

# The Use Of Hypotheses In Descriptive Investigations

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There is little information on the descriptive level of scientific research, especially in the field of social sciences, because it is linked to correlational studies, or it is simply not developed to its full extent. This study aimed to clarify the characteristics of descriptive studies within scientific research. Sometimes, the descriptive research level is confused with the descriptive technique or with the activity of describing a certain phenomenon, fact, or situation that occurs; for this reason, it is essential to establish the minimum characteristics that must be considered to classify a study as being descriptive-level. Descriptive-level studies are essentially univariate; this means that only one variable is used, and this variable comes from exploratory-level studies and is called a categorical variable. Within a descriptive level study, which is quantitative, there are sublevels, and for this, one must know one's line of research very well. Because it is a characterization study, one must review the literature exhaustively to develop this univariate study. Descriptive studies are quantitative because they use primary statistics—i.e., they use the data collected by the researcher—and should not be confused with the description process used at any level of inquiry.

**Keywords:** descriptive level, univariate, descriptive statistics.

## 1. Introduction

When one develops a scientific study, there are as many classifications as university institutions due to the variety of criteria. For example, there are conflicts between qualitative and quantitative research, and so-called mixed

studies appear that adopt varied methodologies that lie between purely quantitative and qualitative approaches. The truth is that scientific knowledge is acquired through scientific research, which can be defined as the methodical investigation of a phenomenon or group of events with the intention of describing or explaining them. In this context, science must be considered both a source of knowledge and a transformative practice of historically conditioned reality. Therefore, it must have both a theoretical and an empirical component.

In this context, it is necessary to take into account the principles of taxonomy (Lucarelli et al, 2020; Supo J., 2015b): a) hierarchy, which implies the organization of the components in an orderly and consistent system (Elliot, 2020 ); b) objectivity, meaning that the classification criteria must be observable, verifiable, and measurable, eliminating the subjective and arbitrary; c) universality, which means that the criteria must be applied to all components of the group to be classified; d) functionality, which means that the study must be useful for the purpose for which it was designed; e) consistency, because its structure must have a logical coherence (which is associated with objectivity); f) flexibility, because it must be continually updated based on the contributions of science and technology; g) exhaustiveness, because within a given domain, all relevant components must be included without any characteristic being omitted, implying that the coverage is complete, avoids gaps, and relates to universality and flexibility (Unterkalmsteiner & Abdeen, 2022); h) exclusion, which implies that each classified unit must belong to a single category according to the hierarchical level (Tyne, 1952); i) parsimony, where the simplest definition is chosen, avoiding unnecessary complexities—this is also called simplicity or Ockham's razor (Basak & Vracko, 2020); j) stability, where the systems must be stable but must allow modifications according to new discoveries; and l) homogeneity, for which the members of a domain must have the same characteristics, whether functional, morphological, or genetic.

On the other hand, it must be clear that quantitative research (Mohajan, 2020) cannot advance without prior qualitative studies. Both are important, and when it comes to statistics, quantitative studies are those that use research to carry out point estimates or hypothesis testing. Descriptive studies, apart from being univariate, are unique because they have hypotheses with a single variable and they seek the differences between the phenomena or facts that are contrasted (Supo & Zacarías, 2024). In this sense, the following question can be posed: Can descriptive studies include hypotheses? These characteristics, when demonstrated, will allow us to demystify the idea that descriptive studies do not include hypotheses and will also allow us to advance the different levels of research where there are two or more variables. This is important for countries, since, as Bunge (2019) wrote, a national project for a modern and developed society must include a scientific and technical development plan. Therefore, this study sought to determine whether descriptive studies include hypotheses.

