



Neutrosophic Analysis of Proposed Strategies for the Prevention of Domestic Accidents in Infants

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Abstract

Accidents in the child population are a significant cause of morbidity and mortality, becoming a global public health problem today. The most affected population are children in the preschool stage, due to the vulnerability and dependency of the caregiver. The high demand for health services due to domestic accidents draws attention and the need arises to carry out actions that instruct mothers and relatives on their prevention. In the present investigation, a documentary review was conducted to know the main causes of domestic accidents. In addition, a survey was applied to a sample made up of mothers of children under five years of age, to evaluate their knowledge about domestic accidents and ways to prevent them, and risk perception. After analyzing the results obtained in the first part of the study, an expert consultation was carried out. The results were processed through multicriteria decision methods. This consultation made it possible to find feasible solutions for the proposed topic, achieving a proposal for an integral educational strategy.

Keywords: domestic accidents; prevention; minors; educational strategy; TOPSIS

1. Introduction

Accidents are a growing problem in public health due to the high mortality, morbidity, and potential loss of years of life in children. Various authors point out that this phenomenon is highly preventable. When it comes to children under five, they are considered a group that is especially vulnerable to these events due to various factors, such as physical and mental immaturity. The greater weight of the head in proportion to the rest of the body makes walking and balance difficult, as well as social and developmental factors such as childhood recklessness, characteristic exploratory spirit, and curiosity[1].

Domestic accidents remain among the five leading causes of death, causing more than 4,000 deaths of all ages, and more than 300 are children and adolescents so a statistical approach to accidents that occur at home is 80% and are considered the fifth cause of morbidity and the seventh of mortality. That is why the injuries they generate are classified as an alarming public health problem, it was also reported that 44% of the accidents that occur in the home are five times higher than those caused by traffic, they are among the five leading causes of death in children aged 1-4 years in most Latin American countries[2, 3].

A pediatric accident is any spontaneous and episodic event from which a complex non-intentional injury syndrome is derived (trauma, fracture, intoxication, burn, drowning) that requires immediate medical assistance to pediatric patients in the emergency or emergency services[4, 5]. The perception of risk and the beliefs held by caregivers can reduce the assessment of danger and prevent prevention[6, 7].

Accidents or unintentional injuries are considered a global health problem; some classify them as an epidemic that reaches the entire world since they constitute one of the main health problems of modern life and those that occur in the home. The medical literature in general and the publications of international organizations, in particular, show that as the causes of death due to deficiency and infectious situations decrease, accidents become an important factor in the death, disability, and disease, so they need to be reduced and avoided[8]. Neutrosophy has been successfully applied to study medical situations, see for example [9-14].

As has been observed according to the bibliography consulted, domestic accidents are a problem that affects the population in general. Therefore, it is necessary to take a series of measures that contribute to the reduction of cases. For the present investigation, the following problem was proposed to be analyzed: How to reduce the risk of domestic accidents in the communities of Ecuador.

2. Method

For the development of the research, theoretical methods were used, such as:

- Synthetic, analytical method: the analytical method allowed the decomposition of the whole into specific aspects to understand how the research topic behaves today. Synthesis was used, that is, the union of the dispersed elements to form a total component.
- Deductive, inductive method: this research method allows for logical reasoning. Through the deductive method, we start from the generic until we reach the particular aspects. In the investigation, this method was applied to know the subject to be treated and evaluate its behavior in the selected sample.
- Logical historical method: these methods allow the construction of the investigation from the historical elements that build the investigation to know its essential elements and its evolution throughout history.

The empirical methods were the following:

- Information gathering: direct observation, document review, surveys of mothers, consulting experts to reach consensus, group work (brainstorming and group dynamics)
- Information Processing: Neutrosophic TOPSIS

TOPSIS:

In the case of TOPSIS, the selection is based on finding the alternative that is closest to the ideal solution and, in turn, is further away from the worst solution. It was developed by Hwang and Yoon in 1981 and is based on the concept that a given alternative should be located at the shortest distance from an ideal alternative that represents the best (positive ideal or simply ideal), and at the greatest distance. Distance from an ideal alternative that represents the worst (negative ideal or anti-ideal)[15, 16]. This method had its evolution towards Neutrosophy; therefore, in this article, linguistic terms will be associated with Single Valued Neutrosophic Numbers (SVNN), in such a way that the experts can carry out their evaluations in linguistic terms, which results in more natural, see [9, 17-20].

