

Statistical Models in Social and Human Sciences Research: From Classification to the Methodology of Selection and Application

Dr. Amara Miloud

University of Salhi Ahmed Naama (Algeria)

amaramiloud2023@gmail.com

Dr. Mahammedi Hamza

University of Salhi Ahmed Naama (Algeria)

mahammedihamza18@gmail.com

Received :01/05/2026

Accepted: 15/06/2026

Published :02/07/2026

Abstract

Statistical models have become a fundamental pillar of research in the social and human sciences, as they provide scientific tools that contribute to the description, analysis, and interpretation of phenomena, as well as the prediction of their trends. However, the methodological challenge is no longer limited to knowing these models or mastering their techniques; it has extended to the question of how to select the most appropriate statistical model and apply it in a manner consistent with the nature of the research problem, the characteristics of the data, and the objectives of the study. From this perspective, this article aims to provide an analytical examination of statistical models in social and human sciences research, beginning with a conceptual grounding of their meaning and functions, followed by their classification according to their research roles, and culminating in the development of a methodological framework to guide researchers in selecting and appropriately applying suitable statistical models.

The study adopts a descriptive-analytical approach through a review and analysis of contemporary methodological and statistical literature, linking it to the requirements of research in the social and human sciences. The findings indicate that the optimal use of statistical models is not determined by the complexity or abundance of statistical techniques, but rather by the extent to which they are aligned with the research question, the level of measurement of variables, the study design, and the assumptions underlying the model. Such alignment ensures the validity of the analysis, the accuracy of the results, and the strength of the conclusions.

The scientific contribution of this article lies in moving beyond the mere classification of statistical models to proposing a methodological framework that assists researchers in selecting and applying them appropriately. This contributes to improving statistical practices, reducing common methodological errors, and enhancing the quality of quantitative research in the social and human sciences.

Keywords: Statistical models; Social and Human Sciences; Statistical Analysis; Research Methodology; Statistical Model Selection; Application of Statistical Models.

Introduction

The social and human sciences have undergone profound methodological transformations as a result of scientific and technological advancements. These disciplines have moved from relying

primarily on descriptive observation and reflective interpretation to employing quantitative and statistical methods in the study of social and human phenomena. The increasing complexity of modern societies and the need to measure social and behavioral variables have necessitated the use of statistical tools capable of analyzing data and generating accurate scientific findings. Statistical models constitute one of the most prominent of these tools, as they enable the understanding of relationships among social phenomena, the interpretation of human behavior, and the prediction of future trends. Consequently, they have become widely utilized in fields such as sociology, psychology, economics, demography, educational sciences, political science, and other related disciplines. The importance of this topic stems from the growing use of statistical models in academic research, accompanied by variations in their levels of complexity and methodological purposes. This situation calls for a closer examination of their nature, types, and functions within the social and human sciences.

This article does not merely aim to review the statistical models used in social and human sciences research; rather, it seeks to move beyond their descriptive classification toward the development of a methodological framework that guides researchers in selecting and applying appropriate statistical models in a scientifically sound manner, thereby enhancing the quality of analysis and the reliability of research findings. Based on this perspective, the article addresses the subject through a methodological sequence that begins by establishing the concept and functions of statistical models, then proceeds to classify the major statistical models used in social and human sciences research, and concludes by presenting the methodological principles that researchers should follow when selecting and applying these models in order to ensure the validity of analysis and the accuracy of results.

Research Problem

Over recent decades, research in the social and human sciences has witnessed a significant expansion in the use of statistical models, driven by advances in statistical software and the growing reliance on quantitative approaches for analyzing social and human phenomena. However, this development has often been accompanied by an emphasis on the technical aspects of statistical models, while insufficient attention has been given to the methodological foundations that should guide the process of selecting and applying an appropriate model. As a result, certain imprecise methodological practices have become widespread, such as choosing statistical tests based on their ease of application or their popularity, without considering the nature of the research problem, the level of measurement of the variables, or the assumptions underlying the statistical model. Consequently, the primary challenge no longer lies in knowing statistical models themselves, but rather in developing a methodological perspective that guides researchers in their appropriate selection and application.

