

**STATISTICAL SIGNIFICANCE OF META-ANALYSIS IN HEALTH SCIENCE  
AND SOCIAL SCIENCES**

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**Abstract**

The article discusses the importance of meta-analysis which is used in social sciences and health sciences to study the overall effects of results that impact policy-making. Meta-analysis is used in social science research, health science, education and psychology to study research gaps, ascertain how important analyses in the field impact the growth of research in the field and more importantly quantitative approach provides more insights for future research. The soul of meta-analysis is the right choice of literature. While highlighting the importance of meta-analysis in social sciences and health sciences, this paper presents the importance of review studies and different steps of research.

**Keywords:** Meta-analysis, Health Science, Social Sciences, Review Studies, Statistical Significance of Meta-analysis

**Introduction**

Meta-analysis is one kind of statistical technique of all the combined findings of independent studies. It is mostly used in healthcare studies and clinical effectiveness. It provides the carefulness and treatment effect studied by (Crombie, Lain K. 2008). Meta-analysis depends upon the validity, quality and systematic study reviews. A perfect meta-analysis covers the complete systematic reviews. Meta-analysis is not only used in the effectiveness of clinical studies, it is also used in other disciplines like social science and psychology. It can provide appropriate treatment based on collected data. Shortly meta-analysis can be said as quantitative, systematic combining, based on previous research and concluding with new knowledge. According to Merriam –Webster Dictionary it is based on the statistical analysis of quantitative data. According to Glass 1976, it is the study of a large collection of data based on statistical analysis and results acquired from individual research to integrate the findings.

**Objectives:**

- i. To determine if meta-analysis is important as a strategy in a research study.
- ii. To find out if meta-analysis leads to innovative results.

### **Meta-analysis in Health Science and Social Sciences**

Meta-analysis is important for the health science that can be known from the studies of constant publication around the world. Meta-analysis is very helpful because it makes review design by summarizing information. Meta-analysis follows a few principles like it can be done systematically to protect society. It can help to know how society is affected by disease and affected in socio-economic conditions of every section of the people. It can follow certain criteria. It includes the pool of results. Meta-analysis depends upon the quantitative analysis of collected data. The review gives the conclusion by giving decisions to policymakers on how the patients receive the utmost care.

Meta-analysis in social science is the scientific method of combined results of qualitative data or quantitative data based on case studies, ethnographic studies, laboratory studies, action research, and field survey etc.

A systematic and planned review of Meta-analysis is very important in social science to determine the overall effects of results of population studies. It can clarify the research field in determining the effects and to discover what further studies are important to demonstrate the effects of results lighted by (Wanous, John P and et al. 1989).

Education is part of social science. Meta-analysis in education combines the results of different outcomes of researchers in the context of education to find out the effects of the problem approach of different educational institutions and related environments.

In medical research also the researcher studies and reviews books and papers published previously on one topic then analyses different findings of results in general. It is used in psychology, medical health, a particular disease, conditions and treatments. The study aims to show the general unknown truth and find out the problems and errors. It can provide common unknown truth of the contrast results of multiple studies and show the different patterns of study lighted by (Greenland, S and et al.2008). Due to incomplete data, it is not found publication bias.

The review procedure is an important component of meta-analysis in modern times. It is used in medical treatment and clinical trials. In this respect collaboration and coherence are very important for the researchers and can refer to statistical methods for using Meta-analysis based on combining evidence and information based on qualitative studies. Meta-analysis is also applied in case studies. A Meta-analysis may be challenging research and requires skill in applying statistics. (Higgins and Green, 2011) mentioned how to use meta-analysis in clinical research by different guides. A Meta-analysis is based on statistics that are also based on primary independent studies and aims to generalize the quantitative study phenomenon ( Gopalkrishnan and Ganesh Kumar,2013).

### **Importance of review:**

According to Gene V. Glass in 1976, there is more numbers of Meta-analyses are conducted in psychology education, statistics, social science, philosophy and economics. ERIC EBSCO

conducted in phrases Meta-analysis, research- synthesis. From 1976 total number of articles published was 5,206 in education. In 32 years totalling 90 meta-analyses were published. 2.8 meta-analyses were published per year by RER. This exponent growth of publications in Meta-analysis was seen in education and social science by Kulic, Kulic & Cohen appeared in the first time of 1980.

In school education, the importance is given on meta-analysis the techniques of analysis for providing the evidence that what works are done in the schools of the districts (Dynarski, 2008; Slavin, 2008). In medical science, Meta-analysis depends on a systematic review and empirical evidence. It is conducted based on strong evidence of disease and to determine its positive and negative effects (Haidich, A B. 2010). An example can be taken from the study of COVID-19 which is studied by (Rahman, A and et al 2021) explained to take better treatment due to the risk factor.

