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Essentials of NURSING Research & Biostatistics

As per the Revised INC Syllabus for BSc Nursing, 2021
(Also Covering the Old Syllabus)

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JAYPEE

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Chapter

3

Research Problems, Objectives, Variables Hypothesis, Delimitation, and Assumptions

Learning Objectives

After completion of this chapter, the students will be able to:

- Describe the concept of research problem.
- Explain the sources of research problems.
- Identify the characteristics of a good research problem.
- List down the qualities of a good research questions.
- Describe the steps in developing a research problem.
- Enumerate the concept, characteristics, importance and types of research objectives.
- Explain the concept and different types of variables.
- State the purposes and types of hypothesis and identify the importance of hypothesis in quantitative studies.
- Describe the characteristics and functions of hypothesis.
- Enumerate the concept, types and uses of delimitations.
- Identify the limitations for the study and how it will be differ from delimitation.
- Describe the concept, types and uses of assumptions.
- Differentiate between assumption and hypothesis.

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INTRODUCTION

In order to begin to identify research problems is it first necessary to understand what is meant by the term research and to have an understanding of how the research problem fits into the whole research process. A number of different definitions for research exist however common to all of them is an agreement that research is systematic, disciplined and focused on gathering information to understand a phenomena, answer questions or solve research problems. The systematic nature of the research process means that research is undertaken in a methodological fashion using a rigorous approach to collect information (data) about a phenomena or research problem and to analyze and interpret that information in order to begin to answer questions or solve problems. Since research is directed at ultimately helping us to answer a question or address a problem, it is critical that we are as clear as possible about the research problem, we are interested in. Thus, developing a problem statement is a critical first step in the research process. In research process, the first and foremost step is selecting and properly defining a research problem. A researcher must find the problem and formulate it when he/she is interested to make a research study and a research problem is one which requires a researcher to find out the best solution for the given problem, i.e., to find out by which course of action the objective can be attained optimally in the context of a given environment. It is an enigmatic, perplexing, or troubling condition for the researcher. Both qualitative and quantitative researchers identify a research problem within a broad topic area of interest. The purpose of study for them is to "solve" the problem or to contribute to its solution by accumulating relevant information.

DEFINITIONS OF RESEARCH PROBLEM

- A research problem, in general refer to some difficulty which a researcher experience in the contest of either a theoretical or practical situation and wants to obtained a solution for the same.
- A research problem is a situation involving enigmatic, perplexing, or troubling condition and the purpose of it to solve the problem to be solved.

MEANING OF RESEARCH PROBLEM

- Research problem is a situation in need of a solution, improvement, or alteration.

or

- A discrepancy between the way things are and the way they ought to be. Research questions are the specific queries researchers want to answer in addressing the research problem.

SOURCES OF RESEARCH PROBLEMS

When a reviewer or consumer critiquing, reviewing or utilizing research questions being puzzled about the origins of research problems. Generally before starting research project their doubt should be cleared regarding development how to select research problem and formulate problem statement. As research is a time consuming enterprise, curiosity about and interest in a topic are essential to a project's success. There are a variety of sources for searching research problem. At the most basic level, research topics originate with researchers' interests. Explicit sources that might fuel researchers' curiosity include experience, the nursing literature, social issues, theories, and ideas from others. The sources of research problems are enlisted as follows **(Fig. 3.1)**:

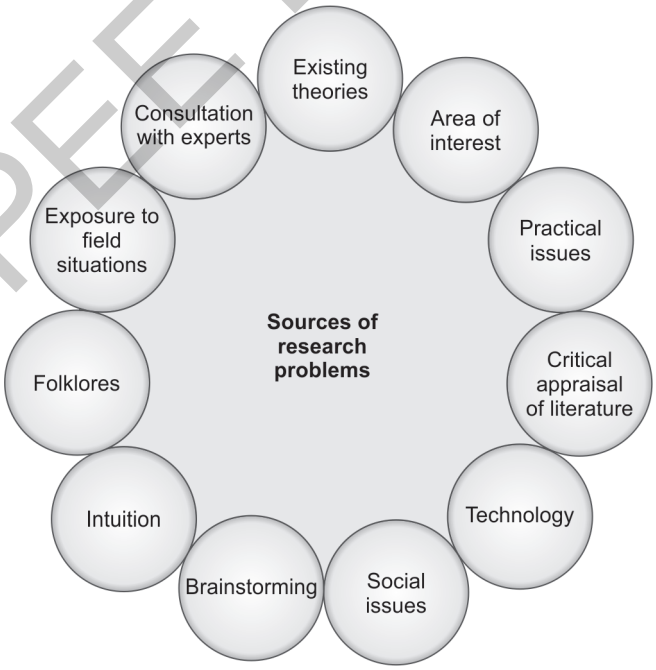

Fig 3.1: Sources of research problems.

