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Scientific Medical Research

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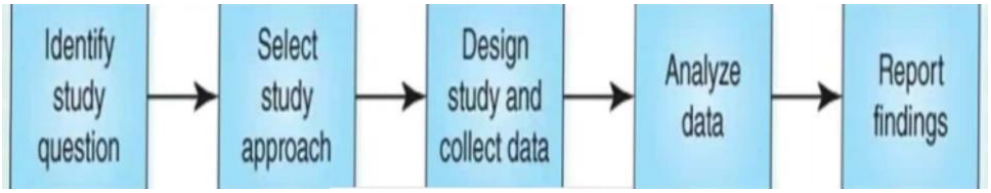
1.1 The research process

In an organized number of steps

In an appropriate way so the least amount of error happens

Research: is the process of **systematically** and **carefully** investigating a subject in order to discover new insights about the world.

In order for your research to be correct and **complete,** you have to follow and complete all of the five steps as follows:



What to study

How to study it

1.2 Health Research

Examines a broad spectrum of biological, socioeconomic, environmental and other factors that contribute to the presence or absence of physical, mental, and social health and well-being.

- Studies humans, genes, microbiological agents, etc. **NOT** Only **humans**
- It's a big umbrella for all studies related to the Health of people and communities ranging from simple case studies to Global and public health issues .
- Includes many sciences: demography, epidemiology, sociology, immunology etc.

Population health Research is a specification of health research that involves **humans** as the unit of investigation.

- There is a distinction between **routine practice activities** & **health research**. Sometimes routine acts in the hospital look as if they are research when they're **not** (imposters)

Examples:

An outbreak of gastroenteritis took place in a hospital, and they started looking into causes, **is this a medical research?** The answer is **No**, because as we previously said, a research is a question and a systematic way of finding the answer. Not just any routine investigation.

Usually such outbreak is not considered a scientific phenomenon it's just a mistake made somewhere

Another example; satisfaction surveys of a hospital's service quality, which ask the patients how happy they are with the service given, but this is just a hospital feedback query to better their work not a research survey.

However, if a group of researchers theorized an intervention that would make the service better and studied it, then it is considered a research.

1.3 main purposes of Health research:

i. Needs assessment (community health profiles) ⇒how healthy and well are people in a certain population? What's their health status? the major concerns in this population?
ii. Risk assessment (risk factors for diseases) ⇒ risk factors for morbidity, mortality, disability, and other health issues.
iii. Applied practice (clinical effectiveness)⇒ evaluate practices and their effect on preventing, treating, and diagnosing health concerns.
iv. Outcome evaluation ⇒ Of procedures, acts, projects, or educational programs used on this population. Is it effective? Is it not?

whatever the cause, we must remember that the job of research is to answer one well-defined question, add a piece of info to the folder, not entirely solve the problem.

Who can do meaningful research?

Anyone can! with some knowledge of it and a strong well and manners.

The best way to learn about health research is to do real research.

Consult someone with more research knowledge for guidance and help.

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Step 1: Identifying the Research question:

It's the first step towards a successful research project, to know **the question you're looking to answer.**

¿Where to get it?

Well, **keep your eyes open**. Observation is the best way to find a research question!

Whether it's of clinical practice, community observations, or personal experience, it should point towards an **unmet demand** for needs assessment, program evaluations and clinical effectiveness studies.

- Unmet demand means that what I'll be studying is a new question that the **answer of is needed**, it's not useful to study a question researched and answered before.
- Sometimes it's useful to re-study previously studied questions when **there isn't a general agreement on its findings**, to find more evidence and help find a more accurate answer.

- The way things are observed differs from one position to another

For example: a trampoline injury will be observed focusing on the injury itself by an ER worker, however a health educator would observe it focusing on causes and safety measures taken before the injury.

2.1 a good research question

1. Ends with a **question mark** and is **not a declaration or statement**.

We don't give opinions when we're asking or researching, we treat the problem objectively.

Choose Subject – follow method – find results

2. Is **testable**.

Can be **measured and examined** – no measurement tool means no real findings.

2.2 Brainstorming and concept mapping

Sometimes we're not met with any interesting observations that entice us to study them, and that's where brainstorming comes in handy to help us find a topic and a question.

Brainstorming: starting point, used to create a list of possible research topics.

The list doesn't have to be clean or filled with great ideas.