Definition 1. Let X be a universe of discourse. A Neutrosophic Set (NS) is characterized by three membership functions [21], $u_A(x), r_A(x), v_A(x): X \rightarrow]-0,1+[$, which satisfy the condition $-0 \leq \inf u_A(x) + \inf r_A(x) + \inf v_A(x) \leq \sup u_A(x) + \sup r_A(x) + \sup v_A(x) \leq 3^+$ for all $x \in X$. $u_A(x), r_A(x)$ and $v_A(x)$ denote the true, indeterminate, and false membership functions of x in A , respectively, and their images are standard or nonstandard subsets of $-0,1 + [$. [22].

Definition 2. Let X be a universe of discourse. A Single Value Neutrosophic Set (SVNS) A over X is an object of the form:

$$A = \{ \langle x, u_A(x), r_A(x), v_A(x) \rangle : x \in X \} \quad (6)$$

Where $u_A, r_A, v_A: X \rightarrow [0,1]$, satisfy the condition $0 \leq u_A(x), r_A(x), v_A(x) \leq 3$ for all $x \in X$. $u_A(x), r_A(x)$ y $v_A(x)$ denote the true, indeterminate, and false membership functions of x in A , respectively. For convenience, a Single Value Neutrosophic Number (SVNN) will be expressed as $A = (a, b, c)$, where $a, b, c \in [0,1]$ and satisfies $0 \leq a + b + c \leq 3$.

The SVNS arose with the idea of applying the neutrosophic sets for practical purposes. Some operations between SVNN are expressed below:

1. Given $A_1 = (a_1, b_1, c_1)$ and $A_2 = (a_2, b_2, c_2)$ two SVNNs we have that the sum between A_1 and A_2 is defined as:

$$A_1 A_2 = (a_1 + a_2 - a_1 a_2, b_1 b_2, c_1 c_2) \quad (7)$$

2. Given $A_1 = (a_1, b_1, c_1)$ and $A_2 = (a_2, b_2, c_2)$ two SVNNs, the multiplication between A_1 and A_2 is defined as:

$$A_1 A_2 = (a_1 a_2, b_1 + b_2 - b_1 b_2, c_1 + c_2 - c_1 c_2) \quad (8)$$

3. The product by a positive scalar with a SVNN, $A = (a, b, c)$ is defined by:

$$A = (1 - (1 - a), b, c) \quad (9)$$

4. Let $\{A_1, A_2, \dots, A_n\}$ be a set of n SVNNs, where $A_j = (a_j, b_j, c_j)$ ($j = 1, 2, \dots, n$), then the Single Value Neutrosophic Weighted Mean Operator (SVNWMO) over the set is calculated by the following equation:

$$\sum_{j=1}^n \lambda_j A_j = \left(1 - \prod_{j=1}^n (1 - a_j)^{\lambda_j}, \prod_{j=1}^n b_j^{\lambda_j}, \prod_{j=1}^n c_j^{\lambda_j} \right) \quad (10)$$

Where λ_j is the weight of A_j , $\lambda_j \in [0, 1]$ and $\sum_{j=1}^n \lambda_j = 1$.

Definition 3. Let $A^* = (A_1^*, A_2^*, \dots, A_n^*)$ be a vector of n SVNNs such that $A_j^* = (a_j^*, b_j^*, c_j^*)$ ($j = 1, 2, \dots, n$) and $B_i = (B_{i1}, B_{i2}, \dots, B_{im})$ ($i = 1, 2, \dots, m$) are m vectors of n SVNNs such that $B_{ij} = (a_{ij}, b_{ij}, c_{ij})$ ($i = 1, 2, \dots, m$) ($j = 1, 2, \dots, n$). Then the Separation Measurement between B_i and A^* is calculated by the following Equation:

$$s_i = \left(\frac{1}{3} \sum_{j=1}^n \left\{ (a_{ij} - a_j^*)^2 + (b_{ij} - b_j^*)^2 + (c_{ij} - c_j^*)^2 \right\} \right)^{\frac{1}{2}} \quad (11)$$