## 2. Methods

The present study was developed based on an analysis of information obtained from Google Scholar (Montero & Hochman, 2005), taking into account the most cited methodology texts in Spanish (Hernández et al. (2014), with 161,650 citations from 2014 to 2024, and Bisquerra et al. (2019), with 8,542 citations from 2019 to 2024) and in English (Cohen et al. (2017), with 96,160 citations from 2017 to 2024, and Bryman (2016), with 89,326 citations from 2016 to 2024). Likewise, the inductive method was used because we started from the various classifications used in research works. The inductive method is usually employed in all the classifications used in research papers, to provide the methodological support (Hernandez et al, 2014; Bryman, 2016; Cohen et al., 2017; Bisquerra et al., 2019). In addition, there are a variety of classifications without taking into consideration the taxonomy, which is governed by principles that allow us to be clear about how a study is going to be developed. Each university institution has its own scheme that is often focused on the training of the professional and not with the professional's scientific knowledge, which is why there is so much confusion when evaluating research. In this context, the alignment rule was applied (Ochoa-Pachas & Yunkor-Romero, 2021), through which the investigative level on which the studies were carried out was established; this means that, if the topic or problem is descriptive, the objective, hypothesis, results, conclusions, and recommendations must be descriptive, and because there is confusion as to whether the description can be taken as the design, method, technique, or level, here, we consider description as a level of research with its own singularities.

## 3. Results

### 3.1 Classification of investigative works

In scientific research, studies can be classified into basic and applied levels (Liu et al, 2023; Pedraz et al, 2014). Basic-level studies begin with exploratory studies and end with predictive studies; applied studies involve the application of research, as shown in Table 1.

**Table 1.** Scientific research levels.

Type of research	Research level
Essential	Qualitative or exploratory
	Descriptive
	Relational
	Explanatory
	Predictive
Applied	Application
	Technological

This implies that basic studies are those where new knowledge is produced, categories are defined or redefined, and variable(s) are measured to

support the research. In this sense, a descriptive study exposes the characteristics, properties, and features of an event or group through the observation and description of its components (Arbaiza, 2013; Bernal, 2010; La Fuente & Marín, 2008).

On the other hand, if statistics are used, that is, the researcher collects primary data and uses statistics either to provide a description, for point estimations, or for contrasting the theoretical or statistical hypothesis, the classification would be qualitative and quantitative research, as shown in Table 2.

**Table 2.** Types and levels of research.

Type of research	Research level
Quantitative	Technological
	Application
	Predictive
	Explanatory
	Relational
Qualitative	Descriptive
	Exploratory

Studies can be classified according to the use or non-use of statistics; when statistics are not used, the study is qualitative, and when statistics are used, the study is quantitative. Regarding qualitative studies, they can be used generically according to Flick (2015), especially in the field of social sciences, which can be hermeneutical, reconstructive, phenomenological, or heuristic. Descriptive studies, which involve quantitative research, are different from relational studies, since the former are univariate and the latter are bivariate. When Arbaiza (2013) pointed out that there can be descriptive–explanatory or descriptive–correlational studies, he did not take into consideration the statistics used in descriptive research that are different from those used in a correlational or explanatory study. Descriptive research is located within basic studies and is quantitative, due to the use of statistics; this is despite the fact that descriptive research is usually expressed as having a qualitative approach (Valle et al., 2022). This confuses the descriptive level with the descriptive technique, since descriptions are made at every level of inquiry and this does not mean that they are located at the indicated level. In this context, Caballero (2013) discusses the answer to the following question: What is the reality of being studied like? From a quantitative point of view, it is the first step that allows the study variable to be measured because descriptive studies involve univariate investigations and initiate research applying primary statistics.

**Table 3.** Types and levels of research.

Research type I: use of knowledge	Research level	Research type II: use of statistics
Applied	Technological	Quantitative
	Application	
Essential	Predictive	
	Explanatory	
	Relational	
	Descriptive	
	Qualitative or exploratory	Qualitative

Research type I refers to knowledge, including whether it is discovered, constructed, related, explained, or predicted. On the other hand, research type II refers to whether statistics are used (quantitative) or not (qualitative). The use of statistics means that if a researcher collects data, they apply the corresponding instrument, processes the information either manually or computationally, and then interpret it, analyze it, and reach clear and precise conclusions. Descriptive studies include basic and quantitative research, and according to Supo (2015), they present three sublevels of research: characterization, estimative, and verification. These sublevels use various types of statistics to obtain consistent results that allow for discussion and reaching relevant conclusions. This classification is shown in Table 4.

