Subject: Scientific research

Topic: Additional information lecture1

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Additional information [mentioned in the book] - lecture1

1.1 research process

- no matter what the goals of a research project are or what methods are used to achieve those goals, the five steps of the research process are the same.

- the first two steps are often completed **concurrently (في نفس الوقت)**

1.2 health research

- population health research involves humans as the unit of investigation **rather than focusing on molecules, games, genes, cells, or other smaller biological components.**

- some studies that are very specific to one population at one place and in one point in time are not particularly helpful for identifying broader patterns. However, most health researchers hope that their findings will reveal trend, relationships, and theories that are **generalizable** to other populations, places, and times.

Identifying a study question (step 1):

Selecting a general topic – reviewing the literature – focusing the research question – collaboration and mentorship – coauthoring

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2.3 Keywords

-The MeSH database can be helpful for **identifying the full extent of a research area** and also for the narrowing the scope of research area.

-Once a list of keywords has been compiled, the researcher looks for the themes that emerge from them. Some topics may be easily eliminated because they do not fit the researcher's interests.

2.4 Exposure, Disease, Population (EDP)

-**The population** is the group of individuals, communities, or organizations that will be examined.

-Is **[exposure]** related to **[disease/outcome]** in **[population]**?

Examples:

- Are exercise habits [exposure] related to the risk of bone fractures [disease] in adults with diabetes [population] ?
- Is reproductive history [exposure] related to the risk of stroke [disease] among women living in rural Ontario [population] ?

- Is household wealth [exposure] related to the risk of hospitalization for asthma [disease] in Australian children longer than 5 years old [population] ?

-A literature review related to the candidate question will assist the researcher in determining what is already known about the topic and what new information a new study could contribute.

2.5 PICOT

-One benefit of PICOT is that it points toward the selection of key indicators that would provide evidence for the success of the intervention.

3.1 Informal sources

-Researchers must be cautious about any claims in these files that contradict more formal sources of scientific information.

-These initial background readings can provide a foundation for understanding the more technical scientific literature that will be read later as part of a through literature review.

3.2 Statistical Reports

-When defining specific exposures, diseases, and/or populations of interest, it may be helpful to identify relevant statistics, such as the estimated prevalence of the exposure in a particular country, the annual global incidence of disease, or the size of a particular population.

- For regional-and country-level population measures and comparisons, the World Bank's World Development Indicators database provides information about a wide range of topics.
- Additional statistical estimates can be found in the annexes of the annual reports issued by United Nations agencies, such as the World Health Organization's **World Health Statistics**, **UNDP's Human Development Report**, and **UNICEF's State of the World's Children**.
- For information about states, provinces, counties, cities, and other smaller governmental units, contact the relevant public health department (this may be the best source of information about **vital statistics**).
- The best place to find very specific information about health-related exposures and diseases may be in published scientific articles.

3.3 Abstract Databases

-Abstract databases allow researchers to search thousands of abstracts for keywords or other term.

-A careful and comprehensive search of at least one major abstract database is the most important component of a careful literature research.

3.4 Full-Text Articles

-The only way to truly understand a study is to read the full text of the article.

3.5 Critical Readings

-About the **internal validity**, a reader should ask:

- What was the goal of the study? Were the methods appropriate for the goal? Was the main study question answered?
- Were the methods used to collect and analyze data scientifically valid? For example, did a study collecting new survey data select an appropriate sample population, recruit an adequate number of participants, use a validated questionnaire, and apply appropriate statistical tests? was the study conducted ethically? Have the authors acknowledged and discussed the limitations of the study methods?
- Do the results seem reasonable? What types of bias I the design, conduct, analysis, and interpretation of the study might have caused some of the results to be inaccurate?
- Are all of the study's conclusions supported by the study's results? If a study was attempting to answer a question about causality, does the article provide sufficient evidence to support that claim?

-About the **external validity**, a reader should ask:

- For experimental studies, how likely is it that the observations from the trial would occur in everyday life outside laboratory conditions?
- To what other populations might the results apply? For example, are results from a study in Canadian men ages 30-49 likely to be applicable to Mexican men ages 30-49, Canadian women ages 30-49, and/or Canadian men ages 50-69?

3.6 What Makes Research Original?

-for a research project to demonstrate originality, it needs to have inly one substantive difference from previous work. That could be a new exposure of interest, a new disease of interest, a new source population, a new time period under study, or a new perspective on a field of exploration.

-**For example**, a literature review might find that several studies have shown that older adults (the population) who take 30 minutes walks several times a week (the exposure) score higher on memory tests (the disease or outcome) than adults who do not routinely walk for exercise. A proposed new study could ask:

- Is playing table tennis (a new exposure) effective at improving memory in older adults (the same outcome and population)?
- Do older adults who walk several times a week (the same exposure and population) improve their balance (a new disease or outcome)?
- Does walking (the same exposure) improve memory (the same outcome) in children (a new population)?

-very few studies create entirely new areas of research, but every research project has the possibility of contributing to advancing a field of research when it addresses gaps in the literature (that is, missing pieces of information that a new study could fill) and builds on previous work.