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Personal Experience

The first credible source of information is what a person comes to know by direct personal experience. In the course of professional training and experiences at work, a nurse feel uncomfortable with some certain things or facing problems in day to day activities which can be changed or improved on. This allows the nurse to embark on solving the problems by which they will conduct research. Sometime personal practical experiences can pursue a nurse to make some changes by carrying out research where they are getting problems. Personal experience, such as gripe, professional wishes, curiosity, new person/experience are also provocative factors for research.

Existing Theories

One good source for completing the research is deducting from the existing theories and hence finding its discrepancies and conclusions. There is good relationship between theories and research. Research is a process of theory development and theory testing because theories are proved by research. Nurses use many theories from other disciplines in their practices. If an existing theory is used in developing a researchable problem, that specific statement from the theory must be isolated. Generally, parts of the theory are subjected to testing in the clinical situation.

Area of Interest

Research is all about exploring and probing new areas that have not been worked upon. A researcher can choose any field or area that interests him and then gather all the existing knowledge about it. This would help to strengthen the grip of the researcher over the topic. Once you know the existing areas, it can observe where there is need for further work. The discrepancies in the research can serve as the basis of the new research where it can try to explore new dimensions and avenues and update the existing knowledge. This would serve as a source for research problem.

Practical Issues

Practical issues can be a source of research ideas. Some current problems facing in nursing education (new learning strategy) nursing practice (new intervention or quality care), nursing administration (e.g., problem facing administrators) can be taken as research problem. Nurses gets plenty of ideas to formulate research problems from their clinical experiences. Every curious nurse has several questions to be answered which are encountered during clinical experience. For example, a nurse finds that unrestricted visiting hours in surgical wards reduced the analgesic demand among postoperative patients. Such clinical experiences could be rich sources of ideas to identify a significant research problem.

Critical Appraisal of Literature

When we critically study books and articles relating to the subject of our interest, including research report, opinion articles, and summaries of clinical issues, pertinent questions may arise in our mind. These may strike reader's mind indirectly by stimulating imagination and directly by stating what additional research is needed. For example, a nurse reads an article on the prevalence of the pin site infection among patients with external fixators while reading this article nurse learns that there is lack of consensus about pin site care. This information may

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serve as a basis to formulate a research problem. There may be areas, as revealed by a dearth of available literature on the topic that remain unexplored that can be identified through the review, discovering the areas how much has been explored and what is remaining can helps to get a research problem.

Past research can be an excellent source of research ideas. It is probably the most important source of research ideas. That's because a great deal of research that has already been conducted on a multitude of topics and, importantly, research usually generates more questions than it answers. This is also the best way to come up with a specific idea that will fit into and extend the research literature. For students planning on writing a thesis or dissertation, the use of past research is extremely helpful, and remember to not just look at the variables and the results, but also carefully examine how they conducted the study. In research every research report suggests areas for continued study which can be referred as source. No study can stand by itself, must be replicated for confidence in the results which can be referred as source.

Technology

Advance technology may have different type of influence on human life. There are many adverse effects of advance technology also which can be considered as research problem. For example, effect of continuous improper uses mobile phone on the health of the individual or the effect of continuous use of computer on the health of the official workers (using computer at least 8 hours in a day). In medical science also different drugs are banned due to such types of adverse effects.

Social Issues

Sometimes, topics are suggested by more global contemporary social or political issues of relevance to the healthcare community. For example, HIV/AIDS, female feticide, sexual harassment, domestic violence, and gender equality in healthcare and in research are some of the current social and political issues of concern for healthcare professionals.

Brainstorming

Brainstorming sessions are good techniques to find new questions, where an intensified discussion among interested people of the profession is conducted to find more ideas to formulate a good research problem. For example, ideas for studies may emerge from reviewing research priorities by having brainstorming session with other nurses, researchers, or nursing faculties.