**Table 4.** Levels and sublevels of descriptive research.

Research level	Sublevels
Descriptive	Verification
	Estimative
	Characterization

A descriptive-level study that is located in the purely descriptive sublevel can also be called characterization because it will list the singularities of the study variable using descriptive statistics; that is, it will calculate the absolute and relative frequencies for a categorical variable and measure the central tendency (average) and dispersion (standard deviation, variance) for a numerical variable. Estimative descriptive studies are inferential, and a point estimate is made by considering a 95% confidence interval and calculating the lower and upper limits, either for prevalence or incidence. In these studies, there are no hypotheses; it cannot be established whether their statements are true or false, since the prevalence and incidence are calculated, and the corresponding intervals are established. In descriptive verification studies, a univariate hypothesis is tested; if the variable is categorical, the X<sup>2</sup> test (a single goodness-of-fit test) is used, and if it is a numerical variable, Student's t-test is applied for a single sample. In this sense, it is important to be aware that the statements of verification studies are propositions that can be true or false. The research level,

the sublevels, and the univariate statistics used are shown in Table 5.

**Table 5.** Descriptive level, sublevels, and univariate statistics.

Research level	Research sublevel	Statistical objectives	Univariate statistics	
			Categorical variable	Numerical variable
Descriptive	Verification (inferential)	- Verify - Contrast - Check	X <sup>2</sup> goodness-of-fit test	Single-sample Student's <i>t</i> -test
	Estimative (inferential)	- Estimate - Calculate - Count	Proportions and 95% confidence interval	Averages and 95% confidence interval
	Purely descriptive (non-inferential)	- Describe - Characterize - Singularize	Absolute frequencies and relative frequencies	Measures of central tendency (mean) and dispersion (standard deviation, variance, standard error of the mean)

The objectives at this level of research are fundamentally statistical, in the following sense: “To know more specifically what is going to be done, objectives must be formulated” (Buendía et al., 2001, p. 15). Having specified this, it must be taken into account that for the purely descriptive sublevel, which is not inferential, the statistical objective is to describe, and the verb “characterize” can also be used. At the estimative sublevel, which is inferential, the statistical objective is to estimate, and the verb “calculate” can also be used. Finally, for the verification sublevel, which is also inferential, the statistical objective of verification can be used, and the verb “contrast” can also be used.

### 3.2 Characteristics of descriptive-level studies

Descriptive quantitative studies are unique because they are univariate, that is, they have a single study variable, which is called the variable of interest. This is why, in these studies, there are no dependent variables or independent variables. The variable of interest must be in a certain environment where the population is located, so the characterization factors that have a link to the study variable must be identified. Studies usually name the independent and dependent variables (Hernández et al., 2014; Bryman, 2016, Cohen et al., 2017; Bisquerra et al., 2019), without taking into account the research level or simply ignoring its importance; Supo (2024) considers that research is important for the development of science.

Characterization factors, which some authors call characterization variables (Supo, 2015), are elements that are in the context of the variable of interest and that the researcher must take into account in their research to understand the phenomenon they are studying and ensure that the research is carried out objectively and clearly. The study population must also be considered, which is not uniform because one researcher can study a certain

population and another researcher can study another population with a different number of components, despite having the same line of research. In descriptive studies, only internal validity is sought, that is, that the results obtained from a group of the population can be transferred to the study population. Descriptive research is cross-sectional and without intervention. It is transversal, since only a single measurement is carried out at a certain time. Likewise, the variable is not manipulated or controlled, which is why descriptive studies are also classified as studies without intervention, as referred to in Table 6.

**Table 6.** Cross-sectional descriptive research without intervention.

Research level	Research sublevel	Statistical objectives	Studies	
			Transverse	Without intervention
Descriptive	Verification (inferential)	- Verify - Contrast - Check	X	X
	Estimative (inferential)	- Estimate - Calculate - Count	X	X
	Purely descriptive (non-inferential)	- Describe - Characterize - Singularize	X	X

Another important characteristic of descriptive studies is that they can be prospective studies, that is, they can use primary data, or they can be retrospective studies, that is, they can use secondary data. Table 7 shows all these integrated characteristics, which can give us a global vision of descriptive studies in their various phases and allow us to understand the importance of descriptive quantitative research in the development of a certain line of research.