Accordingly, the main research problem can be formulated as follows:

How can the transition be made from the theoretical classification of statistical models to the development of a scientific methodology that assists researchers in selecting and applying the appropriate statistical model in social and human sciences research, in a manner that ensures the validity of analysis and the accuracy of results? This main research problem gives rise to a number of sub-questions:

1. What is meant by statistical models, and what is their methodological significance in social and human sciences research?

2. What are the major statistical models used in social and human sciences research, and how can they be classified according to their research functions?
3. What methodological criteria should researchers rely on when selecting an appropriate statistical model?
4. How does the proper application of statistical models contribute to enhancing the quality of analysis, the accuracy of results, and the reliability of conclusions?

Study Objectives

This study aims to achieve a number of objectives, the most important of which are:

1. To establish the concept of statistical models and highlight their methodological significance in social and human sciences research.
2. To analyze and classify the major statistical models according to their research functions, while identifying the characteristics and areas of application of each model.
3. To clarify the methodological foundations governing the selection of an appropriate statistical model in light of the nature of the research problem, the type of data, and the level of measurement of variables.
4. To propose a methodological framework that assists researchers in applying statistical models in a scientifically sound manner, thereby enhancing the quality of analysis, the accuracy of results, and the strength of conclusions.
5. To contribute to the improvement of methodological practice in social and human sciences research by moving beyond the mere presentation of statistical models toward explaining the principles underlying their selection and application.

I. Concept of Statistical Models and Their Importance

Scientific research in the social and human sciences is experiencing rapid development in its methodologies and analytical tools, driven by the increasing complexity of social phenomena and the growing volume of available data. In this context, statistical models have become one of the fundamental pillars upon which researchers rely to organize data, analyze it, and derive scientifically sound conclusions. However, the effective use of these models first requires the establishment of a clear conceptual and methodological foundation that defines what is meant by a statistical model, distinguishes it from related concepts, and highlights its functions and significance in scientific research. From this perspective, this section addresses the theoretical foundations of statistical models as a necessary starting point for understanding their classifications and mechanisms of application in social and human sciences research.

A statistical model refers to a mathematical or quantitative representation of a particular phenomenon that aims to explain, describe, or predict relationships among variables based on empirical data. A statistical model is built upon mathematical and statistical assumptions that enable the scientific testing and analysis of these relationships. According to Field (2018), the selection of a statistical test does not depend on the software being used; rather, it depends on the nature of the research question and the level of measurement of the variables (Field, 2018, p. 42).

The importance of statistical models in the social and human sciences lies in several key aspects, including:

1. Assisting in the interpretation of social and behavioral phenomena.
2. Testing scientific hypotheses in an objective manner.

3. Predicting future trends of the phenomena under study.
4. Reducing subjective bias in the interpretation of results.
5. Supporting decision-making in social, educational, and economic policies.

II. Main Classifications of Statistical Models

After establishing the concept of the statistical model and clarifying its role in the construction of scientific knowledge, it becomes necessary to classify statistical models according to their research functions and analytical objectives. The diversity of research problems and the varying nature of data require the use of different statistical models, each serving a specific function that complements others in supporting scientific research. Accordingly, this classification is not based on the mathematical complexity of the models, but rather on the nature of the role they perform in data analysis, ranging from descriptive models concerned with summarizing the characteristics of a phenomenon, through inferential and explanatory models, to predictive models that contribute to forecasting future trends.

This section aims to provide an analytical overview of these models by highlighting the characteristics of each category and their areas of application in social and human sciences research. Statistical models used in the social and human sciences can be classified into several main types:

1. Descriptive Statistical Models

Descriptive statistical models represent the starting point of the statistical analysis process. They aim to organize, classify, and summarize data in a scientific manner that facilitates understanding of its fundamental characteristics, without seeking to generalize the findings to the statistical population or explain causal relationships among variables. Their primary function is therefore to provide an accurate quantitative description of the phenomenon under study, enabling researchers to develop an initial understanding of the nature of the data and its general patterns before proceeding to more complex stages of analysis (Field, 2018).

