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CONDUCTING RESEARCH

O.K. Ige

Department of Community Medicine, University College Hospital, Ibadan

The word 'research' is derived from the French word 'recherche', which means "to go about seeking". Creswell defines research as "a process of steps used to collect and analyse information to increase our understanding of a topic or issue". Research is usually undertaken for the following reasons:

- To establish or confirm facts
- To reaffirm the results of previous work,
- To solve new or existing problems
- To develop new theories/hypothesis
- A research project may also be an expansion on past work in the field.
- To test the validity of instruments, procedures, or experiments

Steps of Scientific Research

A research project, generally go through the three major steps described below, either formally or informally. The steps are: Pose a question, collect data to answer the question, and present an answer to the question

1. Posing a research question: A research question states what you want to find, it starts out as a crude research question but with the review literature the research question is refined. Literature review means reading published papers to learn something new about the topic of interest, to survey what others have said and written about the topic. The review is to help one reach a conclusion about ideas on the topic. The literature review also helps to identify flaws or holes in previous research which provides justification for the study. The aim is to find information, expert opinion and viewpoints on your research question. Based on what information is available the research question is modified. The refined research question should be the basis for the study objectives and/or hypothesis.

Considerations in selection of a research topic:

- Relevance: to one's day to day work, the environment and the patients or community
- Priority: based on the prevalence, morbidity, mortality, information needs of care providers, needs of patients/community etc. Ask yourself - is this a priority?
- What difference will this study make?
- Feasibility: limit the research scope, take a small piece. This requires thinking about what specifically you want to cover. Your research scope should not be too broad (such that it becomes impossible to execute or too narrow to meet the substantial requirement of a research scope. Consider available time and resources including equipment, manpower and funds. Make a list of the costs, materials, personnel, equipment, etc., to be sure that adequate resources are available to carry out the research. If not, modifications will have to be made to re-design the research to fit the available resources. In addition, evaluate the feasibility of testing the hypothesis; one should be relatively certain that the study can provide the needed answers with the available resources.
- Acceptability to patients/community. Check that data collection procedures are acceptable.

2. Data collection

Define key concepts: Before data collection, it is important to identify and define your key concepts

- "Outcomes" means: disease, death, side effect, complication (in statistics called "dependent variables")
- "Exposures" means: the variables that may be associated with the outcome i.e. the possible "risk factors", "causes", "determinants"

Select study design: Note that study questions lead to study designs. Selection of the study design is very crucial and can make the difference between success or failure in achieving the objectives. Seek the help of a statistical resource person (statistician) or of others more experienced in the field. Statistical help should be sought when planning an experiment rather than afterward when a statistician is expected to extract meaningful conclusions from a poorly designed study. In general one should choose the simplest design that will provide the answer required. This process takes three main forms:

- **Descriptive:** What is the prevalence of condition Z in a specific population?
- **Analytic:** What are the factors associated with condition Z? Is condition X a risk factor for condition Z? Will factor X change condition Y?
- **Diagnostic:** How good is test Q in detecting condition Z?

Guide to selecting the best Study design

- Purpose of the study e.g. study of etiology should be analytical, study of therapy should be experimental such as clinical/community trials
- State of existing knowledge (in relation to study question): if it is new idea, ecologic or cross-sectional studies are best. If it is a new hypothesis

to be tested then cross-sectional analytical or case-control. If it is a newly claimed association, case-control can be used for replication or confirmation, cohort for stronger evidence towards causation or to confirm association and experiment/intervention to prove causation

- Latency: For diseases with very long latency, the costs of concurrent cohort studies or clinical trials are prohibitively high. Better to use case control studies
- Feasibility in terms of time, manpower, equipment and money.

Data collection strategy: There are two major types of data collection: qualitative research and quantitative research. Researchers choose qualitative or quantitative methods according to the nature of the research topic they want to investigate and the research questions they aim to answer. Qualitative research seeks to understand human behaviour and the reasons that govern such behaviour. This type of research aims to investigate a question without attempting to quantifiably measure variables or look to potential relationships between variables. Quantitative research seeks to answer the research question by collecting numerical data to analyze utilizing statistical methods. The Quantitative data collection methods rely on random sampling and structured data collection instruments with predetermined response categories .

In either qualitative or quantitative research, the researcher(s) may collect primary or secondary data. Primary data is data collected specifically for the research, such as through interviews or questionnaires. Secondary data is data that already exists, such as census data or patient database, which can be re-used for the research.

Gathering of data: Consists of identifying a population and selecting samples, gathering information from and/or about these samples by using specific research instruments. The instruments used for data collection must be valid and reliable and designed to collect relevant information.

3. Presenting an answer

Operational definitions: From the beginning, provide operational definitions with regards to defining the variables and how they will be measured/assessed in the study.

Analysis Plan: You should have set up an outline of the statistical analysis of your research to determine whether or not you are able to test the factors you wish with the precision you desire. One of the best ways to do this is to write out the analysis plan with dummy tables.

Data Analysis: A particular danger in this age of the computer and statistical programs is to believe that you can just run the data through the statistical program and the data will be analysed for you. While this is true to a certain extent, you must remember that the computer is a perfect idiot and does only what you tell it to do. Therefore, if you do not know what to tell the computer to do and/or of you don't know what the computer is doing, you may end up with a lot of useless output.

Data Interpretation: There is a need to be able to interpret the computer output that you get in the light of the research. Statistics do not prove anything and there is always the possibility that your conclusions may be wrong. One must consider the consequences of drawing an incorrect conclusion and modify the interpretation accordingly. Do not jump to a conclusion just because an effect is significant. This is especially so if the conclusion doesn't agree with previously established facts. The data should be checked very carefully if this occurs, as the results must make sense. There is no such thing as a negative result just a positive evidence that there may be no real difference among the groups compared. Ask for help when in doubt about how to design, execute or analyse your data. Not everyone is a statistician, but everyone should know the important principles of data analysis. Remember to ask for help when planning a research not after it is completed

Bibliography

1. **Creswell JW.** Educational Research: Planning, conducting, and evaluating quantitative and qualitative research (3rd ed.). Upper Saddle River: Pearson.
2. **Gauch Jr., HG.** Scientific method in practice. Cambridge, UK: Cambridge University Press. 2003 ISBN 0-521-81689-0 (page 3)
3. **Rocco TS.,** Hatcher T., Creswell J.W. (2011). The handbook of scholarly writing and publishing. San Francisco, CA: John Wiley & Sons. 2011 ISBN 978-0-470-39335-2
4. **Kara H.** Research and evaluation for busy practitioners: A time-saving guide, p.114. Bristol: The Policy Press