



# Neutrosophic Statistic for Exploratory Analysis of the Data Provided by the Publications in the Social Sciences

Merck Milko Benavides Benalcázar<sup>1</sup>, Bolívar David Narváez Montenegro<sup>2</sup>, María José Calderón Velásquez<sup>3</sup>, and Jaime Rodrigo Cadena Morillo<sup>4</sup>

<sup>1</sup> Docente de la carrera de Derecho. Universidad Regional Autónoma de los Andes (UNIANDES). Juan de Salinas 612-500, Ibarra. Imbabura. Ecuador Email: ui.merckbenavides@uniandes.edu.ec

<sup>2</sup> Director de la carrera de Derecho. Universidad Regional Autónoma de los Andes (UNIANDES). Km 5 ½ vía a Baños. Ambato. Tungurahua. Ecuador Email: ua.bolivarnarvaez@uniandes.edu.ec

<sup>3</sup> Docente de la carrera de Derecho. Universidad Regional Autónoma de los Andes (UNIANDES). Avenida Lizarzaburu. Riobamba, Chimborazo. Email: ur.mariacalderon@uniandes.edu.ec

<sup>4</sup> Docente de la carrera de Derecho. Universidad Regional Autónoma de los Andes (UNIANDES). Troncal de la Sierra, Tulcán. Carchi. Ecuador. Email: ut.jaimecadena@uniandes.edu.ec

**Abstract.** In the 21st century, several investigations related to society have focused on studies of the Social Sciences. The problems that affect the population are reflected in issues of the rights of women, children, and adolescents. Several authors have reflected their support against domestic violence, femicide, labor exploitation, the evaluation and modification of laws. The present study with the use of exploratory analysis and neutrosophic statistics seeks to define the most debated issues in the Social Sciences and each person's life with society. It should be noted that segments of society such as indigenous people and mestizos are aggravated by discrimination in each element analyzed, which journalists and authors refer to in their publications. For the visualization of the study, three groups comprised of society were analyzed. The analysis is developed in the visualization of the increase of publications disaggregated in neutrosophic subsets.

**Keywords:** publications, social sciences, exploratory analysis, neutrosophic statistics

## 1 Introduction

Among the topics debated by the authors in research and studies in the Social Sciences we may find:

### Modifications of rules and regulations

The modifications of norms and regulations have played an important role for the state and the governing bodies to direct the processes in each country. Among those references is public procurement. For example, article 9 of the Organic Law of the National Public Procurement System seeks to guarantee the full execution of contracts, the effective application of contractual regulations, and ensuring and demanding compliance with the priority objectives of the National Public Procurement System [1].

Public purchases such as all those operations for the contracting and acquisition of products and services carried out by public entities fulfill the objectives that the company has entrusted to it [2]. These operations tend to be regulated by specific laws to guarantee the public sector's proper functioning, especially transparency and accountability to society [3] [4].

Among international organizations, we have the world health organization (WHO), which in 2020 declared COVID-19 a pandemic. The health mechanisms in each country were modified in pursuit of the health situation by approving rules and regulations. Several authors and journalists have set their sights on this critical issue facing society [5].

### Studies against discrimination

The authors and magazines offer an overview of the situation of indigenous communities [6]. Indigenous communities have been affected by climate change [7], [8], [9], [8], [10], [11], [12]. Indigenous peoples and nations today turn out to be the most affected as a result of discrimination. Jobs in the public or private sector lack indigenous people who hold positions in these entities. Indigenous people who have lower-skilled jobs and greater instability bear the worst consequences in the face of economic shocks [13].

### *Criminal proceedings against crimes in society*

Violence

Research and studies against violence have encouraged the struggle and concern of the governments in favor of the victims. For example, violence against women is a social problem that affects the family and that each year leaves thousands of victims in the world according to the results of the census of the National Institute of Statistics and Censuses 2010 [14].

The world health organization (WHO) declares that physical violence causes physical and psychological damage at the body level, it leaves scratches, internal wounds, cuts, burns, fractures, even death. The immediate effect that occurs is pain; children who have suffered violence are exposed to persistent neurological problems and manifest themselves in irritability, lethargy, tremors, and vomiting. In addition, frequent shaking syndrome in young children predisposes them to permanent deafness or blindness, paralysis, and coma, to death. Concerning psychological effects, after a certain amount of time, these become catastrophic since they induce the risk of addictive behaviors to psychoactive substances [15-17].

### **Women's studies**

#### *Femicide*

From the published papers, the authors describe that femicide, from a social and cultural point of view, is derived from the patriarchal system, where authority in the primitive social organization was exercised by a male, who was the head of each family at least. that it is analyzed that femicide is a gender problem closely linked to the patriarchal system, which predisposes women to a greater or lesser extent to be murdered [18], [19] [15] [20], [21].

### **Childhood and adolescent studies**

#### *Childhood and adolescence*

UNICEF, organizations in support of children and adolescents, and various authors defend the rights of children and their development at every stage of life. Several articles refer that children living in distress are victims of abandonment [22].

Abandonment is the action and effect of abandoning or abandoning oneself; lack of dedication or effort to act. It is considered a severe scourge [23] because it is about helpless human beings left to their luck, without anyone's attention. It is a true crime against the life and safety of a defenseless person [24]. It is the minor's family ties breakdown, leaving him to his fate [25-27].