**Table 7.** Levels, sublevels, objectives, and characteristics of descriptive studies.

Level	Sublevel	Objectives	Type of research			
			Cross	Without intervention	Prospective	Retrospective
Descriptive	Verification (inferential)	- Verify - Contrast - Check	X	X	X	X
	Estimative (inferential)	- Estimate - Calculate - Count	X	X	X	X
	Purely descriptive (non-inferential)	- Describe - Characterize - Singularize	X	X	X	X

### 3.3 Descriptive-level studies and the problems: the formulation of the problems at the descriptive level

One way to carry out research is to problematize the statement of the study. In this sense, Ramos (2014) indicated that another essential singularity of research will lie in its problematic nature, which is why problematization is very important in the research process. Problematization in descriptive studies starts from the study variable, which is called the variable of interest. Furthermore, the researcher must develop the components that are in the domain of the study variable, which are usually called characterization factors, with objectivity (Popper, 2007).

The problem can be developed using the funnel technique, that is, a global vision of the topic, continuing with a regional description, and followed by an approach that relates to the country, to end with the local focus of the research problem. Another technique with which descriptive research problems can be developed is using the causes, consequences, prognosis, and solution proposal process. This technique allows for the logical development of a problem and allows the arguments to be structured logically. It must also be taken into consideration that metrics must be sought to support the development of the study problem, including data and information obtained from official organizations, whether national and/or international, with reliable information that allows for solid arguments in the research work. These can also be obtained from trusted databases for the development of this section of the research. The sources of information, including books, magazines, repositories, libraries, newspaper archives, museums, art galleries, and information centers, whether physical or virtual, must also be recorded.

The scientific problem must meet certain characteristics, including the following: a) it has a solution or can be resolved; b) its formulation is clear, coherent, and precise; c) it is significant; d) it is of interest within the field of knowledge where the research is carried out; and e) it is developed in either a physical or mental context that allows an approach from a scientific perspective.

Universities have different ways of defining research problems; they can be a) a problematic situation; b) a description of the problematic reality; c) a statement of the problem; d) a presentation of the problematic situation; or e) a description of the study problem. This diversity of names sometimes generates confusion, but it is necessary to indicate that they all refer to a single point: the development of the approach to the research question.

Once the research problem has been developed based on the variable of interest of the descriptive study, the problems are formulated as questions, considering that a general problem and two or more specific problems can be presented. Some authors prefer to call these the main and secondary problems, respectively (Supo & Zacarías, 2024).

The general problem is linked to the statement of the study, the title of the research, and the purpose of the study; in this sense, it is linked to the general objective, the general hypothesis (if the study has a hypothesis), and the



discussion of the study. In this line of thought, Tafur & Izaguirre (2015) indicated that "A research problem is a difficulty, a fact that draws the attention of the researcher due to its scarcity or abundance, growth or decrease, transformation or permanence, novelty or antiquity, ease or difficulty, lightness or darkness, wealth or poverty, etc." (p. 87).

Likewise, the problem must be correctly posed. According to Piscoya (2007), the problem must have a solution where the characteristics are predictable, and this implies that the problem has the variable (or variables) defined in its constitution. Therefore, according to Ochoa & Yunkor (2019), the research problem of a descriptive study has its particularities because it only has one variable, and many university centers require two variables, despite the fact that these types of studies are univariate studies. Something that should be noted is that, when formulating the main problem, or general problem, descriptive studies must be oriented on three sublevels: the purely descriptive or characterization sublevel; the point estimate sublevel, either prevalence or incidence; and the verification sublevel for hypothesis testing, whether the variable is categorical or numerical.

In this sense, the research problems of descriptive studies must have a single variable, must be formulated as a question, and must focus on the description, estimation, or verification of the observable facts or phenomena of the reality that one seeks to study. However, the main authors of the most cited methodology texts (Hernandez et al., 2014; Bryman, 2016; Cohen et al., 2017; Bisquerra et al., 2019) do not take these characteristics into account, assuming that descriptive studies are of little importance.

For the development of secondary problems, also called specific problems, the variable of interest must be dimensioned, because secondary or specific problems are constructed through the dimensions. The characterization factors allow us to establish the environment in which the variable of interest develops, thus developing a better vision of the problem and an appropriate approach to the situation being studied. These characterization factors allow variables to be developed in relational studies that can be linked to a study variable developed at another level of research.