Descriptive statistics constitute an essential stage in all quantitative research because they help researchers identify the characteristics of the data, detect outliers, examine the shape of the distribution, and determine the degree of sample homogeneity. These aspects directly influence the selection of appropriate statistical models in subsequent stages of analysis. Consequently, methodological literature emphasizes that neglecting descriptive analysis may lead to the inappropriate selection of statistical tests and, ultimately, to inaccurate or misleading results (Pallant, 2020).

Descriptive models rely on a set of statistical indicators that can be classified into three main categories:

- Measures of central tendency, such as the mean, median, and mode, which represent the central value of the data.
- Measures of dispersion, such as the standard deviation, variance, and range, which indicate the degree to which values are spread around the mean.
- Measures of graphical description and distribution, such as frequency tables, percentages, and graphical representations, which facilitate the presentation of data in a simplified form that supports interpretation.

The importance of these indicators extends beyond merely summarizing data; they also serve as a foundation for assessing data quality before applying inferential or explanatory models. They enable researchers to detect outliers, verify the plausibility of the data, and evaluate the extent to which the data approximate a normal distribution. These methodological steps are essential for ensuring the validity of subsequent statistical analyses (Agresti, 2018).

Descriptive models are widely used in the social and human sciences, particularly in the following areas:

A. Population and Demographic Studies

Descriptive models are used to analyze demographic characteristics of populations, such as the distribution of individuals by age and sex, levels of education, marital status, and rates of fertility, mortality, and migration. They also contribute to the construction of demographic tables and indicators upon which researchers and policymakers rely to describe population realities before proceeding to explain or predict demographic changes.

B. Educational Studies

In educational research, descriptive models are used to summarize test results, describe student characteristics, measure levels of academic achievement, and analyze respondents' answers to various measurement instruments. They also help identify patterns in the data and determine the extent of variability, thereby facilitating the selection of appropriate statistical tests in subsequent stages of analysis.

C. Opinion Polls

Opinion polls constitute one of the most prominent fields of application for descriptive models. Frequencies, percentages, means, and graphical displays are used to describe individuals' attitudes and positions toward political, social, or economic issues. This type of analysis provides a clear picture of the characteristics of the sample and the distribution of opinions without extending to the explanation or prediction of the underlying causes of those attitudes. From the foregoing, it is evident that descriptive models are not an end in themselves; rather, they constitute the foundational stage of any statistical analysis. They provide a knowledge base that helps researchers understand the nature of the data, assess its quality, and select appropriate statistical models for subsequent stages of analysis. Consequently, the success of inferential, explanatory, or predictive analyses depends to a large extent on the accuracy of the preceding descriptive analysis. Descriptive statistics should therefore be viewed not merely as a collection of numerical indicators, but as an indispensable methodological step in the development of rigorous scientific research (Field, 2018; Pallant, 2020).

Table (1): Main Indicators Used in Descriptive Statistical Models

Example in the Social Sciences	Purpose of Use	Main Indicators	Category
Average academic achievement of students	Identifying the central value of the data	Mean, Median, Mode	Measures of Central Tendency

Example in the Social Sciences	Purpose of Use	Main Indicators	Category
Variation in household income	Measuring the dispersion of data around the mean	Standard Deviation, Variance, Range	Measures of Dispersion
Distribution of the population by age groups or results of an opinion poll	Presenting data and facilitating its interpretation	Frequencies, Percentages, Histograms, Bar Charts, and Pie Charts	Tables and Graphical Representations (or Tables and Graphs)

Source: Prepared by the researcher based on Field (2018), Agresti (2018), and Pallant (2020).

2. Inferential Statistical Models (Inferential Statistical Models):

Inferential statistical models represent an advanced stage of statistical analysis. They are not limited to describing the characteristics of a sample; rather, they aim to draw scientific conclusions about a statistical population based on data obtained from a representative sample. These models are grounded in probability theory, which makes it possible to estimate the extent to which findings can be generalized, while specifying the associated level of confidence and margin of error (Field, 2018).

