



# ABC of Research

## The Research Process ...

In the first edition of ABC of Research we mentioned that research, regardless of its type, involves a systematic process of chronological steps or phases that guide our thinking, planning and analysis.

A classical research process is composed of five distinct phases that are necessary to follow in order to produce relevant and valid research.

### PHASES OF RESEARCH

- 1 Research question
- 2 Research design
- 3 Implementation
- 4 Analysis
- 5 Dissemination

These phases form the complete cycle of research starting from the production of the research question up to the dissemination of its results.

This cycle in itself acts as a stimulus for a new cycle of research. This issue is dedicated to the first phase concerned with the production of the research question and related objectives.

### ABC of RESEARCH

#### AIMS AT

*creating an awareness of issues related to research*

*providing a core of knowledge that is practice-based.*

*encouraging communication between researchers*

## Phase One – Research Question

### Introduction

Defining the research question is the first step in any research project. It is the most important step as it directs all following steps and if well defined will lead the researcher to produce relevant and valid results. To define a research question one has to go through an intellectual process which is initially broad in nature but ultimately ends by the production of a specific research question and related objectives.

### Topic selection

Any researcher before trying to define the research question should first select a specific topic for his research. Selecting the topic should be directed by its

importance and impact on the wider community. However, in many instances topic selection is directed by one's own personal interest to follow a certain career path. Examples of research topics are cancer, obesity, wound healing, infection.

### Research problem

Once a topic is selected a more complex step is initiated which requires the researcher to determine what is known, what is not known, and what needs to be known about this topic. In doing so, the researcher will be able to define a research problem that can be considered the foundation for his research question that should be answered in the course of a single study.

Research problems can only be identified by a thorough review of the scientific literature and constant consultation with experts in the selected topic. Initially several research problems or a research problem that is broad will be identified. However, through revisiting the literature and reconsultation with the experts, research problems can be cut down to a single one or narrowed down to a level that can lead to the development of a specific research question. Examples of research problems related to the above topics include cachexia in cancer patients, etiology of obesity, scar formation with wound healing, drug resistance with infection treatment.

### PHASE ONE

TOPIC SELECTION



RESEARCH PROBLEM



RESEARCH QUESTION



RESEARCH OBJECTIVES

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## How are we doing?

Global Research Report, Middle East published by Reuters - February 2011 has shown that Turkey and Iran have increased their research output from 5,000 and 1,300 papers in year 200 to 22,000 and 15,000 papers in year 2009, respectively. Egypt has had a less impressive increase with less than 5000 papers produced in year 2009.

The impact of this research has increased for most countries in the region including Egypt from one quarter of world average citation impact to one-half of world average.

The report shows that Egypt, based on global share of research output, is most focused on pharmacy 0.71%, material sciences 0.66%, chemistry 0.57%, engineering 0.48%, agriculture 0.48%, physics 0.4%, microbiology 0.35%, geosciences 0.34%, plant and animal sciences 0.32%, mathematics 0.31%, all fields 0.36%..

The report states that 39% of Egypt's research output is in collaboration with other countries; USA 9%, Saudi Arabia 5.9%, Germany 4.9%, UK 3.9% and Japan 3.5%.

## ABC of Research

Produced By  
Medical Research Institute  
University of Alexandria

165 Horreya Avenue, El-Hadara, Alexandria, Egypt  
www.mri.edu.eg

Contributions and comments are welcomed and will be published

For more details please contact us at  
abc\_research@mri.edu.eg

## Research Question

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### Research question

Research problems that are still unsolved or show clear knowledge deficit are ideal for generating research questions. However, research questions can also be generated from scientific theory and desire to apply new innovations. Regardless, it should be made clear that it is not possible to answer all research questions within one study.

An ideal research question is one that is important, feasible and answerable within one study. The research question should also incorporate well defined and measurable variables as variables that cannot be defined or measured cannot be studied. An example of a research question could be: "Do fish oils improve cachexia in cancer patients" still better "Does omega-3 stop weight loss in patients with cancer cachexia".

The **FINER** criteria can be used as a guide when developing a research question.

### FINER criteria for a good research question

Hulley S, Cummings S, Browner W, Grady D, Newman T. *Designing Clinical Research*. 3<sup>rd</sup> ed. Philadelphia. Lippincott Williams and Wilkins. 2007

<b>Feasible</b>	Adequate number of subjects Adequate technical expertise Affordable in time and money Manageable in scope
<b>Interesting</b>	Getting the answer intrigues researcher, peers and community
<b>Novel</b>	Confirms, disproves, extends previous knowledge
<b>Ethics</b>	Conforms with ethical principles and regulations
<b>Relevant</b>	To scientific knowledge Practice and profession To future research

### Research objectives

Research objectives are prolonged statements that include the specific steps that need to be taken to answer the research question. In other terms, they describe the study design and methodology and when elaborate enough will mention the outcome variables that will be used when evaluating the study results. To be able to write down the research objectives a complete understanding of the study is required.

Examples of commonly used research objectives are evaluation of measurement instruments, description of populations or phenomena, exploration of relationships, and comparison between groups. To apply one of these objectives to the research question about the effect of omega-3 on weight loss in patients with cancer cachexia; one would use the comparison approach by comparing the amount of weight loss in a group of patients with cancer cachexia taking omega-3 with the amount of weight loss in another group of patients with cancer cachexia that are not taking omega-3.

The choice of one of these approaches will frame the research design, the data needed to be collected and the required data analysis procedures.