The formulation of the research problem, which is carried out with a question, must have the following components: a) a purpose of the study (description, characterization, estimation, prevalence, incidence, verification, etc.); b) a line of research (topic of study, variable of interest); c) a population (subjects or objects to be studied); and e) spatial and temporal dimensions (place and time of the study). These factors are always accompanied by the following questions: Which one? How? What?

### **3.4 The descriptive research level and statistical objectives**

The objectives guide the research, which is why they will be formulated to specify and describe the activities that the researcher will develop. It is recommended to formulate them by considering the general aspects first and then the secondary ones (Cubo et al., 2019). The objectives of descriptive studies, which must be synchronized with the research problems, the title of the research work, and the statement of the study, must be raised in accordance with the sublevels of the descriptive level. These objectives are expressed in the form of an infinitive verb. According to Supo (2015), the verbs used depend on the sublevel of the descriptive research to be developed, as shown in Table 8.

**Table 8.** Verbs used in the sublevels of descriptive research.

Level	Descriptive sublevel	Objective verbs
Descriptive	Verification (inferential)	- Verify - Contrast - Check
	Estimative (inferential)	- Estimate - Calculate - Count
	Purely descriptive (non-inferential)	- Describe - Characterize - Singularize

In the various books and articles that teachers and students use and review to prepare their research work, there is little information about what verbs they should use to direct their study purpose and specify it in the research objectives. For example, the verb “describe” is used indistinctly in a main objective and “evaluate” is used in a secondary objective; similarly, the verb “apply” is used in descriptive studies, without considering the levels of research. The descriptive–correlational study is declared (Hernández et al., 2014) without considering that the descriptive level is univariate and the relational level is bivariate, the statistical treatment being different for each research level. Undoubtedly, we are talking about objectives framed in quantitative research, and the verbs used guide us about the level of research and the probable statistics that can be applied. This confusion generates doubts regarding the verb to use and/or not synchronizing the objective with the research problem and the statement of the study. For this reason, Supo's (2015) proposal is a valid, ordering alternative that applies the principle of parsimony, indicating that the simplest explanation is the one that a scientist must choose to continue their path in the research process.

Within the most basic sublevel of descriptive quantitative studies, we find that the pure description or characterization of the study variable, which is called the variable of interest, is associated with the verbs “describe”, “characterize”, and “reproduce”. If the variable is categorical, the absolute and relative frequencies will be determined, and if the variable is numerical, the measures of the central tendency and the dispersion will be determined. Then, the verbs of the statistical objectives will guide the researcher so that they know

which statistic they are going to use and whether they are going to perform inferential or non-inferential operations; that is, if they are related to the purely descriptive sublevel (describe or characterize), the statistician should not use inferential operations.

Non-inferential statistical procedures are related to the nature of the variables (whether they are categorical or numerical variables). For categorical variables, absolute frequencies and relative frequencies are used. On the other hand, for numerical variables, measures of the central tendencies (mean, median, mode) and dispersion (standard deviation, variance, standard error of the mean) are used. In order to make graphs, the rules established by statistics must be taken into consideration: if there are a maximum of four regions, pie charts must be used; if there are more than four regions to graph, bar graphs are used and presented in descending order, as long as the hierarchical regions are not derived from ordinal categorical variables. It is the researcher's choice to present tables or graphs.

If the researcher is going to carry out work that falls within the estimative sublevel, which is fundamentally inferential, the verbs “estimate”, “calculate”, or “compute” can be used, and this will imply obtaining proportions if the study variable is categorical, with a 95% confidence interval and both a lower limit and an upper limit. If the variable is numerical, the estimate is obtained through the averages, always with a 95% confidence interval and both the lower and upper limits. It is at this sublevel where the point estimate is found and studies of the prevalence (the number of existing cases of an event divided by the number of individuals in a population in each period) and the incidence (the number of new cases of an event that occurs in a certain period; incidence can show the probability that an individual in a population will be affected by the event being studied) can be conducted.

