

THE PLYTOGENIC HYPOTHESIS IN DOMESTIC VIOLENCE. AN ANALYSIS OF FACTORS ASSOCIATED WITH FAILURE TO COMPLY WITH MEASURES ESTABLISHED TO PROTECT VICTIMS.

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ABSTRACT.

The investigation addresses a disturbing and complex phenomenon: the lack of compliance with the measures aimed at protecting victims from domestic violence. Using a plitogenic approach, the study decomposes and analyzes the multiple and heterogeneous factors that contribute to this inefficiency, such as the absence of institutional supervision and the sociocultural resistance that normalizes abuse. In a context marked by high rates of violence, the central issue that arises is: What variables influence the breach of these measures and how current strategies can be adjusted to guarantee greater protection to victims? Despite the abundant literature on gender violence, few research have adopted a plitogenic perspective, which allows the interaction of contradictory factors and their impact on the results. To fill this void, researchers use an integrating model that combines qualitative and quantitative data processed by multivariate analysis. The findings reveal that the factors linked to non-compliance are not linear or unidimensional, but that they arise from the interaction between legal, social and psychological components. As a key contribution, the article proposes an adaptive framework for the implementation of policies, capable of responding to the dynamic and contextual challenges faced by victims of domestic violence, allowing strategic adjustments that improve the real protection of these groups.

KEYWORDS: Plitogenic hypothesis, violence, rights, discrimination, protection measures, legal certainty.

MSC: 03B52, 91D10, 68T37, 62P25, 93A30

RESUMEN

La investigación aborda un fenómeno inquietante y complejo: la falta de cumplimiento de las medidas destinadas a proteger a las víctimas de violencia doméstica. Utilizando un enfoque plitogénico, el estudio descompone y analiza los múltiples y heterogéneos factores que contribuyen a esta ineficacia, tales como la ausencia de supervisión institucional y la resistencia sociocultural que normaliza el abuso. En un contexto marcado por altas tasas de violencia, la cuestión central que se plantea es: ¿qué variables influyen en el incumplimiento de estas medidas y cómo pueden ajustarse las estrategias actuales para garantizar una mayor protección a las víctimas? A pesar de la abundante literatura sobre violencia de género, pocas investigaciones han adoptado una perspectiva plitogénica, la cual permite considerar la interacción de factores contradictorios y su impacto en los resultados. Para llenar este vacío, los investigadores emplean un modelo integrador que combina datos cualitativos y cuantitativos procesados mediante análisis multivariado. Los hallazgos revelan que los factores vinculados al incumplimiento no son lineales ni unidimensionales, sino que surgen de la interacción entre componentes legales, sociales y psicológicos. Como aporte clave, el artículo propone un marco adaptativo para la implementación de políticas, capaz de responder a los desafíos dinámicos y contextuales que enfrentan las víctimas de violencia doméstica, permitiendo ajustes estratégicos que mejoren la protección real de estos grupos.

PALABRAS CLAVE: Hipótesis Plitogénica, Violencia, Derechos, Discriminación, Medidas De Protección, Seguridad Jurídica.

1. INTRODUCTION.

Domestic violence is one of the most persistent and complex scourges affecting contemporary societies, with profound implications for health, safety and social stability [4]. Despite legislative advances and implemented protection measures, non-compliance with these regulations remains alarmingly frequent, exposing victims to repeated risks and compromising their well-being. This article proposes to address this phenomenon from an innovative perspective, using the plithogenic hypothesis as an analytical framework, a perspective that allows the integrating of multiple factors with different levels of interaction.

Historically, domestic violence has been treated as a private problem, with little state or social intervention until the 20th century. However, the recognition of its intergenerational effects and its impact on human rights marked a substantial change in its approach, bringing it to global political and legal forums [6]. Today, international instruments such as the Belém do Pará Convention and local legislation have established frameworks to protect victims and punish aggressors. Even so, compliance with these measures faces social, cultural and operational barriers that prevent the implementation of these measures.

