


# Preliminary Analysis of an Explanatory Model of Suicidal Ideation in Healthcare Workers: Influence of Anxiety and Depression

## *Análisis preliminar de un modelo explicativo de la ideación suicida en trabajadores de la salud: Influencia de la ansiedad y la depresión*

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### Abstract

Recent research highlights the alarming increase in suicidal behavior worldwide. In the Peruvian context, the increase in suicide cases and the lack of evidence-based detection tools constitute a significant challenge. Early identification of suicidal ideation is crucial to prevent suicide, and it is essential to have tools that allow robust interpretations and inferences to be made from the data obtained. The purpose of this study was to evaluate an explanatory model for suicidal ideation in relation to depression and anxiety. The sample consisted of 86 health professionals working during the year 2023, selected using a snowball sampling method and inclusion criteria. Suicidal ideation was found to be influenced by anxiety and depression in health personnel. In addition, a significant influence of IFIS scores on depression was observed ( $\beta=0.63$ ;  $p=0.041$ ), whereas no significant influence on anxiety was found in this study ( $\beta=0.17$ ;  $p=0.041$ ), with a notable effect size. In conclusion, the model based on anxiety and depression in relation to suicidal ideation is determined to be optimal.

**Keywords:** Suicidal ideation, Health professionals, Mental health, Suicide.

### Resumen

Investigaciones recientes resaltan el aumento alarmante de la conducta suicida a nivel mundial. En el contexto peruano, el incremento en los casos de suicidio y la falta de herramientas de detección basadas en evidencia constituyen un desafío significativo. La identificación temprana de la ideación suicida resulta crucial para prevenir el suicidio, y es fundamental contar con herramientas que permitan realizar interpretaciones sólidas e inferencias a partir de los datos obtenidos. El propósito de este estudio fue evaluar un modelo explicativo para la ideación suicida en relación con la depresión y la ansiedad. La muestra estuvo compuesta por 86 profesionales de la salud que trabajaron durante el año 2023, seleccionados mediante un método de muestreo de bola de nieve y criterios de inclusión. Se encontró que la ideación suicida está influenciada por la ansiedad y la depresión en el personal de salud. Además, se observó una influencia significativa de las puntuaciones del IFIS en la depresión ( $\beta=0.63$ ;  $p=0,041$ ), mientras que en este estudio no se encontró una influencia significativa en la ansiedad ( $\beta=0.17$ ;  $p=0,041$ ), con un tamaño de efecto notable. En conclusión, se determina que el modelo basado en la ansiedad y la depresión en relación con la ideación suicida es óptimo.

**Palabras clave:** Ideación suicida, Profesionales de la salud, Salud mental, Suicidio.

## INTRODUCTION

According to the Pan American Health Organization (PAHO, 2021), suicide is a serious public health problem globally, with approximately 700,000 deaths annually, with higher rates among individuals aged 15-29 years. The term “suicidal ideation” is used to describe thoughts and behaviors related to self-harm, although there is no precise definition or taxonomy that encompasses the entire suicide spectrum. According to Krieger (2011), lived experiences in a specific social and ecological environment have a determining influence on an individual’s health and illness.

Suicidal ideation (SI) encompasses a range of thoughts, wishes, and concerns related to death and suicide being a widespread phenomenon in the general population. It can manifest itself actively, with concrete thoughts of self-elimination, or passively, expressing a desire to die or disappear (Baños-Chaparro et al., 2020). The prevalence of SI in a meta-analysis and systematic review in the general European population showed a higher lifetime prevalence of wishes to die (20 %) and suicidal ideation (9 %) compared to suicide planning (2 %) and suicide attempts (3 %). Likewise, Baños-Chaparro et al. (2021), in another meta-analysis, indicated a lifetime prevalence of 11 % of passive suicidal ideation (SI) in the general population, finding that this form of SI was associated with other psychological problems and suicide attempts.

In the Peruvian context, a study conducted on adolescents during the pandemic revealed that 21% expressed having had suicidal thoughts (Baños-Chaparro et al., 2020). Furthermore, in the last three years, the frequency of completed suicides in Peru has increased, with an average of 2 suicides per day each year (Baños-Chaparro et al., 2021).

Several factors influence the mental health of individuals throughout their lives, among them depression and anxiety (He et al., 2023). In a study on suicidal ideation and its relationship with depressive symptoms, job burnout, and substance use in medical residents, 13 % (n=41) reported having had passive thoughts of death recently, while 14 % (n=43) mentioned having had active suicidal thoughts, with a higher proportion of women (67.4 %) than men (32.6 %) (Lozano-Mundo et al., 2022).