The verification sublevel corresponds to descriptive studies that have hypotheses, and for this, the verbs “verify”, “contrast”, and “confirm” are used, which allows the researcher to be guided in the application of certain statistics; “verify”, as a sublevel of the descriptive level, does not appear in the books most cited by researchers, such as Hernandez et al. (2014), Bryman (2016), Cohen et al. (2017), and Bisquerra et al. (2019); little importance is given to these studies, and they are considered inferior, without consideration of the fact that it is the first quantitative study that the inquirer must take into account. If the variable is categorical, the researcher must apply the  $\chi^2$  goodness-of-fit test; if the variable is numerical, then the researcher will have to apply Student's *t*-test for a single sample. It must be established that it is better to work with the entire population, but if this cannot be accomplished, the calculations can be made from groups of the population so that, when the operations are carried out, the results allow the researcher to generalize them to the population of study. It should always be remembered that descriptive studies are univariate because

they only have one analytical variable, designated as the variable of interest. These criteria for identifying descriptive studies are not taken into account by Hernández et al. (2014), Bryman (2016), Cohen et al. (2017), or Bisquerra et al. (2019).

### 3.5 Justification in descriptive studies

Once the research problems and their corresponding objectives have been established, the research is justified, establishing why and for what purpose the line of research is being investigated: Have there been few studies on said line? Has it been treated qualitatively, and the quantitative step has not been taken? Will the study serve as support for studies at other levels of research?

From these guidelines, three types of justifications can be established: theoretical, practical, and methodological.

Theoretical justification implies that the researcher wants to contrast reality with a certain theory or a specific model; they want to refute the validity of a certain theory, model, or doctrine; or the results obtained are intended to reaffirm the theory, model, or doctrine that is being used (Martín Gordillo et al, 2001). Practical justification refers to whether the research presents a specific investigation with results that can be shown, whether these results can contribute to providing new alternative solutions to the posed problem, or whether the results obtained are similar to or different from other studies at the same research level. Methodological justification allows us to show whether the results are going to be treated in a novel way, that is, if the researcher has built a new instrument to measure the study variable, or if, through this instrument, the validity of its application can be explained to a certain population or a certain group that is being studied.

### 3.6 Descriptive studies and theoretical framework

The development of the theoretical framework should focus on the variable of interest. The index technique can be used, developing the topic as follows: definition, characteristics, properties, classification, uses, applications, and theories that support the variable of interest. The conceptual map technique can also be used when developing a specific theory.

The sources of information used by the researcher are important; this implies recognizing and distinguishing primary sources from secondary and even tertiary sources. In this, Eco (1984) clearly points out the following: in the case of a thesis entitled “The Economic Thought of Adam Smith”, the object is constituted by the books of Adam Smith, while the instruments are other books about Adam Smith. In this case, we will say that the writings of Adam Smith constitute the primary sources, and the books about Adam Smith constitute the

secondary sources, or critical literature.

It must be remembered that the theoretical framework has three components. The first is the study background, which brings together research works, both national and international, and which, being of the same investigative level as the research work being developed, allows the preparation of material that can be used for a discussion of this. Then, the theoretical bases follow, where the variable of interest is developed and the author must substantively decide why they are going to use a specific theory—not just any one, but one that agrees with the author of the research. This means that they must define the variable of interest, establish its characteristics and properties, and develop a theory, doctrine, postulates, or principles that are closest to the researcher's proposal (Lavado, 2023; 2020).

The theoretical framework is completed with the definition of terms, which group the most important concepts of the work that must be defined. It is usually noted that there must be at least ten sources, and that these should be in accordance with the level of research being conducted.

It should be considered that characterization factors must also be developed. These factors are components that are linked to the variable of interest and allow the environment in which the study variable is developed to be completed. This seeks to understand the reasons why the phenomenon or fact occurs. It is necessary to search for information from reliable and primary sources, for which databases of information sources must be used. These can include electronic file systems such as university repositories, Alicia, Scopus, Google Scholar, Renacyt, Elsevier, Aranzadi (for legal texts), Eric, Anuies (for education), Web of Science, Bupna, Sirius (for sociology), and PsycInfo (psychology). These sources must be trusted, not generate uncertainty, and have relevant and consistent information. It is evident that scientific literature is written in the English language.