Here's a way to start. Ask yourself questions related to different areas:

FIGURE 2-1 Brainstorming Questions

Area	Questions
Values	• What are my interests and personal values? • What research topics are personally meaningful? • Have some understudied conditions that I could explore significantly affected me, my family, my friends, or my patients/clients? • Have certain health issues sparked my passion because they reflect what I consider to be an injustice?
Skills Personal growth Connections	• What knowledge and skills do I already have? • What new skills do I want to develop? • What source populations and/or data sources might be available to me through professors, supervisors, colleagues, and other personal and professional contacts?
Job and/or course requirements Gaps in the literature	• What does my supervisor or professor want me to study? • What information is not currently available that would make a contribution to the discipline and/or to improving health practices or policies?

you have to know what **you can** and what **you want to do** + what **needs to be done** so that you can carry out the research.

Questions like: Am I interested in the topic? Do I have a passion for it? Is it needed?

- Answering these questions allows you to know if you have an appropriate research subject or not

Once you have set the starting point, you go and start reading about the subject so that the idea is formed well.

Concept mapping: used to identify central themes that might be worth studying.

How does it work?

- We start by listing several diseases or population groups that are interesting to study.
- Then we branch ideas from them.
- After that we identify the ideas that show up several times while we're listing and appear as a central theme.

Once several ideas appear, we choose the one that we want to go with.

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2.3 Keywords

After you have a subject, you start looking up keywords of it.

for example: you want to study **child health in Africa**, some of the keywords would be 'children' 'Africa' 'malaria' 'measles' 'Uganda' so basically you look up multiple **words related to your main theme** of the idea to give it more refinement and shape.

- MeSH (**Medical Subject Headings**) by the national library of medicine of the US government, helps you to narrow the field you're looking into, giving you sub categories until you reach a subject that you are most interested in, because as we said Scientific Medical Research is very specific.
- The MeSH dictionary is available from PubMed.org

2.4 EDP [Exposure, Disease, Population]

This method is the easiest way for refinement

Actually, EDPs form the basis for many research questions:

How does it work?

You basically see if this [exposure] is related to that [disease/outcome] in a certain [population]

Check slides 15, 16, 17 for specific examples on Exposures, diseases, and populations

Exposures can be related to several areas like socioeconomic status, Health related behaviors, Health status, environmental exposures.

And diseases can be of various kinds like, infectious and parasitic, noncommunicable, neuropsychiatric, injuries.

Populations too must be very specific.

Example: what's the relation between [exercise habits] and [asthma development] in [adults with diabetes]

2.5 PICOT

Is often used for **clinical research**,

P: patient

I: intervention

C: comparison

O: outcomes

T: timeframe

This is another way to plan

what population? which intervention? are you comparing? What's the outcome of intervention? within what timeframe?

This method Points toward **selection of key indicators** that would provide **evidence of the success of intervention**

After deciding the subject, the next step begins:

3. literature review

Background reading allows the aim and the scope of the research to be **refined .**

Reviewing helps you plan your next steps, what is the design to follow, what are your measuring tools, how to specify the population you'll study?

3.1Informal resources

- Nontechnical information from trusted sources (e.g CDC, WHO) can provide helpful **background on a topic** & can give you new information that support your research.
- Factsheets and other informal information that have not been peer-reviewed are **not part** of the formal scientific literature (Do NOT cite them in formal reports) .

[As we said in the beginning, in the research we're not giving value declaration, we're not giving statements, we're rather giving information collected in a systemic way]

Peer review: is when a fellow researcher of the same field reviews the research and points out mistake areas and weak points. So, a **peer reviewed scientific journal** is written by experts and are reviewed by several other experts in the same field before the article is published in order to ensure the article's quality.

- If a piece of information is not formal, we don't cite it, meaning that we don't put it in the references (المراجع) that we based our research on.

3.2 Statistical reports ⇒ these are formal so you can reference them

Examples include:

- (World bank world development) indicators.
- UN agency reports (world health statistics, human development report, state of the world's children).
- Annual reports from groups like the American cancer society and population reference bureau.
- Information from state and local departments.

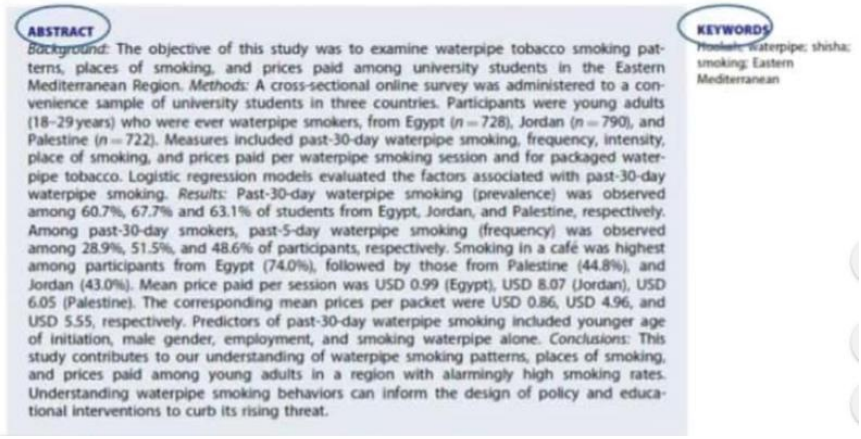
You should cite these so that the person reading the research can find them

3.3 abstract databases

Is a **paragraph-length summary** of an article, chapter, or book

- It gives a brief description of the study population, study design and findings.