From the exploratory analysis provided by the data of the analyzed publications, the most published topics can be determined through exploratory research and the application of neutrosophic statistical modeling. That is why this study focuses on:

- Problem situation: increase in publications of the Social Sciences and its reflection in society
- The main objective: define which are the most debated topics in the Social Sciences
- Specific objectives:
  - Determine the studies with the greatest contribution of data to society
  - Carry out the measurement and modeling of the neutrosophic variable
  - Analyze the effect of the data provided in the publications on society

## **2 Materials and methods**

Neutrosophic probabilities and statistics are a generalization of classical and imprecise probabilities and statistics. For example, the Neutrosophic Probability of an event E is the probability that event E will occur [28-34], the probability that event E does not occur, and the probability of indeterminacy (not knowing whether event E occurs or not). In classical probability  $\text{nsup} \leq 1$ , while in neutrosophic probability  $\text{nsup} \leq 3 +$ .

The function that models the neutrosophic probability of a random variable x is called the neutrosophic distribution:  $NP(x) = (T(x), I(x), F(x))$ , where T (x) represents the probability that the value x occurs, F (x) represents the probability that the value x does not occur, and I (x) represents the indeterminate or unknown probability of the value x.

Neutrosophic Statistics analyzes neutrosophic events and deals with neutrosophic numbers, the neutrosophic probability distribution [35], neutrosophic estimation, neutrosophic regression, etc. It refers to a set of data formed totally or partially by data with some degree of indeterminacy and the methods to analyze them. Neutrosophic statistical methods allow the interpretation and organization of neutrosophic data (data that can be ambiguous, vague, imprecise, incomplete, or even unknown) to reveal underlying patterns [36].

In short, the Neutrosophic Logic [37] [38], Neutrosophic Sets, and Neutrosophic Probabilities and Statistics have a wide application in various research fields and constitute a new reference of study in full development.

The Neutrosophic Descriptive Statistics includes all the techniques to summarize and describe the characteristics of the neutrosophic numerical data [39].

Neutrosophic Numbers are numbers of the form  $N = a + bI$  where a and b are real or complex numbers [40], while "I" is the indeterminacy part of the neutrosophic number N.

The study of neutrosophic statistics refers to a neutrosophic random variable where  $X_l$  and  $X_u I_N$  represents the corresponding lower and upper level that the studied variable can reach, in an indeterminate interval  $[I_l, I_u]$ .

Following the neutrosophic mean of the variable  $(\bar{x}_N)$  when formulating:

---

Merck M. Benavides B, Bolívar D. Narváez M, María J. Calderón V, Jaime R. Cadena M. Neutrosophic Statistic for Exploratory Analysis of the Data Provided by the Publications in the Social Sciences

$$X_N = X_l + X_u I_N; I_N \in [I_l, I_u] \tag{1}$$

$$\text{Where } \bar{x}_a = \frac{1}{n_N} \sum_{i=1}^{n_N} X_{il}, \bar{x}_b = \frac{1}{n_N} \sum_{i=1}^{n_N} X_{iu}, n_N \in [n_l, n_u] \tag{2}$$

is a neutrosophic random sample. However, the calculation of neutral squares (NNS) can be done as follows

$$\sum_{i=1}^{n_N} (\bar{X} - \bar{X}_{iN})^2 = \sum_{i=1}^{n_N} \left[ \begin{matrix} \min \left( \begin{matrix} (a_i+b_i I_L)(\bar{a}+\bar{b} I_L), (a_i+b_i I_L)(\bar{a}+\bar{b} I_U) \\ (a_i+b_i I_U)(\bar{a}+\bar{b} I_L), (a_i+b_i I_U)(\bar{a}+\bar{b} I_U) \end{matrix} \right) \\ \max \left( \begin{matrix} (a_i+b_i I_L)(\bar{a}+\bar{b} I_L), (a_i+b_i I_L)(\bar{a}+\bar{b} I_U) \\ (a_i+b_i I_U)(\bar{a}+\bar{b} I_L), (a_i+b_i I_U)(\bar{a}+\bar{b} I_U) \end{matrix} \right) \end{matrix} \right], I \in [I_L, I_U] \tag{3}$$

Where  $a_i = X_l, b_i = X_u$

The variance of the neutrosophic sample can be calculated by

$$S_N^2 = \frac{\sum_{i=1}^{n_N} (X_i - \bar{X}_{iN})^2}{n_N}; S_N^2 \in [S_L^2, S_U^2] \tag{4}$$

The neutrosophic coefficient (NCV) measures the consistency of the variable. The lower the NCV value, the more consistent the factor's performance is. NCV can be calculated as follows [41].

$$CV_N = \frac{\sqrt{S_N^2}}{\bar{X}_N} \times 100; CV_N \in [CV_L, CV_U]$$

To achieve a scale of measurement of the variables, it is associated with the linguistic terms with their neutrosophic evaluation and a score value.

