

# Suicide risk factors associated with gender in the department of Cauca, Colombia, January 2018 - December 2021

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## Abstract

**Objectives:** To characterize the population under study and determine the risk factors associated with the gender of suicide cases in the department of Cauca between 2018 and 2021.

Materials and methods: Quantitative retrospective descriptive research, elaborated from primary source data provided by the National Institute of Legal Medicine and Forensic Sciences - Valle Department.

**Results:** Between 2018 and 2021 in the department of Cauca 302 people committed suicide, mainly during the year 2021, the cases occurred most frequently in the male sex (72.8%), adults (78%), in unstable marital unions (61%), with hanging as the main mechanism (61%) and especially in contexts of conflicts with the partner or ex-partner. The most affected municipalities were Popayán, Santander de Quilichao, Patía, Timbío and El Tam-

bo, with higher frequency during Mondays and the month of December.

**Conclusions:** Suicide continues to be present in the department of Cauca affecting especially adult men, who employ asphyxia and intoxication with chemical agents as a means, especially in contexts of couple conflicts, and for whom it is worth considering these as early warning elements on which to institute intervention strategies.

**Key words:** Suicide, sex, prevalence, risk factors, Colombia.

### Resumen

**Objetivos:** Caracterizar a la población objeto de estudio y determinar los factores de riesgo asociados al sexo de los casos de suicidio sucedidos en el departamento del Cauca entre los años 2018 y 2021.

**Materiales y métodos:** Investigación cuantitativa descriptiva retrospectiva, elaborada a partir de datos de fuente primaria entregados por el Instituto Nacional de Medicina Legal y Ciencias Forenses - Regional Valle.

**Resultados:** Entre el 2018 y 2021 en el departamento del Cauca se suicidaron 302 personas, sobre todo durante el año 2021, los casos se presentaron con mayor frecuencia en el sexo masculino (72.8%), adultos (78%), en uniones maritales inestables (61%), con el ahorcamiento como principal mecanismo (61%) y sobre todo en contextos de conflictos con la pareja o expareja. Los municipios más afectados fueron Popayán, Santander de Quilichao, Patía, Timbío y el Tambo, con más frecuencia durante el día lunes y el mes de diciembre.

**Conclusiones:** El suicidio continúa presente en el departamento del Cauca afectando especialmente a hombres adultos, quienes emplean la asfixia y la intoxicación con agentes químicos como medio, sobre todo en contextos de conflictos de pareja, y para quienes vale la pena considerar estos como elementos de alerta temprana sobre los cuales instaurar estrategias de intervención.

**Palabras clave:** Suicidio, sexo, prevalencia, factores de riesgo, Colombia.

### Introduction

Suicide, the deliberate act of taking one's own life, is a complex phenomenon with multiple causes affecting several dimensions of the individual, in which genetic, biological, environmental, social, sociological and cultural factors interact (1) (2), and for which the World Health Organization (WHO) estimates that there are 703,000 deaths each year, with an underreporting of 20% (3) (4), and is one of the leading causes of death worldwide (1.3%), ahead of malaria, HIV/AIDS, breast cancer, war and homicide (3) (4). In the

world, men commit suicide up to 2.3 times more often than women, middle and low income countries register 77% of the cases, since they are the most populated regions of the planet, 88% correspond to adolescent suicides as 90% of this population resides there (3), and, in general, it can be said that suicide rates are higher in those regions with higher poverty rates (5).

It is the fourth leading cause of death worldwide among 15-29 year olds, below traffic accidents, tuberculosis and interpersonal violence (3). It is ALSO one of the 10 leading causes of loss of age-standardized life years in Europe, Central Asia, Australasia, South America, Pacific Asia, and the United States (5). Africa reports the highest suicide rates and the eastern Mediterranean the lowest with 11.2 and 6.4 suicides per 100,000 inhabitants comparatively; likewise, Africa contributes the highest rate of male suicides followed by the Americas with 18 and 14.2 suicides per 100,000 inhabitants respectively (6).

Many of the people who die by suicide do it without prior diagnosis of mental health conditions (6), and about half of the cases may have a low probability of diagnosis when measured with some screening instruments (7), so it is essential that governments, productive sectors and the health system promote health and well-being of its citizens, employees and patients (8), through financial relief for people in need, strengthening access to health services, ensuring high quality prenatal care (9), creating protective environments within the community that help reduce the stigma of seeking help, educating and providing tools for interpersonal, academic and work-related problem solving, limiting tabloid publication of cases and instead publicizing sources of help, limiting access to suicide media, and identifying and supporting people at risk (9) (10).