Inferential models are of particular importance in social and human sciences research because researchers often work with limited samples, making it impractical to study all members of the statistical population. Consequently, statistical inference serves as an essential tool for testing scientific hypotheses and evaluating the significance of differences or relationships among variables, rather than relying solely on descriptive observation (Agresti, 2018).

These models rely on a number of statistical indicators, most notably significance levels (p-values), confidence intervals, and hypothesis tests. These indicators assist researchers in making scientific decisions regarding whether to accept or reject the null hypothesis, while estimating the probability that the observed results may have occurred by chance.

This category includes several statistical tests that vary according to the nature of the data, the number of groups being compared, and the level of measurement of the variables. Among the most prominent are:

A. Student's t-Test

The Student's t-test is used to compare the means of two independent or related groups in order to determine whether statistically significant differences exist between them. It is one of the most widely used statistical tests in educational, psychological, and social research, such as comparing the average academic achievement of male and female students or assessing the effect of a training program before and after its implementation.

Its use requires that the dependent variable be quantitative, that the data follow a normal distribution, and, in the case of independent samples, that the assumption of homogeneity of variance between groups be satisfied (Field, 2018).

B. Analysis of Variance (ANOVA)

Analysis of Variance (ANOVA) is used when a researcher wishes to compare the means of three or more groups. It examines whether the observed differences among group means are attributable to the effect of the independent variable or merely to random variation.

In the social sciences, common applications include comparing levels of job satisfaction according to educational attainment or examining differences in academic achievement among students from different academic disciplines. ANOVA is generally more appropriate than conducting multiple t-tests because it reduces the likelihood of committing a Type I error (Hair et al., 2022).

C. Chi-Square Test

The Chi-Square test is used to examine the relationship or independence between two nominal or ordinal variables. It is also employed to assess the extent to which an observed distribution corresponds to an expected distribution.

Its importance is particularly evident in social research that relies on categorical data, such as studying the relationship between gender and electoral participation or between marital status and housing patterns. The test determines whether the relationship between variables is statistically significant or merely attributable to chance (Agresti, 2018).

Overall, inferential statistical models constitute the cornerstone of quantitative research. They enable researchers to move beyond the description of data toward the testing of hypotheses and the derivation of generalizable conclusions, provided that the appropriate statistical test is selected according to the nature of the data and that its underlying assumptions are verified before interpreting the results. Furthermore, the use of these models should not be limited to statistical significance values (*p*-values); it is advisable to complement them with additional indicators such as effect size and confidence intervals, as these provide a deeper understanding of the practical significance of the findings. This recommendation is strongly emphasized in contemporary methodological literature (Cohen, 1988; Field, 2018; Hair et al., 2022).

3. Explanatory Statistical Models

Explanatory statistical models represent an advanced stage of statistical analysis. They do not merely identify the existence of differences or relationships between variables; rather, they seek to explain the nature of these relationships, determine their direction, and measure the magnitude of the effect of independent variables on a dependent variable. Consequently, they constitute an essential tool for testing theoretical models and verifying explanatory hypotheses in social sciences and humanities research (Gujarati & Porter, 2021).

These models are based on the fundamental assumption that social phenomena do not occur randomly but are influenced by a set of interconnected factors that can be measured and analyzed statistically. Therefore, the researcher's role extends beyond demonstrating the existence of relationships among variables to identifying the most influential factors, measuring the extent of their influence, and constructing a model that explains the phenomenon under study (Hair et al., 2022).

Regression models are among the most widely used explanatory models in the social sciences and humanities because they provide the ability to analyze causal or quasi-causal relationships between variables. These may involve a single independent variable (simple regression) or multiple independent variables (multiple regression). These models have also evolved into

more specialized forms, such as logistic regression, multilevel regression, and Poisson regression, to accommodate different types of data and research objectives.