Linguistic term	NNVU	Score
Very Weak (VW)	(0.10, 0.75, 0.85)	0
Weak (W)	(0.25, 0.60, 0.80)	1
Medium Weak (MW)	(0.40, 0.70, 0.50)	2
Medium (M)	(0.50, 0.40, 0.60)	3
Medium Strong (MS)	(0.65, 0.30, 0.45)	4
Strong (S)	(0.80, 0.10, 0.30)	5
Very Strong (VS)	(0.95, 0.05, 0.05)	6

Table 1. The evaluation system for experts according to the weight of the factor with the neutrosophic subset

### 3 Results

#### 3.1 Data collection

To identify the possible relationships or integrations, three groups studied in the social sciences are established to analyze segments of the neutrosophic group based on exploratory data analysis provided by surveys, interviews, and exploratory analysis of the most common themes in society (Table 1). The sample for each neutrosophic subset is 120 social issues that have a greater interest in society with an intercept versus groups ( $F_n$ ) (table 2). For the modeling of the neutrosophic statistics, it is suggested to code the variable and its representation in charts and tables (Table 2).

#### 3.2 Development of the method

Variable	Coding	Group	Sample	Ethnic groups
Topics with greater representation in the Social Sciences	ESC	A	120	Indigenous
		B	120	Mixed race
		C	120	general

Table 2. Characteristics of the DML variable

By modeling the variable with the use of neutrosophic statistics, the relative frequencies are obtained to determine the level of representativeness of the subjects,  $F_n = \{F_1, F_2, F_3, F_4, F_5\}$  of the factors in the ESC (table 3), in a sample of 360 people subdivided into groups A, B, and C.

COD	Studies	Topics	Scale	Group	Ethnic groups
F1	Modifications of rules and regulations	<ul style="list-style-type: none"> <li>Work code</li> <li>Penal Code</li> <li>Laws</li> </ul>	[0; 6]	A	Indigenous
F2	Studies against discrimination	<ul style="list-style-type: none"> <li>Gender</li> </ul>			

F3	Criminal proceedings against crimes in society	<ul style="list-style-type: none"> <li>• Labor</li> <li>• Assaults</li> <li>• Crimes</li> <li>• Violence</li> </ul>		
F4	Women's studies	<ul style="list-style-type: none"> <li>• Femicide</li> <li>• Women's rights</li> <li>• Domestic violence</li> <li>• Children's rights</li> <li>• Abandonment in childhood and adolescence</li> </ul>	B	Mixed race
F5	Childhood and adolescent studies	<ul style="list-style-type: none"> <li>• Adoption and guardianships</li> <li>• Education</li> <li>• Child labor</li> </ul>	C	general

**Table 3.** Most published social studies are segmented into groups (ESC).

To obtain the weight of each factor that influences the ESC in each group, as the measure of indeterminacy for each study on a scale of  $0 \leq ESC \leq 1$ , it is decided to analyze the variable from the linguistic terms with its neutrosophic evaluation for  $F_n = \{F_1, F_2, F_3, F_4, F_5\}$  (table 1).

Days	Neutrosophic frequencies				
	F1	F2	F3	F4	F5
1	[4 ; 5]	[4 ; 6]	[2 ; 2]	[1 ; 1]	[4 ; 5]
2	[1 ; 3]	[3 ; 4]	[1 ; 3]	[4 ; 4]	[0 ; 2]
3	[1 ; 2]	[0 ; 2]	[1 ; 2]	[1 ; 3]	[4 ; 5]
4	[1 ; 1]	[0 ; 1]	[2 ; 3]	[1 ; 1]	[4 ; 6]
5	[3 ; 4]	[4 ; 5]	[2 ; 4]	[1 ; 2]	[3 ; 5]
6	[0 ; 1]	[1 ; 2]	[2 ; 3]	[4 ; 4]	[0 ; 1]
7	[3 ; 4]	[2 ; 3]	[3 ; 3]	[3 ; 5]	[3 ; 5]
8	[4 ; 5]	[2 ; 3]	[4 ; 6]	[4 ; 5]	[0 ; 2]
9	[0 ; 1]	[4 ; 6]	[0 ; 0]	[4 ; 4]	[4 ; 4]
10	[2 ; 2]	[0 ; 0]	[0 ; 2]	[1 ; 1]	[3 ; 3]
11	[2 ; 4]	[3 ; 3]	[0 ; 0]	[2 ; 2]	[4 ; 5]
12	[2 ; 2]	[1 ; 2]	[2 ; 3]	[0 ; 0]	[0 ; 0]
13	[1 ; 1]	[3 ; 3]	[0 ; 1]	[3 ; 3]	[0 ; 1]
14	[0 ; 2]	[3 ; 4]	[2 ; 2]	[2 ; 3]	[3 ; 3]
15	[1 ; 1]	[0 ; 0]	[3 ; 4]	[3 ; 5]	[4 ; 6]
16	[4 ; 5]	[3 ; 4]	[1 ; 1]	[0 ; 1]	[0 ; 2]
17	[2 ; 2]	[3 ; 5]	[1 ; 3]	[0 ; 2]	[4 ; 6]
18	[2 ; 4]	[1 ; 3]	[4 ; 6]	[4 ; 5]	[1 ; 2]
19	[0 ; 0]	[0 ; 0]	[3 ; 3]	[0 ; 2]	[0 ; 0]
20	[2 ; 3]	[2 ; 2]	[0 ; 2]	[1 ; 3]	[2 ; 3]
0-120	[265; 383]	[252; 374]	[225; 347]	[245; 354]	[253; 383]

**Table 4.** Neutrosophic frequencies.

Of the neutrosophic relative frequencies observed for ESC, for 120 studies analyzed, the results showed that there is a level of total indeterminacy of  $F_1 = 118, F_2 = 122, F_3 = 122, F_4 = 109, F_5 = 130$ , with a level of

representativeness [37.5%; 65%], in subjects with a weight greater than 3, with a higher incidence of 42% for studies F4 and F5.