In education and social science, the trend of meta-analysis has been developed due to the support of research synthesis. There are some examples included in the Comprehensive School Reform Quality Centre (CSRQ), What Works Clearinghouse (WWC), the international Campbell Collaboration (C2) and Best Evidence Encyclopaedia (BEE). All these are found in (Slavin 2008).

A meta-analysis helps the consumers and policymakers to evaluate critically based on evidence in Meta-analytic analysis in social science and education for further educational practice mentioned by (Soyeon Ahn, and et al 2012) and (Walker E, Hernandez AV, Kattan MW, 2008). The current practices of extended studies in Meta-analysis make free from the threat of validity. In respect of validity, it studies the growing concern of methodologies including observational analysis, poor reporting mentioned by (Briggs, 2008).

#### **Steps and use of Quantitative Review of literature in Meta-analysis:**

The formulation of a research question is based on primary and secondary objectives.

Id identification of relevant literature is based on strategy and determination of eligibility.

Extract the data according to relevant study level and estimation of parameters model.

Appraisal of data is based on the preparation of computation of outcomes of results, performing the relevant data transformation and selecting the Meta-analytic model. Synthesis of study level into summary based on pooling data and calculation of summary measure including confidence interval Exploration of analysis is based on sources of heterogeneity (social science, psychology) and selection of meta-analysis.

Synthesis of knowledge is based on interpretation of findings and providing recommendations for the future work said by (Mikolajewicz and et al. 2019).

#### **Meta-Analysis: Salient Characteristics and Significance**

The importance of Meta-analyses is helpful to know the strong evidence of the present study. The goal is to focus and determine whether the effect exists or not in the study. Meta-analyses should necessary for the clear description of the transparent report of the result in any primary studies and provide suggestions mentioned in the research paper (Pigott, D.Terry and Polanin, R. Joshuah, 2019)

#### **Essential features of Meta-analysis:**

There is an aim to review systematically and appraise synthesize different types of available data evidence addressing research questions. It is one type of statistical summary of results from related studies. Being based on quantitative analysis and integrated results culled through selection, compilation, comparison, and deduction, meta-analysis, if successful, can provide innovative results. However, it provides non-valid results if the data is not validated and results are not verified.. Validity is crucial in individual studies. Statistical heterogeneity is considered in the formal meta-analysis, diversity in the study.

#### **The Utilities of Meta-analysis:**

Meta-analysis is used for:

- i. Evaluation of the effects of subsets.
- ii. Creation of another new hypothesis for inspiring future studies. Overcome the problems of limitations few numbers of sample sizes.
- iii. Establishment of statistical significance.

#### **Statistical significance:**

Statistical significance is important to create the validity of the results with the help of studying observed differences. It establishes greater significance when a researcher has taken many studies. It also establishes the reliability and validity of research information.

#### **Merits and Limitations of Meta-analysis:**

In individual studies, Meta-analysis carries numerous advantages. It includes more power in the ability to solve the problems statistically. It is also based on evidence. Meta-analysis can provide precise estimates in respect of effect size and it can increase the general ability in respect of study results of individual study. Meta-analysis has some disadvantages though it has a powerful tool. It is difficult to examine appropriate studies. It also requires complex statistical skills and techniques. (Salters, K.2020). Again careless summarising, abstracting and overstatement are considered invalid meta-analyses. However, we tend to agree with A. B. Haidich (2010), that:

Meta-analysis is a quantitative, formal, epidemiological study design used to systematically assess previous research studies to derive conclusions about that body of research. Outcomes from a meta-analysis may include a more precise estimate of the effect of treatment or risk factor for disease, or other outcomes, than any individual study contributing to the pooled analysis. The examination of variability or heterogeneity in study results is also a critical outcome. The benefits of meta-analysis include a consolidated and quantitative review of a large, and often complex, sometimes apparently conflicting, body of literature. The specification of the outcome and hypotheses that are tested is critical to the conduct of meta-analyses, as is a sensitive literature search. A failure to identify the majority of existing studies can lead to erroneous conclusions; however, there are methods of examining data to identify the potential for studies to be missing; for example, by the use of funnel plots. Rigorously conducted meta-analyses are useful tools in evidence-based medicine. The need to integrate findings from many studies ensures that meta-analytic research is desirable and the large body of research now generated makes the conduct of this research feasible.

Meta-analysis continues as a tool of research, or more precisely, tool of analysis with comparable works within a field of study.

#### **Conclusion:**

Meta-analysis is beneficial in respect of COVID-19 in medical science and society impact of social science to take the utmost attention because medical science is not separate from social science. What impact has been influencing on the people by the disease and to take better treatment from the very beginning. Again in respect of education, social studies different problems are solved by making plan policies by the government. Meta-analysis can help in studying all these with different text, review studies, figures and statistics. Hopefully, researchers will study the special contributions meta-analysis can make for conduction of interdisciplinary research.

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