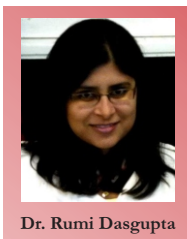# Research Hypothesis or Statistical Hypothesis?

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When I started preparing for my dissertation, I got scared when I started reading up about research hypothesis and got totally jumbled up with terms like research hypothesis, null hypothesis, alternative hypothesis and statistical hypothesis. The symbols H0, HA, H1 or H2 made me more confused. The books I was referring to or the websites I have looked up to did not help me much. Things started getting clear after my research methodology lectures and when I started working on my research proposal.

There are two types of hypotheses in a research setup – Research Hypothesis and Statistical Hypothesis. When I am talking about research hypothesis, the first important factor is the research question. The research process begins with the interest in a topic or area but to define an appropriate research question knowledge and understanding of the subject plays a crucial role. As suggested by Haynes it is important to know the boundary between the current knowledge and ignorance. The challenge lies in the determination of clinical uncertainties (in a clinical study setup) to be studied and to justify the necessity for investigation while developing a research question.

It is, hence, extremely important to increase the knowledge in the field of interest. It could be done by a thorough literature review, in-depth interviews with subjects and experts in the field, being aware of the latest trends and technological advances made in the interest area. It is imperative to comprehend what has been studied about the interest area till date to further the facts that has been formerly collected on the topic. This will help formulate the research question.

The primary research question should be driven by the hypothesis rather than the data. This means the research question and the research hypothesis should be developed before the starting the study. A research hypothesis is a knowledgeable declaration that is tentatively advanced to account for realities. It is a testable question on the area of interest. If a study is used to examine the research question, then the hypothesis is known as the experimental hypothesis. The research or clinical hypothesis is developed from the research question and then the main essentials of the study — sampling method, intervention (if applicable), comparison and outcome variables — are abridged in a form that creates the basis for testing, statistical and eventually medical significance.

However, while testing the statistical significance, the theory should be stated as a "null" hypothesis. The hypothesis testing is done to infer about the study population based on random sampling. Statistical hypothesis is the statement about whether a pattern or trend or difference is present in the collected data.

The research design will help to determine the choice of statistical test to be used – a simple study design may require a student t-test while a more complex design may require ANOVA or a correlational study design may use a correlation coefficient. Here, each of these statistical tests will have a different null hypothesis and an alternative hypothesis. Statistical tests are used to differentiate between the null hypothesis and alternative hypothesis.

In an article, C. Alan Boneau stated that from the given endless piles of numbers from a small sample, the t-test and F-test will determine if the means of the piles are different or not. So, rejection of null hypothesis or the alternative hypothesis does not necessarily mean it supports the tested research hypothesis. For example, a psychiatrist may predict an interaction of the variables and may reject the null hypothesis for the interaction in ANOVA; but the alternative hypothesis for interaction in an ANOVA may simply denote an occurrence of the interaction. There could be many ways for an interaction and the observed interaction may not be the one predicted in the research hypothesis.

Moreover, it is not important for the statistical test results to address the research hypothesis. While the statistical hypothesis should be discussed with the results, research hypothesis should be discussed in the discussion and conclusion section.

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