Days	Neutrosophic frequencies				
	F1	F2	F3	F4	F5
1	[2 ; 6]	[2 ; 5]	[2 ; 2]	[1 ; 2]	[1 ; 1]
2	[2 ; 5]	[2 ; 6]	[1 ; 3]	[1 ; 2]	[2 ; 5]
3	[1 ; 1]	[1 ; 4]	[2 ; 4]	[2 ; 4]	[2 ; 3]
4	[1 ; 1]	[2 ; 3]	[1 ; 4]	[1 ; 5]	[1 ; 5]
5	[1 ; 4]	[1 ; 5]	[1 ; 5]	[1 ; 2]	[1 ; 4]
6	[2 ; 5]	[1 ; 1]	[1 ; 5]	[2 ; 6]	[1 ; 3]
7	[1 ; 5]	[1 ; 3]	[2 ; 5]	[1 ; 4]	[1 ; 5]
8	[1 ; 3]	[2 ; 4]	[1 ; 5]	[2 ; 3]	[2 ; 5]
9	[1 ; 5]	[1 ; 3]	[1 ; 1]	[1 ; 5]	[1 ; 2]
10	[1 ; 4]	[2 ; 4]	[1 ; 2]	[2 ; 6]	[1 ; 4]
11	[1 ; 3]	[1 ; 1]	[2 ; 2]	[2 ; 3]	[1 ; 3]
12	[1 ; 1]	[1 ; 4]	[2 ; 5]	[1 ; 3]	[1 ; 2]
13	[1 ; 4]	[1 ; 1]	[2 ; 4]	[1 ; 5]	[2 ; 5]
14	[1 ; 3]	[2 ; 3]	[1 ; 5]	[1 ; 3]	[1 ; 4]
15	[1 ; 3]	[2 ; 5]	[1 ; 5]	[1 ; 5]	[1 ; 1]
16	[1 ; 5]	[2 ; 2]	[1 ; 2]	[2 ; 4]	[2 ; 2]
17	[1 ; 4]	[2 ; 3]	[1 ; 2]	[2 ; 6]	[1 ; 5]
18	[2 ; 4]	[2 ; 3]	[1 ; 2]	[2 ; 2]	[2 ; 6]
19	[1 ; 2]	[1 ; 1]	[1 ; 5]	[2 ; 4]	[1 ; 3]
20	[2 ; 6]	[2 ; 6]	[1 ; 1]	[2 ; 4]	[1 ; 1]
0-120	[182; 419]	[180; 430]	[174; 412]	[179; 454]	[179; 427]

**Table 5.** Relative neutrosophic frequency of the level of ESC in Group B

Of the neutrosophic relative frequencies observed for the ESC, for 120 studies analyzed, the results showed that there is a level of total indetermination of  $F_1 = 237, F_2 = 250, F_3 = 238, F_4 = 275, F_5 = 248$ , with a level of representativeness [68.3%; 75.8%], in subjects with a weight greater than 3, with a higher incidence of 72% for studies F4 and F5.

Days	Neutrosophic frequencies				
	F1	F2	F3	F4	F5
1	[0; 1]	[0; 2]	[3 ; 5]	[0; 0]	[3 ; 4]
2	[3 ; 5]	[2 ; 4]	[2 ; 4]	[2 ; 2]	[2 ; 5]
3	[3 ; 4]	[2 ; 5]	[3 ; 3]	[3 ; 5]	[3 ; 4]
4	[0; 0]	[3 ; 3]	[2 ; 4]	[1 ; 3]	[2 ; 4]
5	[3 ; 4]	[0; 0]	[2 ; 4]	[3 ; 5]	[3 ; 4]
6	[3 ; 4]	[0; 2]	[0; 0]	[2 ; 3]	[1 ; 4]
7	[3 ; 5]	[0; 0]	[2 ; 4]	[3 ; 4]	[0; 1]
8	[0; 1]	[2 ; 4]	[3 ; 6]	[3 ; 4]	[2 ; 5]
9	[3 ; 4]	[0; 1]	[1 ; 4]	[1 ; 2]	[2 ; 4]
10	[2 ; 4]	[0; 3]	[3 ; 3]	[2 ; 2]	[0; 3]
11	[2 ; 5]	[2 ; 2]	[0; 1]	[0; 3]	[2 ; 2]
12	[0; 1]	[0; 0]	[1 ; 3]	[1 ; 2]	[2 ; 5]
13	[0; 0]	[2 ; 5]	[3 ; 3]	[1 ; 4]	[3 ; 3]
14	[2 ; 4]	[2 ; 3]	[1 ; 4]	[1 ; 4]	[0; 1]
15	[0; 3]	[0; 3]	[2 ; 4]	[2 ; 5]	[3 ; 5]
16	[1 ; 2]	[3 ; 6]	[3 ; 3]	[1 ; 4]	[1 ; 2]
17	[0; 0]	[0; 3]	[0; 0]	[0; 2]	[1 ; 4]