This type of model is particularly useful for addressing research questions such as: What factors have the greatest influence on the phenomenon? Which variables explain the largest proportion of variation in the dependent variable? Does the effect of a particular variable remain significant after controlling for other variables? Such questions cannot be adequately answered by descriptive or inferential models alone.

Explanatory models have numerous applications across various branches of the social sciences and humanities, including:

A. Explaining the Relationship Between Educational Level and Income

This is one of the most common applications in economics and sociology. Linear regression models are used to examine the effect of years of education or educational attainment on an individual's average income while controlling for other variables such as age, gender, work experience, and place of residence. The model enables researchers to estimate the expected increase in income associated with higher educational attainment and to assess the statistical significance of this effect (Gujarati & Porter, 2021).

B. Studying Factors Affecting Academic Achievement

In educational research, explanatory models are used to analyze the impact of various factors on academic achievement, such as learning motivation, family socioeconomic status, class size, teaching methods, and parents' educational level. Multiple regression helps identify the variables that contribute most to explaining differences among students, thereby providing a scientific basis for developing educational policies and academic support programs (Field, 2018).

C. Analyzing Determinants of Voting Behavior

In political science and political sociology, explanatory models particularly logistic regression are used to analyze the factors influencing an individual's decision to participate in elections or vote for a particular candidate. These factors may include age, educational level, party affiliation, income, trust in institutions, and geographic affiliation. Such models allow researchers to measure the relative effect of each variable while controlling for the effects of other variables, thereby contributing to a more accurate understanding of voting behavior (Agresti, 2018).

In general, explanatory models represent a significant advancement in social research because they move the researcher from merely describing a phenomenon to explaining it and understanding the factors that influence it. Nevertheless, the results of these models should be interpreted with caution, as a strong statistical relationship does not necessarily imply a confirmed causal relationship. Unobserved mediating or latent variables may not have been included in the model, or the relationship may be influenced by contextual factors that cannot be measured directly. For this reason, contemporary methodological literature emphasizes the importance of combining statistical analysis with the study's theoretical framework when interpreting results and cautions against relying solely on statistical indicators (Hair et al., 2022; Kline, 2023).

Table2. Comparison between Inferential Statistical Models and Explanatory Statistical Models.

Aspect of Comparison	Inferential Statistical Models	Explanatory Statistical Models
Objective	Testing differences or relationships	Explaining the phenomenon and measuring the effects of variables
Question it Answers	Are there differences or a ?relationship	Why does this relationship exist? What is ?the magnitude of each variable's effect
Main tools	t-test, ANOVA, Chi-square test	Linear regression, multiple regression, logistic regression
Nature of Outputs	Statistical significance value, mean differences	Regression coefficients, effect size, (proportion of explained variance (R^2))
Research Value	Hypothesis testing	Building explanatory models that support theory

Source: Prepared by the researcher based on Field (2018), Agresti (2018), and Pallant (2020).

4. Predictive Statistical Models

Predictive statistical models are among the most advanced approaches in quantitative analysis. Their role extends beyond describing social phenomena or explaining relationships among variables to forecasting future values or trends based on patterns extracted from historical data. These models are founded on the assumption that social, economic, and demographic phenomena, despite their complexity, exhibit patterns and trends that can be analyzed and utilized to generate future projections that assist researchers and decision-makers in planning and making informed decisions (Montgomery, Jennings, & Kulahci, 2015).

Predictive models have gained increasing importance in the social sciences and humanities due to the rapid pace of demographic, economic, and social transformations. Governments and institutions now rely on these models to develop strategic plans, anticipate societal needs, and estimate future risks. Furthermore, significant advances in statistical software and computational technologies have improved the accuracy of predictive models and enhanced their ability to handle large datasets and multiple variables (James et al., 2021).

Predictive models differ from explanatory models in that their primary objective is not to explain the causes of a phenomenon but rather to achieve the highest possible accuracy in predicting future values of variables, even when the causal relationships among variables are not fully understood.