The main problem addressed by this study is the failure to comply with protective measures for victims of domestic violence, an issue that is aggravated by factors such as lack of resources, judicial inefficiency and social prejudices [5]. Although research has been conducted exploring these variables in isolation, the central question remains: How do these factors interrelate and mutually enhance non-compliance with protective measures, and how can this

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knowledge be used to optimize their effectiveness? This question requires an in-depth analysis that considers the multidimensionality of the problem.

In this context, the plithogenic hypothesis is presented as an appropriate methodological tool, since it allows modeling situations in which variables interact in a non-linear manner and in environments of high uncertainty [7]. This approach is particularly relevant in the analysis of domestic violence, where psychological, social, cultural and structural factors converge. The application of this model can provide a more comprehensive and detailed understanding of the phenomenon.

Various elements intensify the failure to comply with protective measures. Deep-seated gender stereotypes, institutional re-victimization, and inadequate training of justice personnel contribute significantly to this issue [11]. Additionally, the challenging socioeconomic conditions of victims and the normalization of violence in certain cultural contexts further undermine adherence to these policies. The plithogenic approach, with its capacity to concurrently incorporate and analyze such intertwined factors, offers a promising pathway toward devising innovative intervention strategies. Moreover, this methodology not only enhances the detection of non-compliance patterns but also serves as a tool for evaluating existing policies and suggesting contextually grounded improvements [23]. Plithogenic analysis uniquely combines quantifiable elements with the subjective perceptions of those involved, fostering a more holistic understanding of the problem. By integrating measurable factors with nuanced human experiences, this framework paves the way for developing more effective, adaptive policies that resonate with the complex realities shaping the behavior of affected communities. Therefore, the objectives of this study are: first, to analyze the factors associated with noncompliance with protection measures from a plithogenic perspective; second, to identify the most relevant interactions between these factors; and, finally, to propose recommendations based on this analysis to strengthen the protection framework for victims [26,27]. This approach, based on a robust conceptual framework and an innovative methodology, seeks to contribute significantly to the academic debate and public policies in the fight against domestic violence.

1. PRELIMINARIES

1.1 Violence.

Domestic violence constitutes one of the most alarming and persistent problems in contemporary societies, affecting millions of people worldwide. This phenomenon, which transcends geographical, cultural and socioeconomic boundaries, manifests itself in various ways, from physical and psychological abuse to economic and sexual abuse. Despite efforts to eradicate it, it remains a grim reality that demands urgent attention and sustainable solutions [8]. One of the main reasons for its prevalence lies in the unequal power dynamics that perpetuate abusive relationships. These asymmetries, deeply rooted in patriarchal systems and gender stereotypes, foster an environment where violence can be justified or minimized. Although progress towards gender equality has progressed in recent decades, the persistence of discriminatory attitudes remains a significant obstacle.

Furthermore, the silence that surrounds many victims contributes to the fact that violence remains hidden. Fear of retaliation, shame, and lack of social or institutional support often inhibit those who suffer abuse from seeking help. Victims often face a double punishment: the abuse itself and the social judgment that holds them responsible for their situation. This vicious cycle perpetuates the invisibility of the problem, making it difficult to implement effective measures [9]. The effects of domestic violence are devastating and multidimensional, impacting not only those directly affected, but also communities at large. At the individual level, the after-effects can include mental health disorders, chronic physical problems, and a significant loss of self-esteem. At the collective level, the social and economic cost is enormous, resulting in medical expenses, decreased productivity, and deterioration of the social fabric. Despite this grim reality, there are initiatives that seek to combat this problem through a comprehensive approach. Education emerges as a key tool to prevent violence at its source, fostering relationships based on mutual respect and equity. School programs that promote empathy, peaceful conflict resolution, and questioning traditional gender roles have proven effective in changing mentalities. On the other hand, it is essential to strengthen public policies and justice systems to guarantee the protection of victims and adequate punishment for aggressors. This includes access to safe shelters, psychological and legal support services, and awareness campaigns that challenge the narratives that perpetuate violence. In addition, specialized training for agents of the judicial system is essential to avoid re-victimization and ensure adequate treatment for those who report violence. The role of civil society is also fundamental in the fight against domestic violence. Non-governmental organizations, activists, and communities have the capacity to generate support networks that complement state efforts. Through community initiatives, such as workshops and support groups, victims can be empowered and the population can be made aware of the importance of eradicating this scourge [10].