18	[2 ; 4]	[3 ; 6]	[0; 0]	[0; 2]	[3 ; 5]
19	[1 ; 2]	[2 ; 3]	[2 ; 5]	[2 ; 3]	[1 ; 1]
20	[1 ; 3]	[3 ; 6]	[2 ; 3]	[3 ; 6]	[3 ; 5]
0-120	[170; 352]	[183; 368]	[179; 377]	[177; 366]	[198; 381]

**Table 6.** Relative neutrosophic frequency of ESC level in Group C

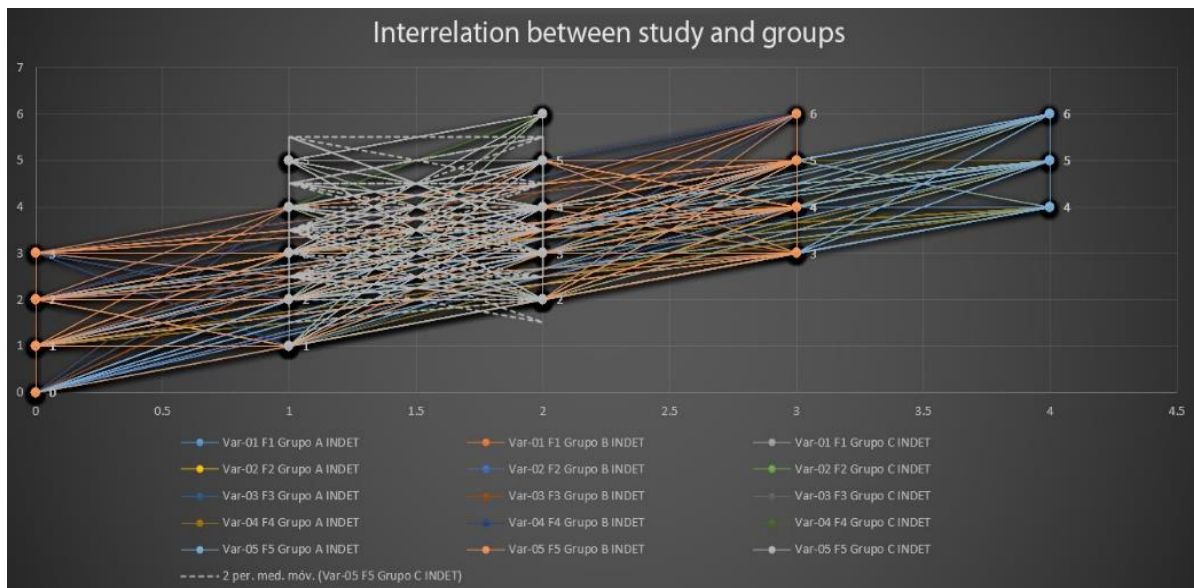
Of the neutrosophic relative frequencies observed for ESC, for 120 studies analyzed, the results showed that there is a level of total indeterminacy of  $F_1 = 182, F_2 = 185, F_3 = 198, F_4 = 189, F_5 = 183$ , with a level of representativeness [41.6%; 69.1%], in subjects with a weight greater than 3, with a higher incidence of 60 % for studies F3 and F5.

### 3.3 Neutrosophic statistical analysis

In the first stage, for the results in the modeling, the ESC is observed in the population, they are interrelated between the studies of women and childhood and adolescence. These determine that writers, reporters, and journalists have reported in their publications the current situation of women in society and the physical and psychological state of children and adolescents in the population. Among other groups with a completed level of studies, are the rights of the child, abandonment, adoption and guardianship, and education.

For the analysis of the representative mean as a function of  $\bar{x} \in [\bar{x}_L; \bar{x}_U]$ , the values of the neutrosophic means are calculated and for each study in interrelation with each neutrosophic subset, determined by the values of the neutrosophic standard deviation  $S_N \in [S_L; S_U]$ , to determine in which study there is a greater coherence and incidence of ESC in society  $CV_N \in [CV_L; CV_U]$ .

The graphic modeling represents that the result provided implies by the groups analyzed that there is a greater incidence in the F5 studies. The development of childhood and adolescence for F5 is present in several publications that defend the rights of boys and girls in society. The average level of the problems with the highest frequency is represented in the mean of indeterminacy of F5 with group C. The interrelation F5 - Group C defines that the studies are not only directed to a segment of society but the general sphere, to cause that the problems affect each sector within the neutrosophic group analyzed in society (Figure 1).



**Figure 1.** Neutrosophic interrelation between ESC research topics and groups. Own elaboration

### 3.4 Comparative analysis

To determine the associated referent indeterminacy measure  $\bar{x} \in [\bar{x}_L; \bar{x}_U]$ ,  $S_N \in [S_L; S_U]$  y  $CV_N \in [CV_L; CV_U]$  for the form of neutrosophic numbers (Table 5). In the results obtained for Group A, it is observed that for the values  $CV_N$  go from 0.58 to 0.695 with the indeterminacy measure of 20.9%, the effect brings with it an increase in studies that advocate for women's rights and the full development of childhood and adolescence and from 23.4% to women's studies, as corresponding to the weakest links among the indigenous group.