Among the most prominent predictive models used in the social sciences and humanities are the following:

A. Time Series Models

Time series models are used to analyze the development of phenomena over time by examining data collected at successive time intervals. Their purpose is to identify general trends, seasonal fluctuations, and cyclical patterns, and then use this information to generate future forecasts.

These models are widely applied in economics, demography, and management, such as forecasting unemployment rates, inflation, student enrollment in educational institutions, or

crime rates in future years. One of the most well-known models is the ARIMA model, which has demonstrated considerable effectiveness in analyzing time-series data and predicting future trends (Box, Jenkins, Reinsel, & Ljung, 2016).

B. Demographic Forecasting Models

Predictive models occupy a special place in population studies, where they are used to estimate future population size and demographic composition based on fertility, mortality, and migration rates. These models assist in formulating public policies related to education, healthcare, housing, and labor markets, and they serve as a key tool for sustainable development planning. Common applications include forecasting population size over a specified period, estimating the proportion of older adults, and projecting labor force size. These indicators are of great importance for economic and social planning, particularly in countries experiencing rapid demographic transitions.

C. Economic Forecasting Models

Economic studies rely on predictive models to estimate future economic indicators such as economic growth rates, inflation, unemployment, consumption, and investment. These models are used to evaluate the effects of economic policies, explore potential scenarios, and support decision-making by governments and financial institutions.

A major advantage of these models is their ability to integrate a large number of economic and social variables within a single analytical framework, enabling more accurate forecasts, particularly when dynamic models or econometric models are employed (Gujarati & Porter, 2021).

It should be noted that the success of predictive models depends not only on the strength of the statistical model itself but also on the quality of the data used, the length of the time series, the stability of the phenomenon under study, and the validity of the model's underlying assumptions. Therefore, forecasting results should be viewed as probabilistic estimates rather than certain facts, especially in the social sciences, where political, economic, and cultural factors may influence outcomes in ways that are difficult to predict accurately.

In recent years, predictive models have undergone significant development through the application of Machine Learning (ML) and Artificial Intelligence (AI) techniques. These approaches have shown increasing ability to improve forecasting accuracy by analyzing large datasets and identifying complex patterns that traditional statistical models may fail to detect. Nevertheless, classical statistical models continue to maintain an important role in social science research because their results are generally easier to interpret and more clearly linked to social theories, whereas some machine learning models, despite their high predictive performance, remain less interpretable (James et al., 2021).

In summary, if descriptive models answer the question “What happened?”, inferential models answer “Are there differences or relationships?”, and explanatory models answer “Why did the phenomenon occur?”, then predictive models address a more advanced question: “What is likely to happen in the future?”.

III. Methodology for Selecting and Applying Statistical Models in Social Sciences and Humanities Research

While the previous section discussed the classification of statistical models and outlined their characteristics and areas of application, knowledge of these models alone is not sufficient to

ensure the quality of scientific research unless the researcher is able to select and apply the most appropriate model in light of the research problem, the characteristics of the data, and the objectives of the study. The success of statistical analysis is not determined by the number of tests used or their level of complexity, but rather by their suitability to the research question and their methodological assumptions. Accordingly, this section examines the general principles that researchers should follow when selecting and applying statistical models to ensure sound analysis, accurate results, and robust conclusions (Field, 2018; Hair et al., 2022).

1. Starting from the Nature of the Research Question

The research problem and the questions or hypotheses derived from it constitute the starting point for selecting a statistical model. If the objective is to describe the characteristics of a phenomenon, descriptive models are the most appropriate choice. If the goal is to test differences between groups or examine relationships among variables, inferential models should be employed. Conversely, if the objective is to explain the factors influencing a phenomenon or predict its future trends, explanatory or predictive models become the most suitable option (Creswell & Creswell, 2023).