Where $i = (1, 2, \dots, m)$

Definition 4. Let $A = (a, b, c)$ a SVNN, the score function S of a SVNN, based on true membership degree, undetermined membership degree, and false membership degree is defined by the following Equation :

$$S(A) = \frac{1 + a - 2b - c}{2} \quad (12)$$

Where $S(A) \in [-1; 1]$

In this paper, linguistic terms will be associated with SVNN, so that experts can carry out their evaluations in linguistic terms which is more natural. Therefore, the scales shown in Tables 1 and 2 will be taken into account [14, 23, 24].

Table 1: Linguistic terms used

Linguistic term	SVNN
Extremely good (EG)	(1,0,0)
Very Very Good (VVG)	(0.9, 0.1, 0.1)
Very Good (VG)	(0.8,0,15,0.20)
Good (G)	(0.70,0.25,0.30)
Moderately Good (MDG)	(0.60,0.35,0.40)
Medium (M)	(0.50,0.50,0.50)
ModeratelyBad (MDB)	(0.40,0.65,0.60)
Bad (B)	(0.30,0.75,0.70)
Very Bad (VB)	(0.20,0.85,0.80)
Very Very Bad (VVB)	(0.10,0.90,0.90)
Extremely Bad (EB)	(0,1,1)
Not Important (NI)	(0.10,0.75,0.85)

Table 2: Linguistic terms that represent the weight of the importance of the alternatives.

Linguistic term	SVNN
Very Important (VI)	(0.95, 0.1, 0.1)
Important (I)	(0.75,0.30,0.45)
Medium (M)	(0.50,0.40,0.60)
Not Important (NI)	(0.30,0.70,0.80)

The TOPSIS method for SVNN consists of the following, assuming that $A = \{\rho_1, \rho_2, \dots, \rho_m\}$ is a set of alternatives and $G = \{\beta_1, \beta_2, \dots, \beta_m\}$ is a set of criteria, the following steps will be carried out:

Step 1: Determine the weight of the experts. For this, the specialists evaluate according to the linguistic scale that appears in Table 1, and the calculations are made with their associated SVNN, call $A_t = (a_t, b_t, c_t)$ the SVNN corresponding to the t-th decision-maker ($t = 1, 2, \dots, k$). The weight is calculated by the following formula:

$$\lambda_t = \frac{a_t + b_t \left(\frac{a_t}{a_t + c_t}\right)}{\sum_{t=1}^k a_t + b_t \left(\frac{a_t}{a_t + c_t}\right)} \tag{13}$$

$$\lambda_t \geq 0 \text{ and } \sum_{t=1}^k \lambda_t = 1$$

Step 2: Construction of the aggregate unique value neutrosophic decision matrix. This matrix is defined by $D = \sum_{t=1}^k \lambda_t D^t$, where $d_{ij} = (u_{ij}, r_{ij}, v_{ij})$ and is used to aggregate all the individual evaluations; d_{ij} is calculated as the aggregation of the evaluations given by each expert $(u_{ij}^t, r_{ij}^t, v_{ij}^t)$, using the weights λ_t of each one with the help of Equation 5. In this way, a matrix $D = (d_{ij})_{ij}$ is obtained, where each d_{ij} is a SVNN ($i = 1, 2, \dots, m; j = 1, 2, \dots, n$).

Step 3: Determination of the Weight of the Criteria. Suppose that the weight of each criterion is given by $W = (w_1, w_2, \dots, w_n)$, where w_j denotes the relative importance of the criterion $\lambda_t w_j^t = (a_j^t, b_j^t, c_j^t)$. S_i is the evaluation of the criterion λ_t by the t-th expert. Equation 5 is then used to add the w_j^t with the weights λ_t .

Step 4: Construction of the neutrosophic decision matrix of the weighted mean of unique values with respect to the criteria. $D^* = D * W$, where $d_{ij} = (a_{ij}, b_{ij}, c_{ij})$.