Factors	$\bar{x}_N$	YN	CVN
<i>Modifications of rules and regulations</i>	2,208 + 3,192 I; I ∈ [0; 30.8]	1.28 + 2.523 I; I ∈ [0; 49.3]	0.58 + 0.791;I ∈ [0; 26.6]
<i>Studies against discrimination</i>	2.1 + 3.117 I; I ∈ [0; 32.6]	1,268 + 2,507 I; I ∈ [0; 49.4]	0.604 + 0.804 I; I ∈ [0; 24.9]
<i>Criminal proceedings against crimes in society</i>	1,875 + 2,892 I; I ∈ [0; 35.2]	1,304 + 2,624 I; I ∈ [0; 50.3]	0.695 + 0.907 I; I ∈ [0; 24.2]
<i>Women's studies</i>	2,042 + 2.95 I; I ∈ [0; 30.8]	1,234 + 2,351 I; I ∈ [0; 47.5]	0.695 + 0.907 I; I ∈ [0; 23.4]
<i>Childhood and adolescent studies</i>	2,108 + 3,192 I; I ∈ [0; 34.0]	1,407 + 2.69 I; I ∈ [0; 47.7]	0.667 + 0.843 I; I ∈ [0; 20.9]

**Table 7.** Neutrosophic forms with indeterminacy measure for Group A

In the results of Group B, it is observed that for the values  $CV_N$  go from 0.082  $CV_N$  to 0.087 with the indeterminacy measure of 83% and 83.3%. It shows a strong interrelation between the studies aimed at the fight against femicide and child labor in childhood and adolescence. Group B characterized by mestizo people, suffers the harmful effects of society. A complicated stage where the burden of the family falls on single women. It is noteworthy that this group is discriminated against, issues that are addressed in social research (table 6).

Factors	$\bar{x}_N$	YN	CVN
<i>Modifications of rules and regulations</i>	1,517 + 3,492 I; I ∈ [0; 56.6]	0.125 + 1.978 I; I ∈ [0; 93.7]	0.082 + 0.566 I; I ∈ [0; 85.5]
<i>Studies against discrimination</i>	1.5 + 3,583 I; I ∈ [0; 58.1]	0.125 + 1.937 I; I ∈ [0; 93.5]	0.083 + 0.541 I; I ∈ [0; 84.7]
<i>Criminal proceedings against crimes in society</i>	1.45 + 3.433 I; I ∈ [0; 57.8]	0.126 + 1.843 I; I ∈ [0; 93.2]	0.087 + 0.537 I; I ∈ [0; 83.8]
<i>Women's studies</i>	1,492 + 3,783 I; I ∈ [0; 60.6]	0.125 + 1.868 I; I ∈ [0; 93.3]	0.084 + 0.494 I; I ∈ [0; 83.0]
<i>Childhood and adolescent studies</i>	1,492 + 3,558 I; I ∈ [0; 58.1]	0.125 + 1.792 I; I ∈ [0; 93.0]	0.084 + 0.504 I; I ∈ [0; 83.3]

**Table 8.** Neutrosophic forms with indeterminacy measure for Group B

In the results obtained from Group C, it is observed that for the values  $CV_N$  go from 0.465 to 0.568 with the indeterminacy measure of 26.3% and 27.9%. It shows a strong interrelation between studies directed at women and children and adolescents. Group C is characterized by people throughout the neutrosophic group that studies the problems of society. Changes in the development of society are characterized by problems that negatively affect the weakest links in society. Women and children and adolescents are present in more than 80% of the investigations with existing levels of indeterminacy in the reference topic (table 7).

Factors	$\bar{x}_N$	YN	CVN
<i>Modifications of rules and regulations</i>	1,417 + 2,933 I;I ∈ [0; 51.7]	0.805 + 2.354 I; I ∈ [0; 65.8]	0.568 + 0.803 I; I ∈ [0; 29.3]
<i>Studies against discrimination</i>	1,525 + 3,067 I;I ∈ [0; 50.3]	0.819 + 2.536 I; I ∈ [0; 67.7]	0.537 + 0.827 I; I ∈ [0; 35.1]
<i>Criminal proceedings against crimes in society</i>	1,492 + 3,142 I; I ∈ [0; 0; 52.5]	0.832 + 2.378 I; I ∈ [0; 0; 65.0]	0.558 + 0.757 I; I ∈ [0; 0; 26.3]

<i>Women's studies</i>	1.475 + 3.05 I; I ∈ [0; 51.6]	0.795 + 2.34 I; I ∈ [0; 66.0]	0.539 + 0.767 I; I ∈ [0; 29.7]
<i>Childhood and adolescent studies</i>	1.65 + 3.175 I; I ∈ [0; 48.0]	0.767 + 2.049 I; I ∈ [0; 62.6]	0.465 + 0.645 I; I ∈ [0; 27.9]