Intuition

Traditionally institutions are considered good sources of knowledge as well as sources to find new research problems. It is believed that reflective mind is good sources of ideas, which may be used to formulate a good research problem.

Folklores

Common beliefs could be right or wrong. Peoples have a variety of believe and practice which may affects the health conditions can be tested for right or wrong. Let's take a small example, it is generally believed that studying just before the test decrease the score. We believe we should not study just before test to relax our mind. Researchers can conduct a

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research study on whether one should study before the test or no. In this way the common myths can also be tested.

Exposure to Field Situations

During field exposure, researchers get variety of experiences, which may provide plenty of ideas to formulate research problems. For example, while working in field a researcher observed a specific traditional practice for cure of disease condition, which can be used as research problem to investigate its efficacy.

Consultation with Experts

Experts are believed to have sound experience of their respective field, which may suggest a significance problem to be studied. In addition, expert may help in finding a current problem of discipline to be solve, which may serve as basis for formulation of research problem.

RESEARCH PROBLEMS TO BE AVOIDED (FIG. 3.2)

The research problem undertaken for study must be carefully selected. Generally the less expert person or the students casually select any topic for research without knowing the consequences. Researcher use to conduct a research either for the partial fulfillment of her/his studies or publishing any index journal or presenting any national or international seminar. Even though it is for the partial fulfillment of her/his studies of publication purpose. It should be carefully selected because conducting study is not an easy or small thing. During selection the research has to avoid some of the problem statements which are described below. Otherwise he/she will face problems later during conducting studies.

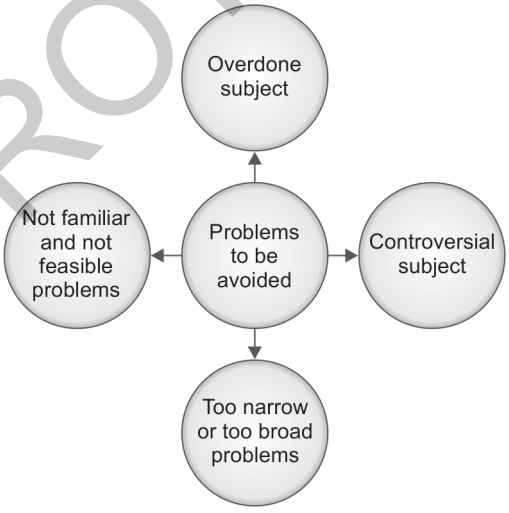

Fig 3.2: Research problems to be avoided.

Overdone Subject

Subject which is overdone should not be normally chosen because people are already aware about that and its results then what's the new in selecting such topic. For example, effectiveness of warm compress and back massage in reducing labor pain. If it is already proved by so many researcher that warm compress and back massage is helpful in reducing labor pain then no need to repeat again and again. In such types of studies the result said something new also it will create controversy.

Controversial Subject

So many subjects/problems having controversy on the result or the research or in the research methodology it is wise not to select such type of problem because there may be many issues that can arises due to controversy. So this type of research problems should be avoided.

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Too Narrow or Too Broad Problems

Too narrow or too vague problems should be avoided. If a researcher select a too narrow research problem there will be difficult to get the reviews on that. It will be difficult in constructing tools on that and the generalization will be a limited group with limited area. Vague problem should be avoided because it is necessary that problem statement should be clear. Too broad problems should be avoided because it will be difficult to conduct due to too broad problem. For example a study on methods of family planning is too broad than only conventional contraceptive and it is also broad than only the emergency contraceptive pills. Similarly study to assess nutritional deficiency disorder is too broad which is difficult to conduct whereas a study to assess vitamin A deficiency disorders is narrower than it. Similarly a study to assess bitot spots due to vitamin A disorder is more narrower than the above two problem statements.

Not Familiar and Not Feasible Problems

The subject selected for research should be familiar and feasible so that the related research material or sources of research are within one's reach. Not familiar and not feasible problems should be avoided. The feasibility of research problem in reference to time, availability to subjects, facilities, equipment and money, and ethical considerations should be checked. The time needed for a research study is depend upon what type of the study that is based on which a problem statement may be select. The maximum allotment of time for an undergraduate (UG) or a postgraduate (PG) student will be one to two week. So a cross-sectional and quantitative studies should be selected by them. Similarly the researcher must consider realistically the financial resources available for research projects and the cost for conducting the study. Based on the capacity of the researcher to spend money or funding agency contracts the problem statement must be selected. Similarly availability to subjects, facilities, equipment and money, and ethical considerations and the qualification and expertise of the researcher must be taken into consideration.