Step 5: Calculation of the positive and negative SVNN ideal solutions. The criteria can be classified as cost-type or benefit-type:

$$\rho^+ = a_{\rho+w}(\beta_j), b_{\rho+w}(\beta_j), ac_{\rho+w}(\beta_j) \tag{14}$$

Denotes the positive ideal solution:

$$\rho^- = (a_{\rho-w}(\beta_j), b_{\rho-w}(\beta_j), ac_{\rho-w}(\beta_j)) \quad (15)$$

Denotes the negative ideal solution:

$$\begin{aligned} a_{\rho+w}(\beta_j) &= \{ \max_i a_{\rho iw}(\beta_j), \text{if } j \in G_1 \min_i a_{\rho iw}(\beta_j), \text{if } j \in G_2, & a_{\rho-w}(\beta_j) &= \{ \min_i a_{\rho iw}(\beta_j), \text{if } j \in G_1 \max_i a_{\rho iw}(\beta_j), \text{if } j \in G_2, \\ b_{\rho+w}(\beta_j) &= \{ \max_i b_{\rho iw}(\beta_j), \text{if } j \in G_1 \min_i b_{\rho iw}(\beta_j), \text{if } j \in G_2, & b_{\rho-w}(\beta_j) &= \{ \min_i b_{\rho iw}(\beta_j), \text{if } j \in G_1 \max_i b_{\rho iw}(\beta_j), \text{if } j \in G_2, \\ c_{\rho+w}(\beta_j) &= \{ \max_i c_{\rho iw}(\beta_j), \text{if } j \in G_1 \min_i c_{\rho iw}(\beta_j), \text{if } j \in G_2, & c_{\rho-w}(\beta_j) &= \{ \min_i c_{\rho iw}(\beta_j), \text{if } j \in G_1 \max_i c_{\rho iw}(\beta_j), \text{if } j \in G_2, \end{aligned}$$

Step 6: Calculation of the distances to the positive and negative SVN ideal solutions. With the help of Equation 6, the following Equations are calculated:

$$s_i^+ = \left(\frac{1}{3} \sum_{j=1}^n \{ (a_{ij} - a_j^+)^2 + (b_{ij} - b_j^+)^2 + (c_{ij} - c_j^+)^2 \} \right)^{\frac{1}{2}} \quad (16)$$

$$s_i^- = \left(\frac{1}{3} \sum_{j=1}^n \{ (a_{ij} - a_j^-)^2 + (b_{ij} - b_j^-)^2 + (c_{ij} - c_j^-)^2 \} \right)^{\frac{1}{2}} \quad (17)$$

Step 7: Calculation of the Coefficient of Proximity (CP). The CP of each alternative is calculated with respect to the positive and negative ideal solutions.

$$\tilde{\rho}_j = \frac{s^-}{s^+ + s^-} \quad (18)$$

Where $0 \leq \tilde{\rho}_j \leq 1$

Step 8: Determination of the order of the alternatives.

They are ordered according to what was achieved by $\tilde{\rho}_j$. The alternatives are ordered from highest to lowest, under the condition that $\tilde{\rho}_j \rightarrow 1$ is the optimal solution.

Additionally, for statistical processing, the following formula was used to calculate the sample size ([25]).

$$n = \frac{ZNpq}{E^2(N-1) + Z^2pq} \quad (19)$$

Where:

N: Sample size,

Z: It is the value of the normal distribution with the assigned confidence level,

E: Desired sampling error,

N: Population size.

3. Application of the methods

Summarizing what was found in the consulted bibliography, the most frequent accidents in infants occur due to the following causes:

- Suffocation: According to the WHO, there are 370,000 drowning deaths worldwide, making it the third leading cause of unintentional injury-related mortality. Unsupervised children in rural areas with little formal swimming instruction are most at risk of drowning.
- Burns: it is one of the greatest traumas that people can suffer, these are one of the main causes of accidents in children. These burns in children also create a great problem, since they present a high risk of morbidity and mortality, leaving disabling, functional, and aesthetic lesions[26].
- Poisoning: Poisoning is one of the main causes of morbidity and mortality worldwide. There are multiple poisoning causes, ranging from pesticides and industrial chemicals to lead and mercury poisoning[27].
- Traffic Injuries – Each year, more than 1 million deaths are associated with traffic accidents and an estimated 20 to 50 million non-fatal injuries worldwide. These accidents cause the death of 186,300 children (from 0 to 17 years old)[28].
- Falls: More than 400,000 fatal falls occur each year worldwide. This makes them the second leading cause of unintentional injury-related deaths after traffic accidents. Children living in countries with poor infrastructure and unsafe housing conditions are especially at risk of injury from falls. In developing countries, infants have significantly higher rates of fall-related injuries than older children.