In Colombia, between 1979 and 2014, 56,448 suicides were registered, with a maximum peak in 1999, with a gradual decrease until 2014 (11). However, and even though the Colombian state has implemented programs and actions to counteract this phenomenon, it must be recognized that the measures have not been effective as the suicide rate between 2009 and 2018 went from 4.5 to 5.93 per 100,000 inhabitants with an annual increase of 8.3%, a total of 20,832 suicides during this period and an average of 2,083 cases per year. During 2018, 10.4% of all external cause deaths in Colombia were by suicide, where 43.6% of suicides occurred in young people between the ages of 20 and 39 and, alarmingly, 10.53% of all suicides were children and adolescents between the ages of 5 and 17, especially

between the ages of 5 and 9 (12).

In the country, men continue to be the most affected (82.34%) with a male-to-female ratio of 4.6:1 (higher than that estimated for Latin America), especially among those from urban areas between 25 and 44 years of age, those over 65 years of age, and men from rural areas between 45 and 64 years of age. In the female population, suicide is more common among those aged 15-17 years and 20-24 years, and accounts for up to 4.8% of maternal deaths among those aged 20-29 years, single, housewives, students, rural residents, and those with low education (13).

In general, single marital status (53.04%) and high school are the educational level and marital status most frequently found in cases with men with less education than women (9)(10); the urban area is the geography where most suicides occur (73.98%) each year with Bogota, Cali, Medellin, and Barranquilla as the cities with the highest rates. The place of residence, the month of February, Sundays and holidays, Christmas and New Year's celebrations are the time and place where most deaths occur, with asphyxia followed by intentional intoxication as the most common methods used by both genders (14)(15).

According to the Interpersonal Theory of Suicide (IPTS) proposed by Thomas Joiner (2005), suicidal behavior could be explained by the interaction between intraindividual dynamic systems (Perceived Burden and Frustrated Belonging, understood as perceptions about oneself) and interindividual risk factors (Acquired Capacity, understood as painful events that desensitize the subject) (16) (17). The basis of this postulate lies in the fact that continuous exposure to painful or terrible events (one's own or others) generates habituation, causing greater tolerance to pain and a low sense of fear of death (18) (19). However, the causes of suicide and its high prevalence in the male population continue to be the subject of debate, leading to the objective of the present study, which was to determine the risk factors for suicide in the department of Cauca - Colombia, associated with gender, in cases that occurred between January 2018 and December 2021 (20) (21).

### **Materials and methods**

A quantitative descriptive cross-sectional quantitative study was conducted on a total of 302 necropsy records whose cause of death was suicide, performed between January 2018 and December 2021 at the National Institute of Forensic Medicine and Forensic Sciences - Cauca sectional. As

ethical and legal considerations, the project was presented to the institution based on the provisions of the Declaration of Helsinki for work with humans, taking into account that the project is classified as of no risk.

From the primary source of information (necropsies), the year, month, day, age, marital status, academic level, occupation, department, modality, or method used and the reason for the SUICIDE event were described in a univariate manner, determining their relative and absolute frequencies (independent variables). For the purposes of the study, gender was defined as the variable under study (dependent variable), the data were systematized in the Stata statistical package and the results obtained were expressed through tables and graphs. The results were presented in relative and absolute frequencies, and in those crosses with a p value < 0.005, the OR was calculated by logistic regression to determine the degree of association.

### Results

Suicide rate in the department of Cauca.

The highest rate was recorded between 2019 and 2021 with 5.6 suicides per 100,000 population and the lowest in 2018 with 4.5 suicides per 100,000 population. Overall, the pandemic period had a higher rate of 5.1 compared to the pre-pandemic period with 5.0 suicides per 100,000 population (Table 1).

**Table 1.** Suicide rates per 100,000 inhabitants in Cauca 2018-2021

DEPARTMENT	2018 RATE	2019 RATE	2020 RATE	2021 RATE
CAUCA	4.5	5.6	4.7	5.6
RATE PER PERIOD	5.0 PRE-PANDEMIC		5.1 PANDEMIC	

### Sociodemographic characteristics

It was found that 72.8% of the cases were male (N=220), with an age distribution of mostly adults with 66.6% (N=201), regarding marital status 61.0% (N=178) of the suicides were in an unstable marital union and 88.5% (N=253) had primary/secondary education (Table 2)).