**Table 9.** Neutrosophic forms with a measure of indeterminacy for Group C

## Conclusions

- Currently, authors, reporters, researchers, and journalists have debated in their publications the issues that have generated controversy in society. Several are in favor of the rights of children and adolescents, the rights of women, and ethnic groups regarding indigenous people and mestizos. On the other hand, other publications refer to the fight of women against domestic violence and the abandonment of children and adolescents.
- The exploratory analysis of data carried out through the information obtained and the modeling of the neutrosophic statistics have shown that the subsets A, B, C show a lower value of CV in the Studies on women and childhood and adolescence. Furthermore, the modeling determined that studies, in general, are more related to defending the rights of women, especially and with a higher level of growth in publications in favor of children and adolescents.
- Neutrosophic statistics and exploratory analysis determined the neutrosophic components of the analyzed variable. Each alternative responds to each neutrosophic subset or subgroup in the neutrosophic group that represents society. Therefore, it is required to determine the possible variables that influence a certain degree of indeterminacy in the subgroups studied. As a result, we can see that the culture of good living and the right to all citizens emerges from the laws' modifications and those people who in their publications defend and record the facts and current situation in each era. The increase in publications about childhood and adolescence shows a reflection of current problems in the world.

## References

- [1] Asamblea Nacional Constituyente, "Constitución de la República del Ecuador," C. d. E. y. Publicaciones, Ed., ed. Montecristi, 2008.
- [2] G. ROZENWURCEL, *Compras Públicas en América Latina y el Caribe ¿Internacionalizar o no internacionalizar? ¿Quién, cómo, cuándo?*. Buenos Aires: OMC FLACSO, 2012.
- [3] *Ley Orgánica del Sistema Nacional de Contratación Pública*, A. N. Constituyente, 2008.
- [4] OMC. (2020). *Organización Mundial del Comercio. Obtenido de Contratación pública*. Available: [http://www.wto.org/spanish/tratop\\_s/gproc\\_s/gproc\\_s.htm](http://www.wto.org/spanish/tratop_s/gproc_s/gproc_s.htm)
- [5] GONZALEZ-PEREZ, Maria Alejandra, et al. COVID-19, sustainable development challenges of Latin America and the Caribbean, and the potential engines for an SDGs-based recovery. *Management Research: Journal of the Iberoamerican Academy of Management*, 2021.
- [6] OIT, "Aplicación del convenio sobre pueblos indígenas y tribales núm. 169 de la OIT Hacia un futuro inclusivo, sostenible y justo," ed: OIT, 2019.
- [7] P. Hernández Saragoza, J. R. Valdez Lazalde, A. Aldrete, & , and T. Martínez Trinidad, "Evaluación multicriterio y multiobjetivo para optimizar la selección de áreas para establecer plantaciones forestales. Madera y bosques, 25(2). doi," vol. 10.21829/myb.2019.2521819, 2019.
- [8] OIT. (2014). *Convenio Núm. 169 de la OIT sobre Pueblos Indígenas y Tribales Declaración de las Naciones Unidas sobre los Derechos de los Pueblos Indígenas. Organización Internacional del Trabajo*. Available: <https://bit.ly/2XN0y19>
- [9] CIDH. (2020). *La CIDH alerta sobre la especial vulnerabilidad de los pueblos indígenas frente a la pandemia de COVID-19 y llama a los Estados a tomar medidas específicas y acordes con su cultura y respeto a sus territorios. CIDH*. Available: <https://bit.ly/3jOXY3q>
- [10] P. Ulin, *Investigación Aplicada En Salud Pública. Family Health Internacional*. Washington: Family Health Internacional 2006.
- [11] B. NEWS. (2020). *Coronavirus en Ecuador: así hacen frente al coronavirus los indígenas de la Amazonía (y cómo se preparan para una postpandemia de hambre, desempleo y trueque*. Available: <https://www.bbc.com/mundo/noticias-america-latina-52781113>
- [12] RELIEFWEB. (2020). *Pueblos indígenas y COVID-19 en América Latina: Un enfoque humanitario (Septiembre de 2020)*. Available: <https://reliefweb.int/report/bolivia-plurinational-state/pueblos-indigenas-y-covid-19-en-am-rica-latina-un-enfoque>