A survey was applied to a sample made up of 100 mothers of infants under 5 years of age, who arrived at the emergency services due to some type of domestic accident that occurred to the minor. This survey was developed to evaluate the risk perception of mothers regarding domestic accidents, as well as the measures to prevent them, the most frequent causes, and other data of interest for the study. The results are shown below:

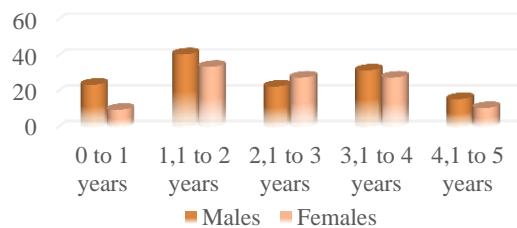


Figure 1: Distribution by age and sex of children under 5 years attended in the emergency room
Source: Mother surveys. Own elaboration

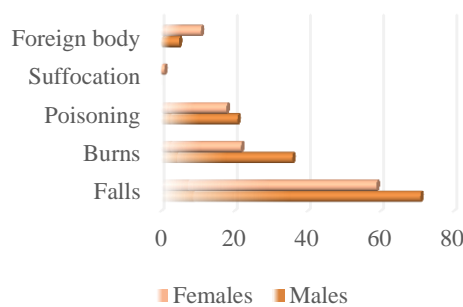


Figure 2: Main causes of medical care for domestic accidents. Source: mother survey. Own elaboration

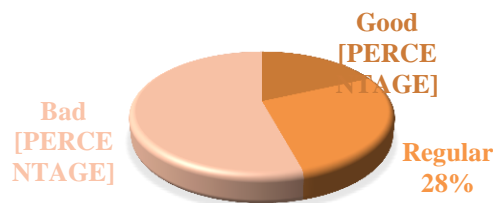


Figure 3: Risk perception in accident prevention. Source: Poll. Own elaboration

Taking into account the obtained results, it was proposed to carry out actions that can improve the level of perception of accident risk in minors, and develop prevention work. Alternative solutions to the issue are proposed.

Alternatives:

1. Carry out campaigns in the mass media on the risk of accidents in minors and ways to prevent them in homes and communities
2. La seminars in the communities by social workers in women's care centers.
3. Carry out debates in the communities.
4. Prepare attending physicians so that they can give talks to pregnant women and mothers of infants on accident prevention
5. Propose a comprehensive educational strategy, to be carried out in the communities for the prevention of domestic accidents in infants

For the analysis of these alternatives, the following criteria are proposed:

1. Effectiveness in terms of information to provide
2. Possibility of application in communities with different characteristics
3. Integrate students in the participation of the activity to be carried out
4. Optimization of time and resources
5. Inform large numbers of people

An expert consultation was carried out with the participation of 5 groups of specialists from different levels. Then, the TOPSIS multi-criteria decision method was applied. Results are presented below.

Table 3: Step 1 "Calculation of the importance vector (λ_t)"

Importance vector	Expert Groups
(0.90,10.1)	Group 1
(0.350.750.8)	Group 2
(0.750.250.2)	Group 3
(0.750.250.20)	Group 4
(0.10.90.9)	Group 5

Table 4: Expert Group No. 1 Single Value Criteria Matrix

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Alt 1	(0.9;0.1;0.1)	(0.75;0.25;0.2)	(0.75;0.25;0.2)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
Alt 2	(0.9;0.1;0.1)	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.9;0.1;0.1)	(0.50;0.5;0.50)
Alt 3	(0.5;0.5;0.5)	(0.9;0.1;0.1)	(0.9;0.1;0.1)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
Alt 4	(0.35;0.75;0.80)	(0.9;0.1;0.1)	(0.9;0.1;0.1)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
Alt 5	(0.9;0.1;0.1)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.9;0.1;0.1)	(0.75;0.25;0.20)