According to Lozano-Mundo et al. (2022), women are those who most frequently experience suicidal ideation, while healthcare personnel, according to Tugnoli (2022), are one of the groups most affected by this phenomenon. The World Health Organization (WHO) reports that the prevalence of suicidal ideation among healthcare professionals is 9.8%, which raises the need to investigate the factors associated with this problem (PAHO, 2021).

The Lozano-Mundo (2022) study notes that suicide is the second most common cause of death among resident physicians, showing a higher incidence of suicidal ideation in this demographic group compared to the general population. Suicidal ideation has been repeatedly linked to three characteristics in residents: alcohol use disorder, burnout syndrome, and sadness.

Information on cases in Latin America is scarce. Jiménez-López et al. (2014) conducted a longitudinal study with 108 residents of various medical specialties in a Mexican hospital, using the Beck depression inventory and the Plutchik suicide risk scale. They found that the risk of suicide increased from 1.9% to 7.4% six months after the start of residency. In addition, Denis-Rodriguez et al. (2017) examined three studies from Paraguay, Ecuador, Peru, Colombia, and Mexico published between 2003 and 2017 in a meta-analysis.

The current research is of importance because of its impact on society. Based on a model relating suicidal ideation to depression and anxiety in Tacna health personnel, we can assess the influence of these factors on suicidal ideation.

## METHOD

### Research Design

The research design adopted is multivariate, given that three variables will be used, of which two are exogenous, and one is endogenous. It is a cross-sectional study since data collection was carried out at a single point in time and perspective, following a forward-looking approach (Supo, 2015), with the participation of 86 health professionals practicing in the locality of Tacna.

## Participants

The sample consisted of 86 health professionals who were active during the year 2023 in the Tacna region. Of these, 27 were men, and 59 were women, representing various professional disciplines. The mean age was 42.5 years, with a standard deviation of 13.8, and ranged from 20 to 67 years. Participants' professions spanned a variety of health fields, including medicine, dentistry, nursing, obstetrics, psychology, nutrition, nursing technician, medical technology, and pharmacy.

## Instruments

**The Inventory of Frequency of Suicidal Ideation (IFIS)** was validated in the Peruvian context by Baños-Chaparro (2020). This instrument was designed with the purpose of measuring the frequency of suicidal ideation over one year, as documented by Castillejos et al. (2019). The IFIS consists of five items, each rated on a scale ranging from 1 (never) to 5 (almost every day), with a midpoint of 3 (sometimes). The total score ranges from 5 to 25 points, with higher scores being indicative of greater severity of the problem, as mentioned by Chang et al. (2017). To assess the factorial validity of the instrument, a Confirmatory Factor Analysis (CFA) was conducted, yielding acceptable fit indices, with a CFI (Comparative et al.) of 0.950, a RMSEA (Root et al. of Approximation) of 0.184 and a SRMR (Standardized Root Mean Square Residual) of 0.0409.

**The Generalized Anxiety Disorder-2 (GAD-2)** was validated in the Peruvian context by Baños-Chaparro (2022). This instrument is used to assess the intensity of anxiety symptoms experienced during the last 15 days. It consists of two items with Likert-type responses, where the total score varies from 0 to 6 points, with higher scores being indicative of greater symptom intensity. As documented by Jiménez-López (2014), the scale is scored using a 4-point Likert-type scale, ranging from 0 (never) to 3 (almost every day). To analyze the factorial validity of the instrument, an Exploratory Factor Analysis (EFA) was performed, obtaining fit indices including a TLI (Tucker-Lewis Index) of 1.03, an X<sup>2</sup> of 0.00, and a GL (Degrees of Freedom) of -1. In addition, Bartlett's values of less than 0.01 and a KMO (Kaiser-Meyer-Olkin) of 0.500 were found.

**The Patient Health Questionnaire-2 (PHQ-2)** was validated in Peru by Baños-Chaparro et al. (2021). This instrument is used to assess depressive symptomatology experienced during the last two weeks. It consists of two indicators with a total of 6 items, and its score is positively correlated with the intensity of depressive symptoms. An Exploratory Factor Analysis (EFA) was conducted to examine the factorial validity of the PHQ-2. The fit indices obtained include a TLI (Tucker-Lewis Index) of 1.03, an X<sup>2</sup> of 0.00, and a gl (degrees of freedom) of 1. In addition, Bartlett's values of less than 0.01 and a KMO (Kaiser-Meyer-Olkin) of 0.500 were found.

## Procedure

Data were collected through a Google form after obtaining informed consent from the participants over 30 days. Subsequently, we proceeded to process the data in a Microsoft Excel 2019 spreadsheet, where analyses of variance were carried out to thoroughly clean the data. In addition, the open-access statistical software JAMOVI 2.3.26.0, with the SEM package, was used for further processing of the information.