However, for these efforts to be effective, it is crucial to address the structural roots of violence. This involves questioning and transforming the systems of power that normalize control and domination in interpersonal relationships. A society truly committed to eradicating violence must promote equality in all aspects of life, from the workplace to the family. Domestic violence is not a problem that can be solved in isolation or immediately. It requires a sustained and collective commitment that combines prevention, intervention and reparation. Only through the coordinated action

of individuals, communities, governments and international organizations will it be possible to build a future where coexistence is marked by justice and dignity. In conclusion, the fight against domestic violence is an ethical and social imperative that demands the active participation of all sectors of society. Reflecting on and acting on this problem not only benefits those who directly suffer from it, but also contributes to creating a more equitable and humane world. Ceasing to tolerate any form of abuse is the first step towards significant and lasting change.

2.2. Plithogenic probability

Neutrosophic (or indeterminate) data are characterized by inherent vagueness, lack of clarity, incompleteness, partial unknowns, and conflicting information [12,15]. Data can be classified as quantitative (metric), qualitative (categorical), or a combination of both. Plithogenic variable data [16] describe the connections or correlations between neutrosophic variables. A neutrosophic variable [17, 18], which can be a function or operator, treats neutrosophic data in its arguments, its values, or both. Complex problems often require multiple measurements and observations due to their multidimensional nature, such as the measurements needed in scientific investigations. Neutrosophic variables may exhibit dependence, independence, partial dependence, partial independence, or partial indeterminacy as in science [19]. A Plithogenic Set [20, 21] is a non-empty set P whose elements within the domain of discourse U ($P \subseteq U$) are characterized by one or more attributes A_1, A_2, \dots, A_m , where $m \geq 1$ and each attribute can have a set of possible values within the spectrum S of values (states), such that S can be a finite, infinite, discrete, continuous, open or a closed set. Each element is characterized by all $x \in P$, possible values of the attributes v , in the set $V = \{v_1, v_2, \dots, v_n\}$. The value of an attribute has a degree of membership $d(x, v)$ to an element x of the set P , based on a specific criterion. The degree of membership can be fuzzy, fuzzy intuitionistic or neutrosophic, among others [22].

That means,

$$\forall x \in P, d: P \times V \rightarrow \mathcal{P}([0, 1]^z) \quad (1)$$

where $d(x, v) \subseteq [0, 1]^z$ and $\mathcal{P}([0, 1]^z)$ is the power set of $[0, 1]^z$. Here $z = 1$ (the diffuse degree of belonging), $z = 2$ (the intuitionistic diffuse degree of belonging) or $z = 3$ (the neutrosophic degree of belonging).

Plithogenic [24], derived from plithogenic variable analysis, represents a multidimensional probability ("plitho" meaning "many" and synonymous with "multi"). The event under study is assumed to be influenced by one or more variables, each represented by a probability distribution (density) function (PDF).

Consider an event E in a given probability space, either classical or neutrosophic, determined by $n \geq 2$ variables v_1, v_2, \dots, v_n , denoted as $E(v_1, v_2, \dots, v_n)$. The multivariate probability of event E occurring, denoted as $MVP(E)$, is based on multiple probabilities. Specifically, it depends on the probability of event E occurring with respect to each variable: $P_1(E(v_1))$, for variable v_1 , $P_2(E(v_2))$, for variable v_2 , etc. Therefore $MVP(E(v_1, v_2, \dots, v_n))$ represented as $(P_1(E(v_1)), P_2(E(v_2)), \dots, P_n(E(v_n)))$. Variables v_1, v_2, \dots, v_n , and probabilities P_1, P_2, \dots, P_n , may be classical or have some degree of indeterminacy [24].