### 3.7 Hypotheses, problems, and objectives in descriptive-level studies

If the statement of the study, the research problems, and the objectives are correctly presented, then the hypotheses will respond to the problems and allow the line of action of the objectives to be followed. A descriptive study should have a descriptive statement, a descriptive problem, and a descriptive objective. The levels of research should not be confused with the tools that researchers use at these levels. It has been established that a study is descriptive because it is univariate, and the analytical intention is the description, characterization, estimation, or verification of the behavior of the variable of interest. Therefore, the hypothesis indicates what is being tested and is defined as tentative explanations of the phenomenon investigated (Hernández-Sampieri & Mendoza, 2018; Hernández et al., 2014). Therefore, it must be remembered that

hypotheses are propositions, which are expressions that can be true or false (Lavado, 2018).

The hypotheses must be aligned with the research problems and their objectives, and to do so, they must have the same components but with different functions. If the statement “states”, the problem “asks”, and the objective “directs”, then the hypothesis raises a probable answer to the question and research objective. This is even truer when the hypothesis must be built with a single variable, that is, the variable of interest.

Some texts consider that hypotheses must have at least two variables (Kerlinger & Lee, 2002), which would negate the construction of hypotheses with a single variable or those that are built as part of descriptive studies with a verification nature. These hypotheses have three alternatives: the first indicates a difference, which implies bilateralism; the second indicates an increase, which implies positive unilaterality; and the third indicates a decrease or detriment, which implies negative unilaterality. In this order of ideas, the construction of a hypothesis with a single variable expresses its empirical nature and is obtained from observations made by the researcher that enable them to order and build their concepts.

It should be noted that the researcher's search is framed in their probable answer, that is, it is framed according to whether it is true or false using the tools of inferential statistics. If there is a numerical variable, Student's t-test should be used for a single sample; if the variable is categorical, the X<sup>2</sup> goodness-of-fit test is applied to explain the phenomena that are observed by the researcher (Supo, 2015). Therefore, they are functions of real conjectures—describing, interpreting, explaining, and predicting the facts of reality and its modifications—and on those foundations, generalized and founded experience is applied and converted into scientific knowledge (Rodríguez Rivas, 2007).

It should be remembered that, in any investigative study, the observed phenomena are interpreted, and this does not make them hermeneutical. When you read a text, you interpret what the author means, and you can use different study methods. In truth, if the researcher carries out a descriptive study and interprets a source of information, this does not make it interpretive, and these facts are what generate confusion among young researchers.

### **3.8 Methods and designs in descriptive studies**

It is important to understand that the research methods are framed within the research methodology, which considers four elements: a) the epistemological element that locates the paradigms; b) the theorist who develops the theoretical content of the research; c) the morphology that allows the elaboration of the scientific object; and d) the technician who tells us how to develop investigative work techniques (Gómez et al., 2010).

The main method used in descriptive studies is the inductive one. This allows us to move from the particular to the general to verify whether the phenomenon studied can continue to be developed using statistical techniques that allow us to corroborate the variations that occur in the surrounding reality and make a first generalization, which allows progress in induction (Sauce & Matzel, 2022).

As such, induction is the fundamental method for exploratory, descriptive, and relational studies. Likewise, the following criteria must be considered: they are basic, quantitative research studies with empirical hypotheses that are raised from observations of reality or the environment. Within the inductive method, the following techniques can be used: observations, documentation, and surveys. These techniques can be used at other levels of research, such as exploratory, relational, or explanatory-observational studies, but this does not mean that they will be documentary, observational, or survey-type studies. A method can apply various techniques, and this does not mean it will be named by the type of technique it uses.

The designs must follow certain parameters; that is, they must comply with the principles of taxonomy: they must be exhaustive, exclusive, and parsimonious. Exhaustiveness implies that the study must be placed in a classification; it is impossible for it not to have a classification. The study must be exclusive because, if it has already been placed in a group, it can no longer belong to another group; it only belongs due to the characteristics of the group in which it was placed. The study must also be parsimonious because it must be the simplest.

In this order of ideas, studies can be a) prospective or retrospective; b) transversal or longitudinal (De Poy, 2024); c) with intervention or without intervention (Ratten, 2023); and d) descriptive or analytical (Ünver, 2023). Therefore, descriptive studies must be cross-sectional, retrospective, without intervention, and, obviously, descriptive. Could there be some variants within this classification? Yes, but only while respecting the principles of exhaustiveness and exclusion. A pure or simple descriptive design, according to Oседа & Cori (2017), seeks and collects information regarding a specific situation (object of study). Its scheme is as follows:

S  $\longrightarrow$  O, where S is the sample and O is the observation.