2. Considering the Nature of the Data and the Level of Measurement

The selection of a statistical model is closely linked to the nature of the data and the level of measurement of the variables (nominal, ordinal, interval, or ratio), as well as the sample size and the number of groups being studied. A statistical test that is appropriate for quantitative data may not be suitable for qualitative data. Moreover, some models require specific assumptions to be met, such as normal distribution, independence of observations, and homogeneity of variance. Therefore, verifying these assumptions is an essential step before conducting the analysis (Pallant, 2020).

3. Proper Application of Statistical Models

The application of statistical models involves more than simply running statistical software. It also requires accurate interpretation of the results and linking them to the study's theoretical framework. Statistical significance (*p*-value) alone is insufficient for evaluating the importance of findings. Researchers should complement it with additional indicators such as effect size and confidence intervals, while interpreting results in light of the study objectives and theoretical context (Cohen, 1988; Field, 2018).

4. Common Errors to Avoid

Methodological literature indicates that some of the most common mistakes in social science research include selecting statistical models that are incompatible with the nature of the data, ignoring model assumptions, interpreting statistical relationships as causal relationships, and relying excessively on software outputs without understanding the theoretical foundations on which they are based. Consequently, the quality of statistical analysis depends more on the researcher's ability to choose the appropriate model than on the complexity of the analysis itself (Tabachnick & Fidell, 2019; 2022).

Table (3): Determinants of Statistical Model Selection in Social Sciences and Humanities Research

Effect on model selection	Criterion
Determines whether the analysis is descriptive, inferential, explanatory, or predictive	Study objective
Determines the appropriate statistical test or model	Nature of variables
Guides the researcher toward data-appropriate models	Level of measurement
Affects the suitability of certain statistical models	Sample size
Must be verified before conducting the analysis	Model assumptions
Depends on linking statistical indicators with the theoretical framework	Interpretation of results

Source: Prepared by the researcher based on Field (2018), Tabachnick & Fidell (2019), and Hair et al. (2022).

Table (4): Matrix for Selecting Statistical Models in Social Sciences and Humanities Research

Models less suitable in this case	Appropriate statistical model	Purpose of analysis	Nature of variables
ANOVA or Chi-square test if their assumptions are not met	t-test	Comparison between two independent groups	Quantitative dependent variable with two groups
t-test for multiple comparisons	Analysis of (Variance (ANOVA	Comparison among more than two groups	Quantitative dependent variable with three or more groups
Spearman if Pearson's assumptions are satisfied, or vice versa when they are not	Pearson correlation coefficient	Examining the relationship between two quantitative variables	Quantitative data
Logistic regression	Linear regression	Predicting a quantitative dependent variable	Quantitative dependent variable
Linear regression	Logistic regression	Predicting a binary dependent variable	Binary dependent variable

Models less suitable in this case	Appropriate statistical model	Purpose of analysis	Nature of variables
Linear regression if the goal is to test a complex causal model	Structural Equation Modeling (SEM)	Testing a theoretical model involving latent variables	Latent variables and causal relationships

Source: Synthesized table prepared by the researcher based on Field (2018), Hair et al. (2022), and Tabachnick & Fidell (2019), Applications of statistical models in the social sciences and humanities.

Conclusion

This study concludes that statistical models have become one of the fundamental pillars of research in the social and human sciences, as they provide scientific tools that help describe, analyze, and interpret phenomena, as well as anticipate future trends. However, the scientific value of these models does not lie in their number or complexity, but rather in their appropriate selection and application in accordance with the nature of the research problem, the objectives of the study, and the characteristics of the data.

The study has shown that statistical models are complementary in nature: descriptive models represent the initial step in understanding data, inferential models contribute to hypothesis testing, explanatory models help in understanding relationships between variables, and predictive models enable the anticipation of future trends. Accordingly, these models should not be viewed as competing tools, but rather as an integrated system in which each model serves a specific stage of the research process.

The study also highlighted that the success of statistical analysis is not determined by the complexity of the model used or the number of statistical tests applied, but rather depends primarily on sound methodological selection based on the research question, the nature of the variables, their level of measurement, the research design, the verification of model assumptions, and the interpretation of results within the theoretical framework of the study, rather than relying solely on numerical indicators.