CHARACTERISTICS OF A GOOD RESEARCH PROBLEM

The major characteristics of good research problem statement are **(Fig. 3.3)**:

Interesting

This is a subjective criteria, the study must be interesting to the person who is conducting the study. It depends upon the individual's choice. Generally new study will be arouse interest of the researcher and others also. A research problem can only be considered good fit is an accordance with researcher's field of interest. A research problem must be as per the motivation of the researcher and it should be fascinating. It is one that grows as it is exercised and that provides the intensity of effort needed for overcoming the many hurdles and frustrations of the research process.

Solvable/Researchable

Problem selected is considered good only if it is solvable so that chances of insolvability of problem should be minimized. It will enhance relevant results. For example, a researcher selects a research problem to know the existence of God in this universe. These sorts of problems are ambiguous and impossible to solve. Therefore, the researcher must ensure that a research in the variables should be precisely defined and measured and lead to an answer to the question.

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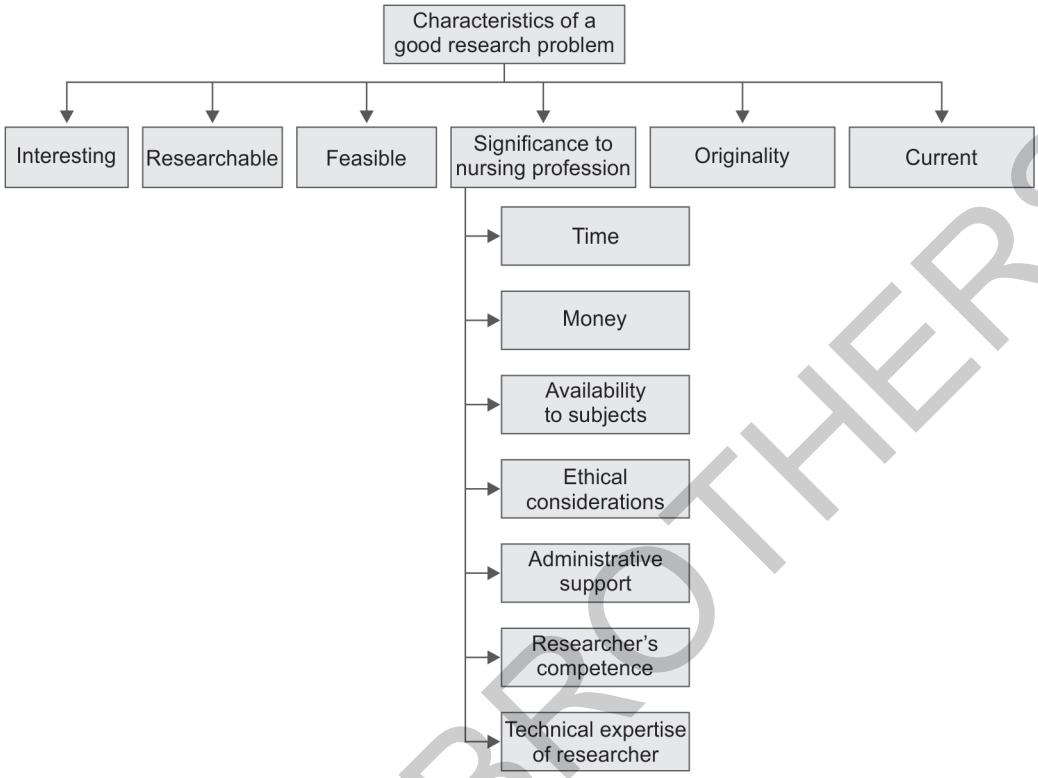

Fig. 3.3: Characteristics of a good research problem.

Feasible/Practicable

Before deciding to carry out the research project, or to select any research problem it must be observed whether it would be feasible to conduct? Can the study be conducted by the researcher? Feasibility is an essential consideration of any research project. Regardless of how significant or researchable a problem may be, the feasibility of research problem in reference to time, availability to subjects, facilities, equipment and money, and ethical considerations should be checked. It will help the researcher to decide whether selected problem is appropriate or inappropriate and study can be.