**Table 2.** Sociodemographic characteristics of suicides in Cauca 2018-2021

Gender	n	%	Marital status	n	%
Male	220	72.8	Stable marital union	114	39.0
Female	82	28.2	Unstable marital union	178	61.0
<b>Total</b>	<b>302</b>	<b>100.0</b>	<b>Total</b>	<b>292</b>	<b>100.0</b>
Age groups			Academic level		
Childhood/Infancy/ adolescence	78	25.8	Primary/secondary school	253	88.5
Adulthood	201	66.6	Technical/ Technologist/ Professional	33	11.5
Old age	23	7.6	<b>Total</b>	<b>286</b>	<b>100.0</b>
<b>Total</b>	<b>302</b>	<b>100.0</b>			

Source: Data from the National Institute of Legal Medicine and Forensic Sciences (INMLCF) - GIFES calculations

### Suicide characteristics according to time and location.

Time and location variables indicate that, in the pandemic period (2020-2021) 51.0% of cases (N=154) and 49.0% (N=148) were reported in the pre-pandemic period (2018 - 2019). The years with the highest suicide occurrence were 2019 and 2021 with 27.2% (N=82) and 27.8% (N=84) respectively. The month and day of the week with the highest frequency of suicides were December with 11.9% (N=36) and Monday with 17.2% (N=52).

Regarding the occurrence of suicide, 33.8% (N=102) occurred in the capital Popayán and 66.2% (N=200) in the municipalities. Finally, the municipalities with the highest number of suicide cases were Santander de Quilichao with 11.9% (N=36), followed by Patía with 3.6% (N=11) and Timbío and El Tambo with 3.3% (N=10), respectively (Table 3).

**Table 3.** Time and location characteristics of suicides in Cauca 2018-2021

Period of the event	n	%	Month	n	%	Day	n	%
Pre-pandemic (2018-2019)	148	49.0	January	27	8.9	Monday	52	17.2
Pandemic (2020-2021)	154	51.0	February	23	7.6	Tuesday	44	14.6
<b>Total</b>	<b>302</b>	<b>100.0</b>	March	21	7.0	Wednesday	30	9.9
<b>Year</b>			Abril	18	6.0	Thursday	42	13.9
2018	66	21.8	May	27	8.9	Friday	42	13.9
2019	82	27.2	June	25	8.3	Saturday	48	15.9
2020	70	23.2	July	30	9.9	Sunday	44	14.6
2021	84	27.8	August	18	5.9	<b>Total</b>	<b>302</b>	<b>100.0</b>
<b>Total</b>	<b>302</b>	<b>100.0</b>	September	20	6.6			
<b>Municipality/capital</b>			October	28	9.3			
Capital (Popayán)	102	33.8	November	29	9.6			
Other municipalities	200	66.2	Diciembre	36	11.9			

Source: Data from the National Institute of Legal Medicine and Forensic Sciences (INMLCF) - GIFES calculations

**Cause or method and reasons for the event.**

Regarding the cause of suicide, it was found that hanging 61.6% (N=186) and poisoning by chemical agents 25.8% (N=78) were the most common methods used. Likewise, conflict with a partner or ex-partner 23.0% (N=37) and falling out of love 21.1% (N=34) were the most common reasons for suicide (Table 4).

**Table 4.** Cause or method and reasons for the fact suicides in Cauca 2018-2021

Cause or method	n	%	Reason for the event	N	%
Hanging	186	61.6	Conflict with partner or ex-partner	37	23.0
Poisoning by chemical agent	78	25.8	Mental illness	28	17.4
Firearm projectile	24	8.0	Heartbreak	34	21.1
Height fall	2	1.0	Economic- Legal	22	13.7
Intoxication by psychoactive agent	6	2.0	Physical illness	16	9.9
Cutting - Sharp	1	0.3	Death of a relative or friend	6	3.7
Other causes	4	1.3	Other reasons	18	11.2
<b>Total</b>	<b>302</b>	<b>100.0</b>	<b>Total</b>	<b>161</b>	<b>100.0</b>

Source: Data from the National Institute of Legal Medicine and Forensic Sciences (INMLCF) - GIFES calculations

### **Suicide characteristics by gender in Cauca**

When gender was related to age, it was found that males committed suicide more in Adulthood with 51.0% (N=154), followed by males and females in Childhood/Infancy/Adolescence with 15.6% (N=47). Significant differences were found,  $p=0.012$ . Regarding the cause of the event, male individuals recurred to hanging (N=142), followed by intoxication by chemical agent (N=70). Significant differences were found,  $p=0.009$ . Finally, in relation to the reason, conflict with a partner or ex-partner was more prevalent in men with 25.2% (N=39), followed by lack of love in men with 12.3% (N=19). Significant differences were found,  $p=0.012$ . (Table 5).