In this context, the main contribution of this study lies in its shift from merely classifying statistical models to proposing a methodological framework for their selection and application in social sciences and humanities research. This contributes to improving statistical practices, reducing common methodological errors, and enhancing the quality and reliability of quantitative research outcomes.

Based on the above, the study recommends strengthening researchers' methodological training in the selection and interpretation of statistical models, updating research methodology curricula to align with recent developments in statistical analysis, and encouraging the integration of theoretical grounding with statistical application, in order to promote a more conscious and effective use of statistical models in scientific research.

References

1. Abu Allam, Raja Mahmoud. Research Methods in Psychological and Educational Sciences. Cairo: University Publishing House, multiple editions.
2. Idris, Thabit Abd al-Rahman. Statistical Data Analysis Using SPSS. Alexandria: University Press.
3. Al-Jabri, Muhammad Abed. Introduction to Scientific Research Methods. Beirut: Center for Arab Unity Studies.
4. Al-Azzawi, Rahim Yunus Kuro. Introduction to Scientific Research Methodology. Amman: Dar Dijlah.
5. Qandilji, Amer Ibrahim. Scientific Research and the Use of Information Sources. Amman: Dar Al-Masirah.
6. Obaidat, Thaqan; Adas, Abdul Rahman; & Abdul Haq, Kaid. Scientific Research: Its Concept, Tools, and Methods. Amman: Dar Al-Fikr.
7. Melhem, Sami Muhammad. Research Methods in Education and Psychology. Amman: Dar Al-Masirah.
8. Al-Najjar, Farid. Statistical Methods in the Social Sciences.
9. Al-Assaf, Saleh bin Hamad. Introduction to Research in Behavioral Sciences.
10. Abu Zina, Farid Kamel. Statistics in Scientific Research.

Foreign References

1. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2022). Multivariate Data Analysis (9th ed.). Cengage.
2. Field, A. (2024). Discovering Statistics Using IBM SPSS Statistics (6th ed.). Sage.
3. Agresti, A. (2018). Statistical Methods for the Social Sciences (5th ed.). Pearson.
4. Tabachnick, B. G., & Fidell, L. S. (2019). Using Multivariate Statistics (7th ed.). Pearson.
5. Cohen, J., Cohen, P., West, S., & Aiken, L. (2013). Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences. Routledge.
6. Montgomery, D. C., Peck, E. A., & Vining, G. G. (2021). Introduction to Linear Regression Analysis (6th ed.). Wiley.
7. Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). Applied Logistic Regression (3rd ed.). Wiley.
8. Wooldridge, J. M. (2020). Introductory Econometrics: A Modern Approach (7th ed.). Cengage.
9. Gelman, A., Hill, J., & Vehtari, A. (2021). Regression and Other Stories. Cambridge University Press.
10. James, G., Witten, D., Hastie, T., & Tibshirani, R. (2021). An Introduction to Statistical Learning (2nd ed.). Springer.
11. Harrell, F. E. (2015). Regression Modeling Strategies (2nd ed.). Springer.
12. Burnham, K. P., & Anderson, D. R. (2002). Model Selection and Multimodel Inference (2nd ed.). Springer.
13. Menard, S. (2010). Logistic Regression: From Introductory to Advanced Concepts and Applications. Sage.
14. Kline, R. B. (2023). Principles and Practice of Structural Equation Modeling (5th ed.). Guilford Press.

15. Byrne, B. M. (2022). *Structural Equation Modeling with AMOS* (4th ed.). Routledge.
16. Pallant, J. (2020). *SPSS Survival Manual* (7th ed.). McGraw-Hill.
17. Creswell, J. W., & Creswell, J. D. (2023). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (6th ed.). Sage.
18. Saunders, M., Lewis, P., & Thornhill, A. (2023). *Research Methods for Business Students* (9th ed.). Pearson.
19. Bryman, A. (2016). *Social Research Methods* (5th ed.). Oxford University Press.
20. Babbie, E. (2021). *The Practice of Social Research* (15th ed.). Cengage.