Significance to Nursing Profession

A problem which a researcher is selecting should have significance to nursing profession or it will not serve any purpose. A research problem is significant for nursing profession when it is directed to develop or refine, the body of professional knowledge. A research problem could be considered significant for nursing profession if it fulfills the following criteria: Patients, nurses, and generate information to get practical implications for nursing profession.

Will the results make a difference that matters to the profession?

- Make a difference in patient care
- Add to professional practice knowledge
- Related to more general conceptual issues
- An instance of a larger class of events

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- Provides solutions of current nursing practice needs
- Promotes nursing theory development or testing
- The results will improve clinical nursing practices
- Healthcare fraternity will benefit from the study

Time

The time needed for a research study is depend upon what type of the study that is. A longitudinal survey a correlational research study that involves repeated observations of the same variables over long periods of time—often many decade but a cross-sectional study is not like this. A qualitative generally takes more time than a quantitative study. Sufficient time should be allowed for a researcher for conducting a study. During selection of problem statement this factor must be considered otherwise the study cannot be completed.

Money

The researcher must consider realistically the financial resources available for research projects and the cost for conducting the study; some studies are much more expensive than others. Therefore, before making the final decision to conduct a study, an accurate determination of the needed equipment is essential. All research projects require some type of resources supplies. Supplies should be ensured and supplies in the early phases of a research project, ensure there are less chances of the project to be revised or discarded later because of equipment or supply. The feasibility of the study must be tested by assessing the ability to pay by the investigator or any funding agencies.

Availability to Subjects

Sometimes after selection of statement it is difficult to carry out the study due to unavailability of participant or participant in sufficient number. For example, the researcher selected a study on the effect of consanguineous marriage on their offspring's. For conducting such type of study such type couple is essential who had undergone consanguineous marriage which is very uncommon in Odisha. Only in south side of Odisha or in the state Andhra Pradesh these type of couple may available. Similarly if a researcher wants to conduct a study on assessing the cause of sickle cell anemia, she has to search the patient suffering with such disorders. So the availability to subjects can determine the feasibility of the study.

Ethical Considerations

A researcher must ensure that the research problem can be considered by the ethical committee without undue hurdles and unless it is in accordance with ethical guideline. If the study poses unacceptable physical risks or invasion of privacy the investigator must seek other ways to answer the question. If there is uncertainty about whether the study is ethical, it is helpful to discuss it at an early stage with a representative of the institutional review board.

Administrative Support

Financial as well as psychological support from administrative is very helpful. The nurse researcher may find it very difficult to conduct research independently. Many research projects require administrative support knowing that the superiors support the research efforts can be very powerful motivating force.

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Researcher's Competence

A research problem can only be feasible if it is in accordance with researcher's competence. Researcher competence is essential in selection of problem statement selection of study subject and research design everything. During selection of problem statement the competence of researcher will also be obtained because all studies are not alike. Some studies can be carried out by less expertise person whereas for some other studies expert person is essential.

Technical Expertise of Researcher

The investigators must have the skills, equipment, and experience needed for designing the study, recruiting the subjects, measuring the variables, and managing and analyzing the data. Consultants can help to shore up technical aspects that are unfamiliar to the investigators, but for major areas of the study it is better to have an experienced colleague steadily involved as a coinvestigator.

Originality

It is fundamentally considered that every research problem should be new and unique in itself. Therefore, it is the key responsibility of a researcher that an innovative knowledge is used for selecting a research problem, so as to extend the growth of existing body of knowledge on a profession.

Current

A good research problem must be based on the current problems and needs of a profession, so that results generated will be of more use. Furthermore, more number of the professionals will be interested in the research conducted on the current issues of their profession.

QUALITIES OF A GOOD RESEARCH QUESTIONS

- It is grounded in a theoretical framework.
- It is builds on, but also offers something new to, previous research.
- It has the potential to suggest directions for future research.
- It is a purpose or question that the researcher is sincerely interested and/or invested in.
- It addresses directly or indirectly some real problem in the world.
- It takes ethical issues into consideration.
- It clearly states the variables or constructs to be examined.
- It is not biased in terminology or position.
- It has multiple possible answers.
- It is simple, or at least manageable.

