- Person, place, time.
2- Host, agent, environment.
-Analytic: This model answers three most important question in the epidemiology which are:
1- Who is diseased?
2- When does this disease occur?
3- Where does this disease prevalent?
***Epidemic:** The occurrence of any disease at a frequency that unusual (compared with baseline data) or unexpected.
Outbreak: Unexpected disease occurrence on a local area in short period, for example cases of measles in a school.
***Endemic:** Disease that is occurring regularly in a define population (usual occurrence of a disease).
***Pandemic** (world wide epidemic): An outbreak of disease of a wide geographical area such as a continent.
***Epizootic:** An outbreak (epidemic) of disease in an animal population often with implication). That may effect human population.
***Epornithic:** An Outbreak epidemic of disease in birds population.

***Epidemiological Measurement (Categories of measurement):**
1:Rate.
2:Ratio.
3:Proportion.
Rate: The frequency (number) of events that occur in a defined time period divided by the average population at risk, as X/Y x K per unit of time.
Ratio: Expresses a relation between a numerator (X) and a denominator (Y) in which events or items counted a (X) are not derived from (Y) as male/female= 2/1.

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Proportion: An expression in to the numerator is always included in the denominator, as Y/(X+Y).

***Classification of measurements:**

A: Morbidity measurements: Rate of illness in population, include incidence and prevalence.

A.1. Prevalent rate: Measures the frequency of all current cases (old and new) of population at risk at specified time. Usually used in chronic diseases. There are 2 types of prevalence:

1. Period prevalence: The number of cases (old & new) of the disease that is present within a period of time (months, year, season, e.g. for year period from 1999-2005).

2. Point prevalence: The number of cases (old & new) of the disease that is present at a certain point in time.

$$\text{Prevalent rate} = \frac{\text{All cases of a disease at a given time}}{\text{Total population (at risk at a given time)}} \times 10^n$$

A.2. Incidence rate: Measures the frequency of a new event (disease) or health problem in population at risk during specified period of time. Usually used for acute diseases.

$$\text{Incidence rate} = \frac{\text{Number of new disease (cases) in specified time}}{\text{Number of population exposed to risk during this period}} \times 10^n$$

A.3. Attack rate: Number of cases of condition out of number of persons exposed.

Prevalence= Incidence X Duration

B: Mortality rate: Include crude death, and case fatality.

B.1. Crude mortality rate:

$$\textbf{Crude mortality rate} = \frac{\text{Total number of deaths reported during a given time}}{\text{Estimated mid interval population}}$$

B.2.Case fatality rate:

It is concerned with person cases who die from a particular disease.

$$\text{Case fatality rate} = \frac{\text{Number of death due to specific cause(disease)}}{\text{Number of cases of this disease}}$$

B.3. Specific Mortality rate:

*Sex specific: male, female.

*Age specific: young or elderly.
*Cause specific: is expressed as :
Cause specific rate= Number of deaths assigned to a specific cause
Estimated mid year population

B.4. Proportionate mortality Ratio(PMR):
PMR=
Number of deaths from a given cause in a specified time period
Total deaths in the same time period

B.5. Maternal mortality rate(MMR)
MMR=
No. of death related to pregnancy during pregnancy or within 42 days post termination
No. of live birth

B.6. Infant mortality ratio:
= Number of death below first year of age
No. of live birth in that year

C: Natality rate: Measures the frequency and probability of birth within a specified population for a given time interval and place.

Crude birth rate =
Number of birth per calendar year X 1000
Mid year population