## Data analysis

The statistical platform Jamovi version 2.3.28 Solid was used. Correlation analyses and regression models were carried out to explore the relationships and predictive capacity between these variables. To evaluate the goodness of fit of the models, we proceeded to analyze the explanatory model of suicidal ideation, considered as the endogenous variable, in relation to anxiety and depression, which act as exogenous variables, in Tacna health personnel, tests such as x<sup>2</sup>/gl, approximate adjustment coefficients (CFI, TLI, RMSEA, RSMR) and beta coefficients were used. The use of Jamovi allowed additional statistical tests to be performed and the results to be effectively presented in graphs and tables.

## RESULTS

**Table 1**

*Analysis of the explanatory model of suicidal ideation based on anxiety and depression in health personnel in Tacna*

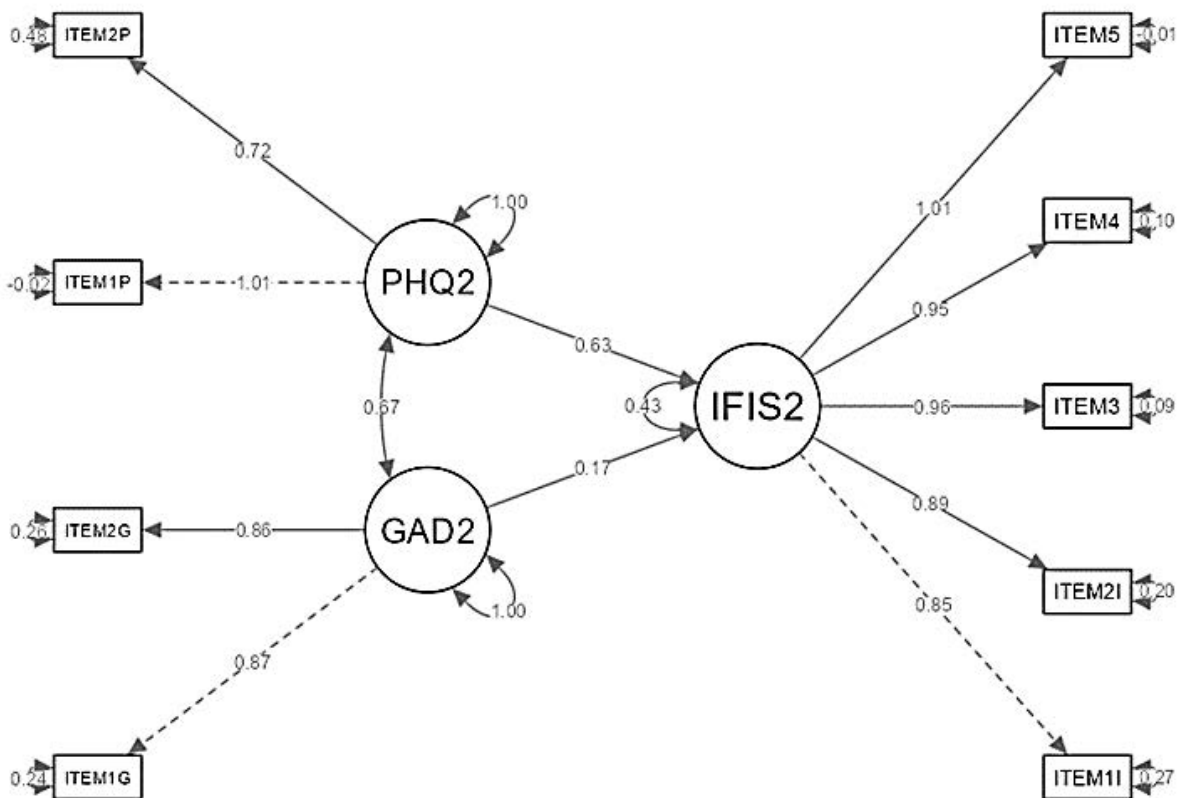
MODEL	x2/gl	CFI	TLI	PFNI	SRMR	RMSEA	ESTIMADOR
Proposed model	0.041	1.00	1.00	0.66	0.05	0.00	WLSMV

According to the results presented in Table 1, it is observed that the value of X2/gl is within acceptable ranges. In addition, it is found that both the CFI and the TLI meet the acceptance standards, as indicated by Escobedo, Hernández, Esteban, and Martínez (2016) for the CFI and by Ruiz, Pardo, and San Martín (2010) for the TLI.

Likewise, the SRMR is also within acceptable limits, according to the criteria established by Escobedo, Hernandez, Esteban, and Martinez (2016). As for the RMSEA, its value is also considered acceptable. Therefore, it can be concluded that the explanatory model presented in Figure 1 is valid.