STEPS IN DEVELOPING A RESEARCH PROBLEM (FIG. 3.4)

Decide on the General Area of Study or Investigation

The researcher will formulate of a research problem begins with selection of a broad research topic from personal experience, literature, previous research, and theories in which researcher

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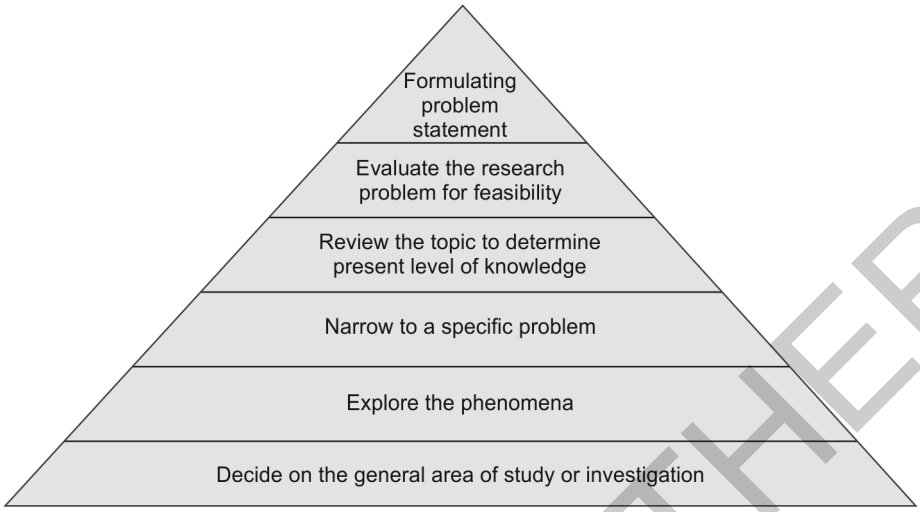

Fig. 3.4: Steps in developing a research problem.

is interested and has significance for nursing profession. Some broad general ideas about things that makes wonder the researcher in practice can be selected. It depends upon the researcher's interest. Choosing a topic in a familiar area will help to make decisions about the need for further research in the area, as well as the feasibility of particular research approaches but here the researcher will select abroad topic. For example, a researcher will select a topic on nutritional deficiencies. Therefore, he or she initially begins with such broad research.

Explore the Phenomena

Phenomena mean a fact or situation that is observed to exist or happen, especially one whose cause or explanation is in question. The researcher will explores the different specific area on which the study can be conducted on this. He/she will identify different specific areas under that broad areas. For example, in the area of nutritional deficiencies what are the specific areas, such as under nutrition, vitamin A deficiencies disorders, iodine deficiencies disorders and nutritional anemia's and so on which is more prevalent. In this stage, the investigator will undergo the review also.

Narrow the Topic to a Specific Problem

In this step, researcher proceeds from a general area of interest to more specific topic of research to conduct a study. For example, from the area of nutritional deficiencies the researcher will select any specific problem like vitamin A deficiencies disorders and formulate the statement 'A study to assess the vitamin A deficiencies disorders among school going children.'

Review the Topic to Determine Present Level of Knowledge

After getting a problem for research, he or she needs to review the nursing literature and theories. Literature is reviewed to know what has already been done in this selected area of research. Review of nursing theories provides an opportunity for nurses researcher to plan a research problem to contribute towards either testing or development of a theory/conceptual model. What different studies are already done on this weather select problem is appropriate or not.

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Evaluate the Research Problem for Feasibility

Once researcher is clear about the specific research problem, next the research problem must be carefully evaluated for its significance, research ability, and feasibility. Feasibility of the research problem should be evaluated for time, cost, availability of subjects and resources, administrative and peer support, ethical consideration, researcher's competence and interest.

Formulating Final Statement of Research Problem

After establishing the significance, research ability, and feasibility, then researcher finally formulates a final statement of a research problem. A statement of research problem could be in declarative or interrogative format. Example of declarative or statement form of problem statement, a study to assess the effectiveness of video assisted teaching module (VATM) regarding prevention of malnutrition among under-fives on knowledge of the mothers in a selected rural community, Odisha and the same problem statement in question form is, what is the effectiveness of VATM regarding prevention of malnutrition among under-fives on knowledge of the mothers in Odisha?