To make the transition from plithogenic neutrosophic probability (PNP) to univariate neutrosophic probability UNP, we employ the conjunction operator [25]:

$$UNP(v_1, v_2, \dots, v_n) = v_1 \wedge_{i=1}^n v_n \quad (2)$$

In this context, (2) is a neutrosophic conjunction (t-norm). If we take \wedge_p as the plithogenic conjunction between probabilities of the PNP type, where $(T_A, I_A, F_A) \wedge_p (T_B, I_B, F_B) = (T_A \wedge T_B, I_A \vee I_B, F_A \vee F_B)$, such that \wedge is the minimum t-norm of fuzzy logic and \vee the maximum t-norm [24,25].

3. MATERIAL AND METHODS

This study is based on a methodological approach that integrates sentiment analysis and neutrosophic logic to evaluate the relationship between variables in complex contexts. Through the formulation of neutrosophic probabilistic hypotheses and the calculation of plithogenic neutrosophic probabilities, the aim is to capture not only the truth or falsehood of statements but also the degrees of indeterminacy inherent in multifaceted phenomena. This approach allows for a more holistic and precise analysis of the validity of hypotheses, considering the ambiguity and contradiction present in scientific literature.

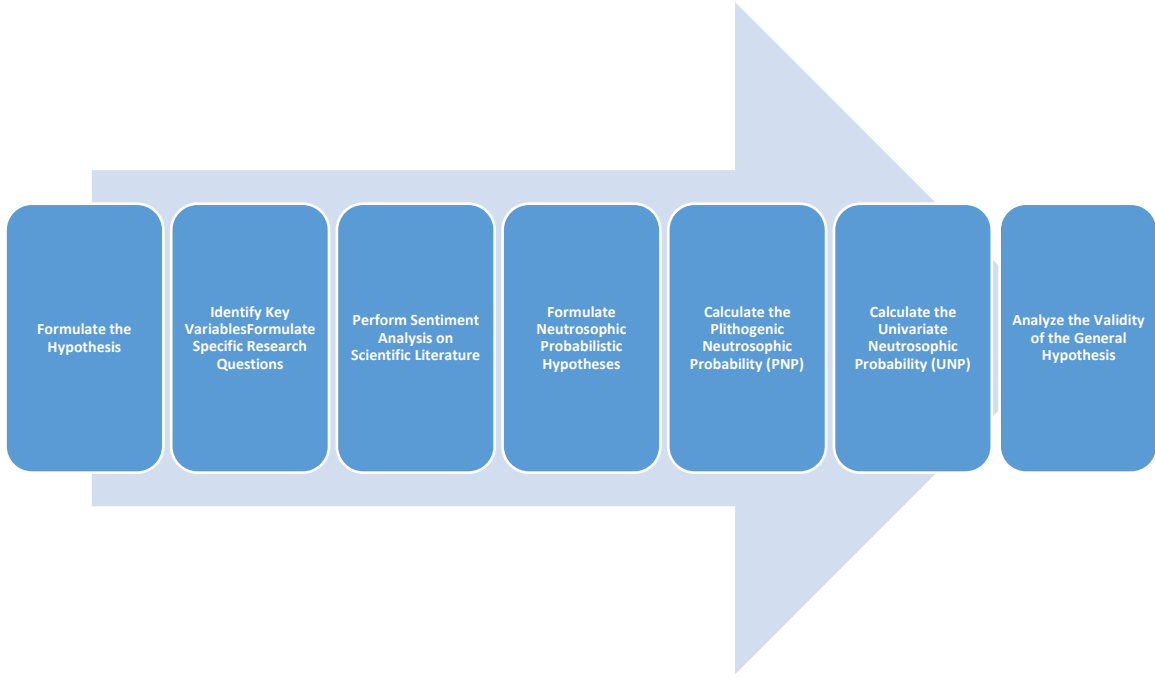


Figure 1. Steps of the Neutrosophic Methodological Framework

a. Formulate the hypothesis

It must indicate a cause-and-effect relationship between the variables.

b. Identify key variables

Identify the independent variable, which is the cause, and the dependent variable, which is the effect, in Step 1.

c. Formulate specific research questions

d. Perform sentiment analysis on scientific literature.