**Figure 1**

*Explanatory model of suicidal ideation based on anxiety and depression in health personnel in Tacna*



**Table 2***Frequency of depression in Tacna health personnel*

PHQ	SEX	Frequencies	% del Total
Without major depressive disorder	Female	56	65.1%
	Male	24	27.9%
With major depressive disorder	Female	4	4.7%
	Male	2	2.3%

According to the data presented in Table 2, it is observed that, of the 86 participants, 80 do not present major depressive disorder, while 6 show symptoms of this disorder. Within this group of 6 participants with symptoms, 4 are women and the remaining 2 are men.

**Table 3***Frequency of anxiety in Tacna health personnel*

GAD	SEX	Frequencies	% del Total
WITHOUT generalized anxiety disorder	Female	54	62.8%
	Male	25	29.1%
WITH generalized anxiety disorder	Female	6	7.0%
	Male	1	1.2%

According to the data presented in Table 3, it is observed that, of the 86 participants, 79 do not present generalized anxiety disorder, while 7 show symptoms of this disorder. Within this group of 7 participants with symptoms, 6 are women, and the remaining one is a man.

**Table 4***Frequencies of suicidal ideation in Tacna health personnel*

IFIS	SEX	Frequencies	% del Total
Without Suicidal Ideation	Female	56	65.1%
	Male	25	29.1%
With Suicidal Ideation	Female	4	4.7%
	Male	1	1.2%

According to Table 4 of the 86 participants, 81 do not suffer from Suicidal Ideation and 5 have the symptomatology, of which 4 are female and the rest are male.

## DISCUSSION

The importance of assessing suicidal ideation and other mental disorders in primary care lies in their fundamental role in reducing their prevalence and addressing their early development. In the Peruvian context, completed suicides are increasing, and clinical practice lacks psychometrically validated assessment tools for the local population. Within the framework of this research, it was found that the relationship between anxiety and suicidal ideation is minimal, registering a correlation coefficient of 0.17. However, this perspective contradicts previous findings, such as those of Husky et al. (2016) in French residents, who found an association between suicidal ideation and disorders such as obsessive-compulsive and post-traumatic stress disorder, the latter included in the group of anxiety disorders. On the other hand, Lozano-Mundo et al. (2022) found in their study in Mexico a directly proportional relationship between anxiety symptoms and insomnia, with a fivefold increased risk of developing suicidal ideation. Likewise, according to the results of Vargas-Terrez (2015), of resident physicians, 8% presented positive suicidal ideation, compared to 5.8% recorded in this research.

From a structural perspective, He et al. (2023) explored a multivariate model that examines the relationship between moral injury, depression, and suicidal ideation. They found that depression exerts both a significant direct ( $\beta = 0.737$ ,  $p < 0.001$ ) and indirect (mediating effect:  $3.907 + 1.726 + 1.453$ ) effect on suicidal ideation. Furthermore, 49.9% of the total variance is attributed to depression and 22.1% to anxiety. Although this model supports the association between depression and suicidal ideation, no significance was found with respect to anxiety. Therefore, it is crucial to extend the research to strengthen preventive measures and address study limitations, such as sample size and diversity, as these aspects could bias the model. A greater diversity in the sample is therefore recommended for a more comprehensive investigation.

One of the main limitations identified in this study is access to the study sample, which is conditioned by the nature of health professionals. In addition, data collection was carried out virtually in environments external to the institutions where

the participants performed their work. On the other hand, the sample size is insufficient for Structural Equation Modeling (SEM) since it is recommended that it be of a larger magnitude. Despite this limitation, we chose to use the ULS (Unweighted Least Squares) estimator, which is suitable for small samples and in the absence of multivariate normality. In addition, abbreviated versions of the measurement instruments were used, which could influence the depth and precision of the measurements obtained.

## CONCLUSIONS

As established in the present study, a significant association was identified between depression and suicidal ideation, as indicated by the  $\beta$  coefficient of 0.63. In contrast, in the case of anxiety, no significant association was found, as the  $\beta$  coefficient was 0.017. Furthermore, it is concluded that, in order to develop a model that considers suicidal ideation as an endogenous variable, it is crucial to take into account various factors that influence this type of thinking and to determine the nature of their relationship with suicidal ideation. This is fundamental to propose preventive interventions in the field of mental health and to understand its implications for the personal and professional development of individuals.

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## AUTHOR CONTRIBUTIONS

EZPM: collected and processed the data.

CPMM: analyzed statistical results and interpretation.

HLDCVR: analyzed statistical results and interpretation.



## ETHICS / LEGALS

The authors declare that they have respected the ethical norms that regulate professional practice (Code of Ethics of the College of Physicians, Dentists, Medical Technologists and Psychologists of Peru). The confidentiality of personal and institutional information was protected, ensuring the anonymity of the persons and institutions involved in the sample.

## COMPETING INTERESTS

The authors declare under oath that they have no conflict of interest in the preparation of this article.

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