CRITERIA FOR DEVELOPING PROBLEM STATEMENT

Clear and Unambiguous

The problem statement should be stated clearly and unambiguously, between 10 and 15 words long and should clearly identify for the reader the purpose of the study. The problem statements that are too long or too short can be confusing or misleading. The researcher has to find out whether the title clear, accurate and unambiguous or not.

Relationship between Variables

The problem statement in quantitative studies should depict the relationship between two or more variables. Generally, a problem statement consist at least two variables named dependent and independent variable but sometime more than two variables, for example, effectiveness of warm compress and back massage on 1st stage of labor pain. In this problem statement the relationship between two independent variables and one dependent variable exist. Sometime in descriptive or qualitative studies there is only one variable known as research variable.

Possibility of Empirical Testing

The problem statement should imply the possibility of empirical testing which means practical applicability. During selecting the researcher will judge the significances of research problem statement which is planned to be done.

RESEARCH OBJECTIVES

Concept and Definitions

Research is an organized investigation of a problem in which there is an attempt to gain solution to a problem. Clearly defined objectives enlighten the way in which the researcher has to proceed to get right solution of a right problem. Sometime objectives are directed towards identifying the relationship or difference between two variables. Generally research objective focus on the

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ways to measure the variables, such as to identify or describe them objective should be closely related to the statement of the problem. A research objective is a clear, concise, declarative statement, which provides direction to investigate the variables. That are the results sought by the researcher at the end of the research process, i.e., what the researcher will be able to achieve at the end of the research study. The objectives of a research project summarize what is to be achieved by the study research objectives is a concrete statement describing what the research is trying to achieve.

Definitions of Objectives

- Objectives can be broadly defined as a general statement which attempts to give both shape and direction to set off more detailed intention for the future. *—Davis, 1999*
- It is also defined as a broad general statement of goal direction which contains reference to the worth whileness of achieving it. *—Sankaranarayanan, 2000*

Definition of Research Objectives

- Research objectives are clear concise declarative statement expressed in the present tense and measure through statistical method.
- Research objective is the specific accomplishment of the researcher that hopes to achieve by conducting the study. The objectives include obtaining answer to research questions or testing research hypothesis.

Characteristics of Research Objectives (Fig. 3.5)

A well-worded objective will be SMART, (i.e., specific, measurable, attainable, realistic, and time-bounded). It should be relevant, feasible, logical, observable, and unequivocal.

Other than this it should be logical, unequivocal, feasible, and observable.

The overall objectives of research project characteristics summarizes below:

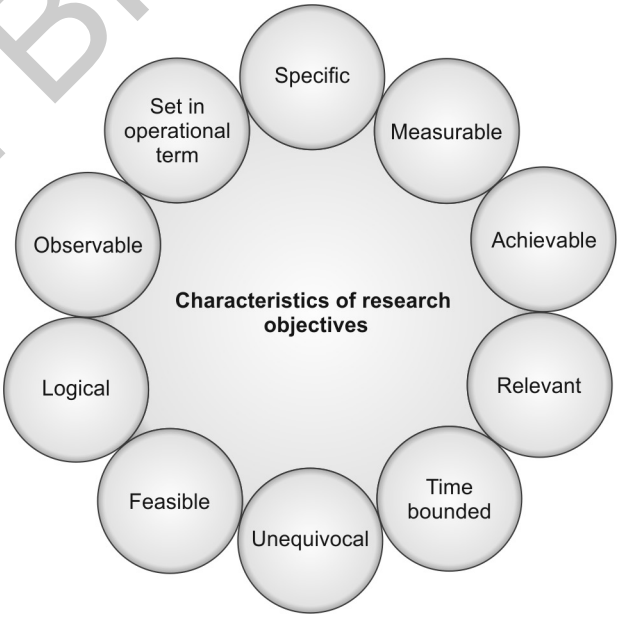

Fig. 3.5: Characteristics of research objectives.

Specific

The objectives should be simple indicating what to achieve, sensible which means it should be practicable and significant not trivial.

Measurable

The existence of a criterion for measurement will make it easier to choose or in construct a valid evaluation mechanism. The objectives can be measurable means it can be evaluated how much fully objectives achieved, partially achieved or not achieved. It should be meaningful and motivating.

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