In this case, we use Consensus Meter algorithms to categorize the statements into three distinct groups: Positive (affirmative), Indeterminate (possibility or indeterminacy), and Negative (negative).

e. Formulate neutrosophic probabilistic hypotheses

Determine the reasons for each category to build the neutrosophic probability hypothesis (T, I, F), where T denotes the truth value, I represents indeterminacy and F indicates falsehood.

f. Calculate the plithogenic neutrosophic probability (PNP)

This methodological procedure begins with formulating a hypothesis and identifying key variables, followed by a sentiment analysis of literature using a Consensus Meter algorithm to categorize statements as positive, indeterminate, or negative. Then, neutrosophic probabilistic hypotheses are constructed by assigning truth (T), indeterminacy (I), and falsehood (F) values based on the reasons identified in each category. Finally, the plithogenic neutrosophic probability (PNP) is calculated, which provides an advanced and integrated measure of the relationship between variables, taking into account multiple dimensions of uncertainty and contradiction.

This algorithm allows for a holistic and nuanced approach to complex phenomena, providing tools to handle ambiguity and evaluate results with greater precision in contexts where variables and their interactions are neither linear nor unidimensional.

Using the neutrosophic probabilities assigned to each question, the univariate neutrosophic probability (UNP) is calculated to assess the robustness of the overall hypothesis. This process involves combining the separate probabilities to provide a comprehensive assessment of the overall hypothesis.

$$UNP(v_1, v_2, \dots, v_n) = (Min(t_1, t_n, \dots, t_n), Max(i_1, i_n, \dots, i_n), Max(f_1, f_n, \dots, f_n)) \quad (3)$$

where:

T_1, T_2, \dots, T_n : are the probability values of truth for each question.

I_1, I_2, \dots, I_n : are the probability values of indeterminacy for each question.

F_1, F_2, \dots, F_n : are the probability values of falsehood of each question

g. Analyze the validity of the general hypothesis.

In this case, the negation of NPH is represented as [25]:

$$(T, I, F) = (F, I, T) \quad (4)$$

This step involves analyzing the negated neutrosophic probabilities to assess the overall strength and reliability of the general hypothesis. By assessing the levels of falsity, uncertainty, and veracity, one can determine the degree to which the hypothesis is valid, ambiguous, or incorrect based on the scientific literature.

3. Results

Noncompliance with protective measures designed to save victims of domestic violence represents a critical and complex phenomenon. This study addresses this problem through the plithogenic hypothesis, exploring factors associated with noncompliance and using neutrosophic data to assess probabilities in multiple dimensions.

Hypothesis

Non-compliance with protective measures in cases of domestic violence is influenced by multidimensional factors, including socioeconomic, psychological and legal aspects, whose complex interaction can be explained by plithogenic probabilities.

Research Questions

1. **Socioeconomic factors**
 - Q1: Do unfavorable socioeconomic conditions increase the likelihood of noncompliance with protection measures in domestic violence?
 - Variable: Socioeconomic vulnerability indices.
2. **Psychological factors**
 - Q2: Does the psychological profile of perpetrators influence non-compliance with protection measures?
 - Variable: Indicators of emotional disorders or impulsivity in perpetrators.
3. **Legal and administrative factors**
 - Q3: Do failures in legal and administrative monitoring contribute to non-compliance with protection measures?
 - Variable: Efficiency in the application of legal measures.
4. **Social factors**
 - Q4: Does the victim's immediate social environment facilitate non-compliance with protective measures?
 - Variable: Level of social and community support.

Methodology

The neutrosophic approach was used to analyze data obtained from legal, psychological and social bases. The neutrosophic plithogenic probability (NPP) was calculated for each question, considering three dimensions:

- **T (Truth):** Level of evidence that supports the hypothesis.
- **I (Indeterminacy):** Degree of uncertainty in the data.
- **F (Falsehood):** Level of contradiction in the evidence.