Table 5: Expert Group No. 2 Single Value Criteria Matrix

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Alt 1	(0.9;0.1;0.1)	(0.9;0.1;0.1)	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.9;0.1;0.1)
Alt 2	(0.50;0.5;0.50)	(0.75;0.25;0.20)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.50;0.5;0.50)
Alt 3	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.9;0.1;0.1)	(0.35;0.75;0.80)	(0.10;0.90;0.90)
Alt 4	(0.35;0.75;0.80)	(0.50;0.5;0.50)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.50;0.5;0.50)
Alt 5	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.75;0.25;0.20)	(0.75;0.25;0.20)	(0.9;0.1;0.1)

Table 6: Expert Group No. 3 Single Value Criteria Matrix.

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Alt 1	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.35;0.75;0.80)
Alt 2	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.9;0.1;0.1)	(0.9;0.1;0.1)	(0.75;0.25;0.20)
Alt 3	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)
Alt 4	(0.9;0.1;0.1)	(0.50;0.5;0.10)	(0.90;0.90;0.50)	(0.10;0.90;0.90)	(0.50;0.5;0.50)
Alt 5	(0.75;0.25;0.20)	(0.75;0.25;0.20)	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.9;0.1;0.1)

Table 7: Expert Group No. 4 Single Value Criteria Matrix

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Alt 1	(0.9;0.1;0.1)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.9;0.1;0.1)	(0.50;0.5;0.50)
Alt 2	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.9;0.1;0.1)	(0.50;0.5;0.50)	(0.9;0.1;0.1)
Alt 3	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.10;0.90;0.90)
Alt 4	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.90;0.90;0.50)
Alt 5	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.75;0.25;0.20)	(0.9;0.1;0.1)	(0.9;0.1;0.1)

Table 8: Expert Group No. 5 Single Value Criteria Matrix.

	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Alt 1	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.9;0.1;0.1)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
Alt 2	(0.75;0.25;0.20)	(0.50;0.5;0.50)	(0.50;0.5;0.50)	(0.9;0.1;0.1)	(0.50;0.5;0.50)
Alt 3	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)	(0.35;0.75;0.80)
Alt 4	(0.50;0.5;0.50)	(0.35;0.75;0.80)	(0.35;0.75;0.80)	(0.10;0.90;0.90)	(0.35;0.75;0.80)
Alt 5	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.9;0.1;0.1)	(0.75;0.25;0.20)	(0.75;0.25;0.20)

Table 9: Decision table aggregated by the experts

Alternatives	C1	C2	C3	C4	C5
Alt 1	(0.71631;0.29863;0.27918)	(0.87682;0.12318;0.11708)	(0.38873;0.64423;0.65967)	(0.7362;0.2796;0.287)	(0.5754;0.4742;0.4985)
Alt 2	(0.8479;0.1521;0.14458)	(0.55805;0.44195;0.42474)	(0.86726;0.13274;0.12389)	(0.7192;0.2808;0.2808)	(0.7056;0.2944;0.2793)
Alt 3	(0.71399;0.30107;0.30812)	(0.52153;0.50706;0.52051)	(0.22599;0.82708;0.85219)	(0.2113;0.8359;0.858)	(0.2442;0.8161;0.8449)
Alt 4	(0.69573;0.33129;0.34425)	(0.30499;0.71888;0.72991)	(0.7289;0.44689;0.29356)	(0.4523;0.8007;0.7726)	(0.3421;0.7104;0.7355)
Alt 5	(0.75912;0.25528;0.25449)	(0.82139;0.17861;0.15508)	(0.82001;0.17999;0.15599)	(0.855;0.145;0.1325)	(0.8365;0.1635;0.1451)

Table 10: Weighted decision matrix of the SVNN

Alternatives	Criterion 1	Criterion 2	Criterion 3	Criterion 4	Criterion 5
Alt 1	(0.58738;0.4287;0.39162)	(0.64922;0.35078;0.3157)	(0.2679;0.75847;0.76204)	(0.55215;0.4597;0.4296)	(0.51786;0.52678;0.54865)
Alt 2	(0.69529;0.30471;0.27802)	(0.4132;0.5868;0.55415)	(0.5977;0.41123;0.38742)	(0.5394;0.4606;0.42464)	(0.63504;0.36496;0.35137)