**Table 5.** Suicide characteristics according to gender in Cauca 2018- 2021

Variable	Female			Male		
	n	%	IC 95%	n	%	IC 95%
Age groups						
Childhood/Infancy/Adolescence	31	10.3	7.1 - 14.3	47	15.6	11.6 - 20.2
Adulthood	47	15.6	11.6 - 20.2	154	51.0	45.2 - 56.8
Old age	4	1.3	0.03 - 3.3	19	6.3	3.8 - 9.6
<b>TOTAL</b>	<b>82</b>	<b>27.2</b>		<b>220</b>	<b>72.8</b>	
<b>P-value</b>	<b>0.012</b>					
<b>Cause or method</b>						
Hanging	37	11.6	0.08 - 0.16	142	44.5	0.39 - 0.50
Chemical agent poisoning	36	11.3	0.08 - 0.15	70	21.9	0.17 - 0.27
Firearm projectile	0	0.0	0.00 - 0.01*	15	4.7	0.02 - 0.08*
Fall from height	2	0.6	0.00 - 0.02	1	0.3	0.00 - 0.02
Psychoactive intoxication	2	0.6	0.00 - 0.02	1	0.3	0.00 - 0.02
Cutting-Short stabbing	1	0.3	0.00 - 0.02	1	0.3	0.00 - 0.02
Blunt-Short blunt	1	0.3	0.00 - 0.02*	0	0.0	0.00 - 0.01*
Other causes	1	0.3	0.00 - 0.02*	2	0.6	0.00 - 0.02
<b>TOTAL</b>	<b>82</b>	<b>27.2</b>		<b>220</b>	<b>72.9</b>	
<b>P-value</b>	<b>0.009</b>					
<b>Reason of event</b>						
Conflict with partner or ex-partner	15	9.7	0.05 - 0.15	39	25.2	0.18 - 0.33
Mental illness	12	7.7	0.04 - 0.13	17	11.0	0.06 - 0.17
Heartbreak	3	1.9	0.00 - 0.05	19	12.3	0.07 - 0.18
Economic - Legal	2	1.3	0.00 - 0.04	13	8.4	0.04 - 0.14
Physical illness	2	1.3	0.00 - 0.04	12	7.7	0.04 - 0.13
Death of a family member or friend	4	2.6	0.00 - 0.06	3	1.9	0.00 - 0.05
Other reasons	4	2.6	0.00 - 0.06	10	6.4	0.03 - 0.12
<b>TOTAL</b>	<b>39</b>	<b>24.2</b>		<b>122</b>	<b>75.8</b>	
<b>P-value</b>	<b>0.012</b>					

Source: Data from the National Institute of Legal Medicine and Forensic Sciences (INMLCF) - GIFES calculations

### Risk factors associated with gender of suicides in Cauca

For the analysis of the risk factors, the multivariate logistic regression model was used, each of the values reported were adjusted according to gender and only those that were statistically relevant are mentioned.

According to the age groups, an OR of 1.73 CI 95% [1.02 - 2.93] was found for adulthood, while in Childhood/Infancy/Adolescence an OR of 0.45 CI 95% [0.26 - 0.77] was determined. In relation to the cause or

method, intoxication by chemical agent presented an OR of 0.45 CI 95% [0.26 - 2.77], the other causes such as the use of firearm projectile, fall from height, intoxication by psychoactive, use of sharp - blunt weapons and use of blunt - short blunt weapons presented an OR of 1. Finally, regarding the reason for the event, only conflict with a partner or ex-partner had an OR of 0.29 CI 95% [0.13 - 0.66] (Table 6).