- Reading the abstract saves you time. When you're looking for articles, it's better to read the general idea than to read the whole article in order to decide whether you do need it or not.
- Abstracts can be either **structured** or **unstructured**



ABSTRACT

Background: The objective of this study was to examine waterpipe tobacco smoking patterns, places of smoking, and prices paid among university students in the Eastern Mediterranean Region. *Methods:* A cross-sectional online survey was administered to a convenience sample of university students in three countries. Participants were young adults (18–29 years) who were ever waterpipe smokers, from Egypt ($n = 728$), Jordan ($n = 790$), and Palestine ($n = 722$). Measures included past-30-day waterpipe smoking, frequency, intensity, place of smoking, and prices paid per waterpipe smoking session and for packaged waterpipe tobacco. Logistic regression models evaluated the factors associated with past-30-day waterpipe smoking. *Results:* Past-30-day waterpipe smoking (prevalence) was observed among 60.7%, 67.7% and 63.1% of students from Egypt, Jordan, and Palestine, respectively. Among past-30-day smokers, past-5-day waterpipe smoking (frequency) was observed among 28.9%, 51.5%, and 48.6% of participants, respectively. Smoking in a café was highest among participants from Egypt (74.0%), followed by those from Palestine (44.8%), and Jordan (43.0%). Mean price paid per session was USD 0.99 (Egypt), USD 8.07 (Jordan), USD 6.05 (Palestine). The corresponding mean prices per packet were USD 0.86, USD 4.96, and USD 5.55, respectively. Predictors of past-30-day waterpipe smoking included younger age of initiation, male gender, employment, and smoking waterpipe alone. *Conclusions:* This study contributes to our understanding of waterpipe smoking patterns, places of smoking, and prices paid among young adults in a region with alarmingly high smoking rates. Understanding waterpipe smoking behaviors can inform the design of policy and educational interventions to curb its rising threat.

KEYWORDS

Hookah; waterpipe; shisha; smoking; Eastern Mediterranean

Structured means it goes through the elements of the research in order while giving a brief description: example given here

Background – method – results – then conclusion

Unstructured: no main titles.

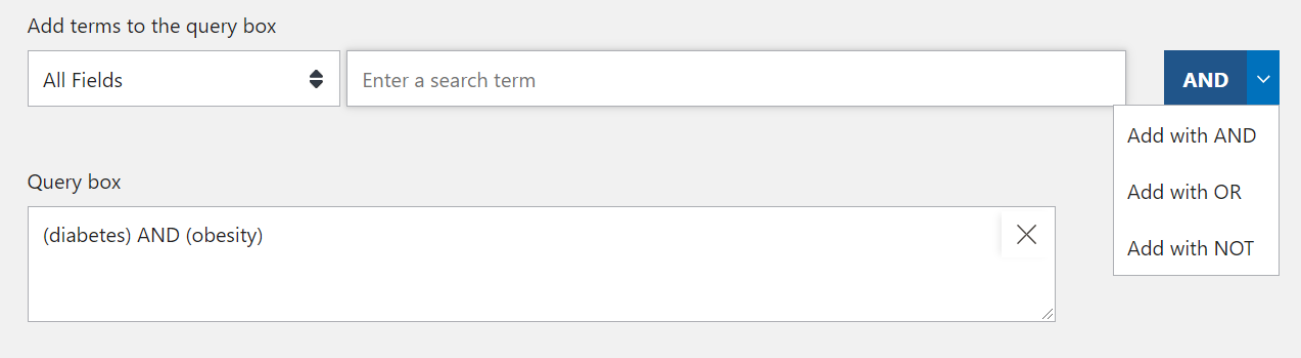
Pay attention to keywords; because they help you find similar and related articles when you look them up on 'abstract databases'

- Examples of abstract databases that are free (you can view the abstract): PubMed, European PubMed Central (PMC), SciELO and LILACS (central and south America)
- AJOL (Africa)
- **Other Databases** that usually require subscription: [MEDLINE] [CINAHL] [Embase] [psycINFO] [Web of Science] [EBSCO] [JSTOR] [Ovid] [ProQuest]
  And company-specific databases: (LWW, SAGE, T&F, Wiley and others)

↳ Once you read the abstract and find indicators that the article will be useful, read the article.