- [13] CEDH. (2020). *Impacto y situación de la población indígena latinoamericana ante el Covid-19*. Available: <https://www.latinamerica.undp.org/content/rblac/es/home/blog/2020/impacto-y-situacion-de-la-poblacion-indigena-latinoamericana-ant.html>
- [14] R. D. S. Calderón, "Efectos del delito de femicidio en las víctimas indirectas dentro de los miembros del núcleo familiar," Facultad de Jurisprudencia, Universidad Regional Autónoma de los Andes UNIANDES, Santo Domingo, Ecuador, 2019.
- [15] J. Suco, *El Femicidio en el Ecuador*. Guayaquil-Ecuador: Universidad Laica Vicente Rocafuerte de Guayaquil, 2015-2016.
- [16] MENJÍVAR, Cecilia; WALSH, Shannon Drysdale. The Architecture of Femicide. *Latin American Research Review*, 2017, vol. 52, no 2, p. 221-240.
- [17] J. E. Ricardo, V. M. V. Rosado, J. P. Fernández, and S. M. Martínez, "Importancia de la investigación jurídica para la formación de los profesionales del Derecho en Ecuador," *Dilemas Contemporáneos: Educación, Política y Valores*, 2020.
- [18] G. A.-J. D. Cesano, *El Delito de Femicidio*. Montevideo, Buenos Aires: IB de F, 2014.
- [19] D. H. Cáliz, *Teoría y Práctica del Femicidio en Ecuador*. Quito: Editorial Ecuador, 2018.
- [20] R. L. Figueroa, *2500 Preguntas y Respuestas a la Constitución*. Quito: Jurídica EL FORUM, 2012.
- [21] E. A. Gómez, *Manual de Derecho Penal Ecuatoriano* vol. PARTE ESPECIAL TOMO I. Quito: Ediciones Legales, 2018.
- [22] J. Machado. (2019). *PRIMICIAS*. Available: <http://primicias.ec/noticias/sociedad/niños-femicidios-huerfanos-victimas>
- [23] D. ECUADOR. (2016). *MENORES EN ABANDONO*. Available: <https://www.derechoecuador.com/menores-en-abandono>
- [24] *Código Orgánico Integral Penal*, Artículo 153, 2014.
- [25] *Código Orgánico de la Niñez y Adolescencia*, E. Legales, 2017.
- [26] J. E. Ricardo, Á. B. M. Vásquez, R. A. A. Herrera, A. E. V. Álvarez, J. I. E. Jara, and N. B. Hernández, "Management System of Higher Education in Ecuador. Impact on the Learning Process," *Dilemas Contemporáneos: Educación, Política y Valore*, 2018.
- [27] J. E. Ricardo, M. I. M. Villalva, Z. A. O. Padilla, and L. A. C. Hurtado, "Filosofía de la comunicación, complemento necesario en el aprendizaje de las Ciencias Sociales," *Magazine de las Ciencias: Revista de Investigación e Innovación*, vol. 3, pp. 39-52, 2018.
- [28] S. H. S. Al-Subhi, I. Pérez Pupo, R. García Vacacela, P. Y. Piñero Pérez, and M. Y. Leyva Vázquez, "A New Neutrosophic Cognitive Map with Neutrosophic Sets on Connections, Application in Project Management. ," *Neutrosophic Sets and Systems*, vol. 22. , pp. 63-75, 2018.
- [29] G. Á. Gómez, J. V. Moya, and J. E. Ricardo, "Method to measure the formation of pedagogical skills through neutrosophic numbers of unique value," *Revista Asociación Latinoamericana de Ciencias Neutrosóficas. ISSN 2574-1101*, vol. 11, pp. 41-48, 2020.
- [30] A. Abdel-Monem and A. Abdel Gawad, "A hybrid Model Using MCDM Methods and Bipolar Neutrosophic Sets for Select Optimal Wind Turbine: Case Study in Egypt," *Neutrosophic Sets and Systems*, vol. 42, pp. 1-27, 2021.
- [31] P. E. D. P. Franco, A. J. P. Palacio, and I. A. C. Piza, "Neutrosophic Hypothesis to validate a Reform Project to Article 87 of the General Organic Code of Processes of Ecuador," *Neutrosophic Sets and Systems*, vol. 37, pp. 316-322, 2020.
- [32] G. A. Gómez, J. F. G. García, S. D. Á. Gómez, and F. Smarandache, "Neutrosophic Sociogram for Group Analysis," *Neutrosophic Sets and Systems*, vol. 37, pp. 417-427, 2020.
- [33] P. A. Mena Silva, A. Romero Fernández, and L. A. Granda Macías, "Neutrosophic Statistics to Analyze Prevalence of Dental Fluorosis," *Neutrosophic Sets and Systems*, vol. 37, pp. 160-168, 2020.
- [34] A. S. Molina, W. A. C. Calle, and J. D. B. Remache, "The application of Microsoft Solution Framework Software Testing using Neutrosophic Numbers," *Neutrosophic Sets and Systems*, vol. 37, pp. 267-276, 2020.
- [35] F. Smarandache, *An introduction to the Neutrosophic probability applied in quantum physics: Infinite Study*, 2000.
- [36] W. B. Vasantha, I. Kandasamy, and F. Smarandache, "Algebraic Structure of Neutrosophic Duplets in Neutrosophic Rings  $\langle Z U I \rangle$ ,  $\langle Q U I \rangle$  and  $\langle R U I \rangle$ ," *Neutrosophic Sets and Systems*, vol. 23, pp. 85-95, 2018.
- [37] E. J. H. Antepara, *Competencies Interdependcies Analysis based on Neutrosophic Cognitive Mapping: Neutrosophic Sets and Systems*, 2017.
- [38] Kumar, Megha, Kanika Bhutani, and Swati Aggarwal. "Hybrid model for medical diagnosis using Neutrosophic Cognitive Maps with Genetic Algorithms." 2015 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE). IEEE, 2015.

- [39] F. Smarandache, *Neutrosophy, a new Branch of Philosophy*: Infinite Study, 2002.
- [40] W. V. Kandasamy and F. Smarandache, "Fuzzy Neutrosophic Models for Social Scientists.," *Education Publisher Inc.*, (2013)
- [41] F. Smarandache, "A Unifying Field in Logics: Neutrosophic Logic. Neutrosophy, Neutrosophic Set, Neutrosophic Probability: Neutrosophic Logic. Neutrosophy, Neutrosophic Set, Neutrosophic Probability: Infinite Study.," 2005.

Received: March 11, 2021. Accepted: May 7, 2021