### 3.9 Inferential and non-inferential descriptive studies

Within descriptive studies, there are purely descriptive ones, where only descriptive statistics are applied. In these studies, inferences are not made, and only the variable of interest is characterized. A second descriptive study is pointing estimation, where inference can be made, but there is no hypothesis testing. Point estimation involves establishing a lower limit and an upper limit

within a 95% confidence interval. Finally, descriptive verification studies are inferential (Bunge, 1985), and a univariate hypothesis is tested, whether it is a difference, increase, or decrease in the study variable. It must be taken into consideration that descriptive studies, both inferential and non-inferential, have the same scientific value (Supo & Zacarías, 2024).

### **3.10 Discussion of the results in descriptive-level studies**

Discussing results involves analyzing the results that have been obtained and then comparing them with previous studies that were found when reviewing the literature. For this reason, the critical capacity of the researcher must be maximized to satisfy the written objectives (Aceituno et al., 2021). In this context, the discussion of the results of a descriptive study must take into consideration the values obtained in the descriptive statistics, whether they are frequencies, point estimates, or the contrast of conjectures. These results must be linked to the results of the descriptive research that is being carried out and linked to the theory that the researcher has used to understand the phenomenon studied.

The argumentation must also be considered (Noroozi, 2023), which can be based on the facts from a situation where a statistic or a real experience is shown; an authority citing a specialist or expert in the matter; an example that has to do with the topic; rationale, when causality is used; or a real and irrefutable truth whose greatest solidity is given by logic. This tool is so consistent that the fundamental characteristic of legal reasoning is the ability to deduce propositions related to human action, starting from the data where the rules of conduct are incorporated (Martino, 2010).

If any rule or regulation has been used, then it is also incorporated into the research discussion; if any doctrine or discipline has been considered, then it is necessary to incorporate it into the discussion of the results so that the conclusions are robust and allow for a clear vision of what the researcher seeks to explain through their findings.

## **4. Conclusion**

First, despite the fact that descriptive studies of point estimation, prevalence, and incidence are performed, being the gateway to quantitative works, the authors of the most cited texts, such as Hernandez et al. (2014), Bryman (2016), Cohen et al. (2017), and Bizquerra et al. (2019), ignore these studies and have little information in their work, so the thesis writers discard them. Quantitative studies begin with descriptive-level research. These studies are univariate because they have a single analytical variable that is called the variable of interest, which can be treated with both descriptive and inferential statistics.



Second, the texts consulted generally write about descriptive studies and, because they do not consider that they carry hypotheses (Hernandez et al (2014), Bryman (2016), Cohen et al.(2017) and Bizquerra et al. (2019)), readers think that these works are of little importance, but they do not take into consideration the sublevels of these studies, which are explained by Supo y Zacarías (2024). The sublevels of descriptive studies are as follows: purely descriptive, estimative, and concerned with verification. The first uses descriptive statistics, while the last uses inferential statistics, point estimation, and hypothesis testing, respectively.

Third, the authors whose work has been analyzed—Hernandez et al. (2014), Bryman (2016), Cohen et al. (2017) and Bizquerra et al. (2019)—do not take into consideration that there may be empirical hypotheses with a single variable, which are called that because they do not have a theoretical foundation and the researcher develops them based on what they observe and describe, which is why it is necessary to make visible these conjectures that are so essential for current science. Descriptive studies can involve hypothesis testing, which corresponds to the verification sublevel. Estimative descriptive studies allow the frequency of an event, that is, its prevalence or incidence, to be measured, which must be accompanied by its corresponding confidence intervals.

Fourth, it is usually indicated that the inductive method is used in exploratory works, but it is also used in descriptive and relational studies; however, this distinction is only formal because, when this method is developed, from the statement, it is passed to the technique and it is not known how induction will be used in these investigations. Descriptive studies use the inductive method to carry out research. This implies that cases of the topic being investigated must be studied and surveys must be applied to collect information, which will allow the corresponding parameters to be established.

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