**Table 6.** Risk factors associated with gender, suicides in Cauca 2018- 2021

Variable	OR	CI 95 %
<b>Age groups</b>		
Childhood/Infancy/ Adolescence	0.45	0.26 - 0.77
Adulthood	1.73	1.02 - 2.93
Old age	1	
<b>Cause or method</b>		
Hanging	1	
Poisoning by chemical agent	0.45	0.26 - 0.77
Firearm projectile	1	
Fall from height	1	
Intoxication by psychoactive agents	1	
Cutting - Sharp	1	
Blunt - Short blunt	1	
Other causes	1	
<b>Reason for the event</b>		
Conflict with partner or ex-partner	0.29	0.13 - 0.66
Mental illness	1	
Heartbreak	1	
Economic- Legal	1	
Physical illness	1	
Death of a family member or friend	1	
Other reasons	1	

Source: Data from the National Institute of Legal Medicine and Forensic Sciences (INMLCF) - GIFES calculations

### **Suicide profile according to gender in the department of Cauca**

The following profile was determined in relation to gender that presented the highest prevalence, which in the case of the department of Cauca was male, thus:

Being male, in the year 2019, month of December, Monday, in the population group of adults, single, with primary/secondary education, using hanging because of couple conflicts and in municipalities outside the capital of the department.

## Discussion

Regarding suicide as a concept, Negredo et al. define it as the deliberate act of taking one's own life, while the WHO recognizes suicide as a complex phenomenon with multiple causes, affecting several dimensions of the individual and involving genetic, biological, environmental, social, sociological, and cultural factors (22) (23). Among these factors, the ones most frequently found to be related to suicide in our study were gender, age, interpersonal relationships, and educational level, with 220 male cases, mostly adults, with unstable marital unions and studies up to primary and secondary school.

Referring to suicide as a public health problem, in 2020 the Secretary of Health of the Department of Cauca established it as the third leading cause of death from external causes in the department with a rate of 5.44 per 100,000 inhabitants during 2018 (14), a figure that correlates well with the rates found in this study of 4.5 suicides in 2018, 5.6 during the year 2021 and 5.1 per 100,000 inhabitants during the entire pandemic period, which continue to generate concern considering suicide as a preventable event.

On the other hand, it is striking the difference in suicide rates between men and women in the department which for men was 8.8 per 100,000 inhabitants during 2018 and for women 4.04 in 2018 per 100. 000 inhabitants (14), a behavior that we also observed in this study where 72.8% of the cases in Cauca between 2018 and 2021 were male (N=220)  $p=0.012$  and of which 51% occurred during adulthood  $n=154$ ; 95% CI 45.2 - 56.8  $p=0.012$ .

Given this behavior, Cabrera et al, found in the prefrontal cortex of 79 suicidal individuals 1729 exclusive genes in women and 1997 exclusive genes in men whose study could better explain this phenomenon and its difference in presentation according to gender (24); Stone et al explain that men are more involved in labor, criminal, economic and legal problems that are more frequently associated with suicidal outcomes compared to domestic problems that are more prevalent in the female population (25).

Access to the media is an important element of the present study, since the second and third causes of death in men were chemical agent intoxication (21.9%  $n=70$ ; 95% CI 0.17 - 0.27  $p=0.009$ ) and firearm projectile (4.7%  $n=15$ ; 95% CI 0.02 - 0.08  $p=0.009$ ), both of which seemed to be related as they are more frequent occupational elements in the male population. However, despite the fact that women suffer more from mental

illness, physical and psychological abuse, inequality, and inequity, they are the ones who seek help, support networks and face these adversities in a more active and resolute manner.

From the above, this study shows that conflict with partner or ex-partner was the most common reason for both genders with 25.2% n=39; 95% CI 0.18 - 0.33 p=0.012 for males compared to 9.7% n=15; 95% CI 0.05 - 0.15 p=0.012 for females; followed by mental illness which was 11.9% n=17; 95% CI 0.06 - 0.17 p=0.012 and 7.7% n=12; 95% CI 0.04 - 0.13 p=0.012 in females.

These findings are related to the theoretical proposal of Thomas Joiner (25), where it was found that the reasons for the event produced a continuous exposure to painful or terrible events that possibly caused greater tolerance to pain and a low sensation of fear in the face of death. Finally, it is important to mention that in Latin America there are not many studies on mental health that disaggregate and analyze for each gender elements such as sociodemographic characteristics and risk factors (18); therefore, our study provides results that may help to better understand why, while women seem to be more susceptible in their mental integrity, it is men who end up being more vulnerable to the most fatal outcomes.

### **Conclusions**

Despite being a preventable phenomenon, suicide continues to be a ubiquitous problem in the department of Cauca in which adult men, through asphyxiation and intoxication with chemical agents, and especially in contexts of conflict with a partner or ex-partner, are the main victims. Although prevention strategies in the department should cover the entire population at risk, both male and female, this study provides specific data on risk factors in terms of age group, possible access to means and sentimental situation that could be considered early warning elements on which to establish intervention strategies.

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