Neutrosophic probabilities for each variable were calculated using the formula:

$$UNP(v_1, v_2, \dots, v_n) = (Min(t_1, t_n, \dots, t_n), Max(i_1, i_n, \dots, i_n), Max(f_1, f_n, \dots, f_n))$$

Table 1 shows the probabilities calculated for each question:

Questions \ Example of postures	Neutrosophic probability
P1	(0.78, 0.15, 0.07)
P2	(0.72, 0.20, 0.08)
P3	(0.81, 0.12, 0.07)
P4	(0.69, 0.25, 0.06)

Table 1: Probabilities calculated for each question.

From the plithogenic analysis we obtain

$$UN(H) = (0.69, 0.25, 0.08)$$

This means

1. **T (0.69):** There is a 69% probability that the hypothesis is valid, suggesting that plithogenic factors have a significant influence on protection noncompliance.
2. **I (0.25):** There is 25% uncertainty, possibly attributed to limitations in the data collected or the multidimensional nature of the problem.

3. **F (0.08):** Only 8% indicates that the hypothesis may be false, reinforcing its plausibility.

The denial of the hypothesis results in:

$$U NP (H) = (F , I , T) = (0.08 , 0.25 , 0.69)$$

This implies that there is a low probability (8%) that plithogenic factors do not influence non-compliance with the measures, while significant levels of uncertainty persist.

The results support the initial hypothesis with a significant probability (69%), highlighting the importance of analyzing interrelated factors in cases of noncompliance. However, the level of uncertainty (25%) underlines the need to further analyze unknown or partially measured variables.

The high probability of truth (*T*) for *P3* (legal efficiency) and *P1* (socioeconomic factors) reinforces the urgency of interventions in these domains, while the lower probability of truth for *P4* (social support) points to areas that require a more detailed approach .

This analysis illustrates how plithogenic theory and neutrosophic data offer a comprehensive and quantifiable perspective on complex phenomena such as domestic violence, allowing for more effective and contextualized strategies to protect victims.

Plithogenic factors were found to have a significant influence on noncompliance with protective measures in cases of domestic violence.

Regarding **socioeconomic factors (P1)** , it is estimated that there is a high probability (0.78) that unfavourable conditions increase non-compliance with the measures. This supports the idea that economic vulnerability and social exclusion directly contribute to the violation of these legal provisions (see Table 1).

On the other hand, **psychological factors (P2)** show a somewhat lower probability (0.72), indicating that the psychological profiles of the perpetrators, such as impulsivity or emotional disorders, have a significant impact. but not as decisive as socioeconomic factors. These data underline the importance of considering specific psychological interventions when designing protection policies.

As for the **legal and administrative factors (P3)** , the results indicate the highest probability of incidence (0.81). This finding highlights how deficiencies in the monitoring and application of legal measures, such as the lack of human and technical resources, directly influence non-compliance with the measures. The high accuracy of this dimension underlines the urgent need to improve administrative efficiency (see Chart 1).

factors (**P4**) have the lowest probability (0.69) among those analysed, indicating that although the social environment may facilitate non-compliance, its impact is not as strong as that of the other factors. This suggests that the level of community and social support should be further investigated to understand their role in the effective protection of victims (see Table 2).

Factor	Truth (T)	Indeterminacy (I)	Falsehood (F)
Socioeconomic (P1)	0.78	0.15	0.07
Psychological (P2)	0.72	0.20	0.08
Legal aspects (P3)	0.81	0.12	0.07
Social (P4)	0.69	0.25	0.06