For the most efficient use of databases you can do the following:

- Search with **keywords and MeSH** words
- Use **Boolean operators**: AND, OR, NOT to include and exclude specifications in the topics you are looking into



E.g. while searching go to advanced search:

You can add specifications with AND, OR & NOT as shown, if you choose one of them, the system will add every term you type in the search box, as shown in the query box

But what do these things do?

Diabetes type one **OR** Diabetes type 2 -> find articles about either of them

Waterpipe **AND** cigarette smoking -> find articles that study both of them

Cigarettes **NOT** waterpipe -> you don't want articles related to waterpipe, you want 'cigarette' smoking specifically

- Carefully consider any limiters related to publication or language -> limiters are like filters that help you further specify your search in the abstract database.

3.4 full text articles:

even though abstracts are easy to find and read, full access to articles is usually hard

Where to find free full text pdfs:

- Google scholar and other search engines
- PubMed Central and other open access repositories
- Journal Websites (if the article is open access)
- Library subscriptions (e-journals) or interlibrary loans when a journal is not in a library's collection
- E-mail the author/corresponding author to politely request a copy -> usually the author is happy that you're interested, and they'd happily send you a copy

- **Elibrary at JU,** our university library has access to full texts in several databases, benefit from that**.**

3.5 Critical reading

The first thing to do after getting the articles you need is to **read them**. You can start by skimming, reread the abstract, looking at tables and figures, then check the references to find more similar articles. If you do not want to read the whole article you can re read the abstract

- You have to take into consideration 2 values while reading:

  - **Internal validity (المصداقية الداخلية):** how well was the study designed, conducted, interpreted, and reported?

Was it conducted well, did it use the correct tools, was the statistical analysis well conducted, were the conclusions correct depending on this statistical analysis?

Internal validity is a relative thing, so you can't judge all articles with the same scale

  - **External validity (المصداقية الخارجية):** also called **generalizability**, how likely is it that the results of this study apply to other populations? Can I say that the result of the study can be generalized over other samples of the population?

- Case studies can't be generalized, for instance, because they were done on small number of patients. Studies on a sample of specific type of patients can only apply to the same type of patients.
- You can however decide to replicate the same study on a larger sample size to increase its external validity

Annotated bibliography: ABs briefly summarize an article or report and **how it relates to the proposed new project**.

So, it's like an abstract, but for your citations, not your research article

For example: you add a reference, then you briefly explain how it relates to your research like: It may cover all the populations you want to study, or it can give an idea about the measurement tool you'll use.

You can do that in a table or spreadsheet for multiple citations where you write down the name of the authors, populations, methods

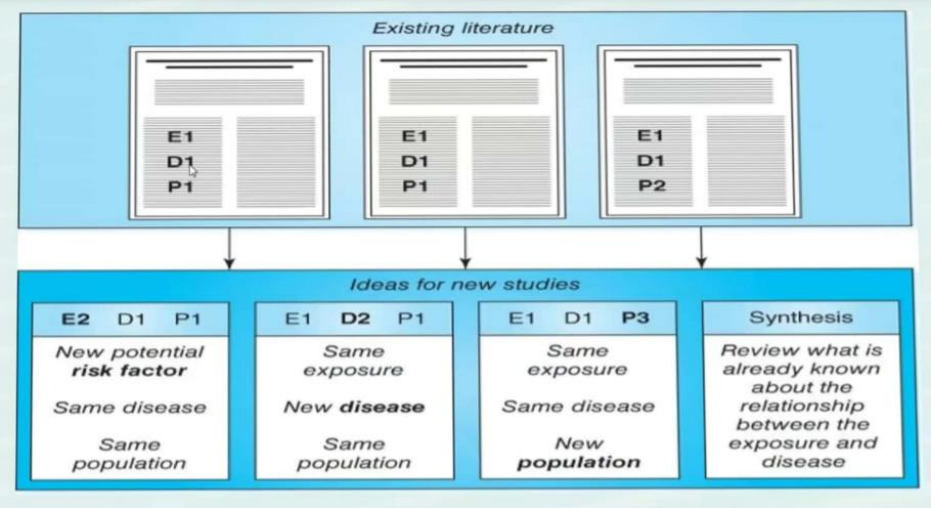
What makes Research original?

For a research project to be considered **original** it needs to have **only substantive difference** from previous work (a new exposure, a new disease/outcome, a new population, or a new perspective)

*Stay clear of paralyzing thinking like 'I want a one-of-a-kind research' *

You can find an idea By the EDP form; you find the EDP form in a certain research and then just change one of the elements.

Original **copy** **Original**



Why original?

Because it did not have the same population

› As you can see, you can have ideas for new studies only by changing one element while the rest is the same (just see what's 'new' in the figure)

As a new researcher, don't look for a research that's so unique, but rather start with a simple research that's a modified replication of a previous one until you learn how to do it.