Alt 3	(0.58548;0.42687;0.41605)	(0.38616;0.63501;0.62838)	(0.15575;0.88261;0.89665)	(0.15848;0.87693;0.8864)	(0.21978;0.83449;0.86041)
Alt 4	(0.57051;0.45165;0.44654)	(0.22582;0.79185;0.79067)	(0.50234;0.6245;0.50606)	(0.33923;0.85053;0.81808)	(0.30789;0.73936;0.76195)
Alt 5	(0.62249;0.38932;0.37078)	(0.60818;0.39182;0.34515)	(0.56513;0.4433;0.40987)	(0.64125;0.35875;0.306)	(0.75285;0.24715;0.23059)

Table 11: Positive and negative ideal values by criterion

Criteria	ideal value +	ideal value -
Criterion 1	(0.69529;0.30471;0.27802)	(0.57051;0.45165;0.44654)
Criterion 2	(0.64922;0.35078;0.3157)	(0.22582;0.79185;0.79067)
Criterion 3	(0.5977;0.41123;0.38742)	(0.15575;0.88261;0.89665)
Criterion 4	(0.64125;0.35875;0.306)	(0.15848;0.87693;0.8864)
Criterion 5	(0.75285;0.24715;0.23059)	(0.21978;0.83449;0.86041)

Table 12. Distances to the negative and positive solutions

Alternatives	d+	d-	CP
Alt 1	0.597486378	0.6269338	0.512025
Alt 2	0.419939766	0.6858352	0.62023
Alt 3	1.040101825	0.2572406	0.198283
Alt 4	0.908835921	0.3722897	0.290596
Alt 5	0.261604358	0.831151	0.760601

The resulting order of the alternatives, based on the criteria proposed to be evaluated, is as follows:

1. Propose a comprehensive educational strategy to be carried out in the communities for the prevention of domestic accidents in infants
2. Give seminars in the communities by social workers in women's care centers
3. Carry out campaigns in the mass media on the risk of accidents in minors and ways to prevent them in homes and communities
4. Prepare attending physicians so that they can give talks to pregnant women and mothers of infants on accident prevention
5. Carry out debates in the communities.

4. Analysis of the results

According to the data provided by the mothers, as shown in the table above, 55% of the cases were male, being higher than the female gender, represented by 45% of the cases. The ages between 1.1 and 2 years are the most frequent, in the incidence of domestic accidents, a fact that is explained in most cases, by beginning the transitional stage, and there is greater danger in different ways. Followed by the group from 3.1 to 4 years.

In 54% of the cases of mothers who arrived at emergency services with their children, there is no perception of risk or preparation in terms of accident prevention. Many of these mothers considered that since their children were small, these types of accidents would not happen, others mentioned that it was a matter of a moment, just a small oversight, that they did not expect it.

According to the criteria issued in the expert consultation, they considered that an educational strategy that integrates different professionals will have a greater possibility of being applied and effective. Through this strategy, it will be possible to provide information to people of different levels of preparation, who do not have access to mass media, and it will also be possible to provide information on the first aid at home, involving professionals from different specialties. In addition to the fact that through this solution, students

can be given participation, so that they are part of the team for the promotion and prevention of domestic accidents in minors in the communities.

5. Conclusion

Accidents in the child population are an important cause of morbidity and mortality, becoming today a global public health problem. Mainly the most affected population are preschool children, due to the vulnerability and dependency of the caregiver.

The mothers in the sample do not have an adequate perception of the risk of domestic accidents, and therefore do not exercise caution and care in certain actions that can cause accidents in children under 5 years of age.

It is necessary to prepare mothers and families, in general, to educate them about caring for accidents at home and ways to prevent them, developing community actions that favor reducing the incidence of these cases.

From the consultation carried out with experts, it turned out that the alternative with the greatest possibility of solving the issue is: Propose a comprehensive educational strategy, to be carried out in the communities for the prevention of domestic accidents in children under 5 years of age.

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