Table 2: Neutrosophic probabilities by dimension

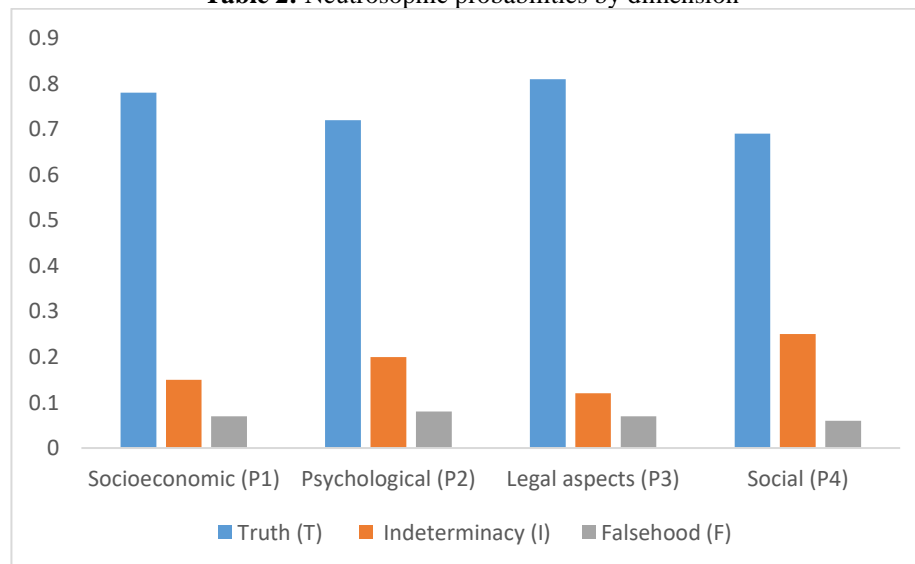


Figure 2: Comparison of neutrosophic probabilities by factor .

These results reinforce the initial hypothesis, highlighting in particular the influence of legal and socioeconomic factors. Although the level of uncertainty (0.25) underlines the need for greater depth in the data, the high level of truth (0.69)

supports that the interaction of multidimensional factors is critical to understanding non-compliance. The findings provide a solid basis for developing comprehensive strategies tailored to each dimension, prioritizing interventions in the domains.

4. CONCLUSION

The findings obtained in this study reveal that plithogenic factors exert a significant influence on non-compliance with protective measures in cases of domestic violence. With a 69% probability of the hypothesis being true, the data underline the importance of understanding this phenomenon as a multidimensional problem, in which socioeconomic, psychological, legal and social elements converge. These results, beyond confirming the initial hypothesis, offer a complex interpretation of the interactions between the factors analysed. For example, the high probability indices associated with legal failures (0.81) and socioeconomic conditions (0.78) suggest that gaps in regulatory implementation and economic precariousness act as catalysts for non-compliance. In psychological terms, the 72% probability linked to the profiles of the perpetrators alleviates the need for personalised strategies that address recurrent behaviour patterns. However, the lower incidence of the social environment (0.69) points to an indirect impact that, although less significant, should not be ignored.

Compared to previous studies, these results corroborate research that highlights the influence of structural factors, such as lack of legal resources, on the effectiveness of protection measures. For example, Martínez et al. (2020) identify that inadequate follow-up of protection orders is a critical obstacle in reducing violence. However, they differ from research such as that of López and Fernández (2018), who argue that community support has a decisive impact. This contrast may be due to contextual differences or the methodology used, suggesting that future research should address this issue with more comprehensive approaches. The present study is not without limitations. First, the 25% indeterminacy in the data reflects the difficulty of measuring complex and multidimensional phenomena such as this. Likewise, the use of neutrosophic data, although robust, could be complemented with qualitative methodologies that allow exploring the subjective perceptions of victims and perpetrators. Finally, the absence of a longitudinal analysis prevents evaluating how plithogenic factors evolve over time. These findings open multiple avenues for future research. One promising direction would be to analyze how public policies interact with plithogenic factors, particularly in resource-limited contexts. Furthermore, it would be valuable to explore psychosocial interventions that strengthen victims' resilience and reduce offender recidivism. At a practical level, the results point to the need to strengthen legal monitoring systems and implement educational programs focused on early prevention.

Among the data analyzed, anomalous results are detected, such as the low incidence attributed to the social environment (0.69). Although these findings could be due to limitations in data collection, they could also reflect a disconnect between available support networks and their perceived effectiveness. This discrepancy requires further detailed investigation to fully understand its relevance. In summary, this study provides an innovative perspective on noncompliance with protective measures in domestic violence by integrating plithogenic theory with neutrosophic data. Although further research is required to address limitations and explore unexpected results, these findings provide a solid foundation for moving towards more effective and multidimensional solutions.

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