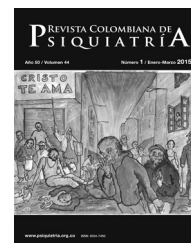




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## Artículo original

# Hidden Suicides of the Indigenous People of the Brazilian Amazon: Gender, Alcohol and Familial Clustering



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## ABSTRACT

**Objective:** To evaluate the coverage, characteristics and the risk of suicide in the indigenous people of Tabatinga in the Brazilian Amazon.

**Methods:** An active surveillance strategy for suicide cases was used: records of the Ministry of Health, the Municipal Health Secretariat, the Special Indigenous Health District of the Upper River Solimões (Distrito Sanitario Especial Indígena Alto Río Solimões), the Military Hospital of Tabatinga, the National Indian Foundation (Fundación Nacional del Indio) and the civil registry offices were examined from 2007 to 2011 for individuals over 9 years of age. Adjusted rates were estimated using the direct method and according to age. A descriptive analysis was performed and the hypothesis tests were considered significant if  $p$ -values were  $<0.05$ .

**Results:** The coverage of indigenous suicide was 82.8%, since 11 (17.2%) were classified as hidden suicides. For men between 15 and 29 years of age, and for women aged from 12 to 20 years, the probability of suicide was around 70.0%. In 17.2% of the sample there was a record of alcohol consumption before death and relationship between victims. The corrected adjusted mortality rate was 111.7/100,000 (95% CI, 84.6–148.6).

**Conclusions:** The risk of suicide in the indigenous people of the Tabatinga is very high. Coping strategies should consider the complex relationship between suicide and alcohol consumption, gender differences and the existence of vulnerable groups, such as young people, especially those with close relatives who have committed suicide.

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## Suicidios ignorados de indígenas de la Amazonia brasileña: sexo, alcohol y vínculo parental

### R E S U M E N

#### Palabras clave:

Suicidio  
Indios sudamericanos  
Trastornos relacionados con alcohol  
Composición familiar  
Sexo y salud

**Objetivo:** Evaluar el alcance, las características y el riesgo de suicidio de los indígenas de Tabatinga, en la Amazonia brasileña.

**Métodos:** Se utilizó una estrategia de vigilancia activa del suicidio y se examinaron los registros de mayores de 9 años, de 2007-2011, del Ministerio de Salud, la Secretaría Municipal de Salud, el Distrito Sanitario Especial Indígena Alto Río Solimões, el Hospital Militar de Tabatinga, la Fundación Nacional del Indio y la notaría del Registro Civil. Las tasas ajustadas se calcularon utilizando el método directo, según la edad. Se realizó un análisis descriptivo y se consideró que las pruebas de hipótesis eran significativas si  $p < 0,05$ .

**Resultados:** El alcance del suicidio indígena fue del 82,8%, ya que 11 (17,2%) se clasificaron como suicidios ocultos. Alrededor del 70,0% de la probabilidad de suicidio de los varones se situó a los 15-29 años y la de las mujeres, a los 12-20 años. En el 17,2% de la muestra, se registró consumo de alcohol antes de la muerte y relación parental entre las víctimas. La tasa de mortalidad ajustada corregida fue 111,7/100.000 (IC95%, 84,6-148,6).

**Conclusiones:** El riesgo de suicidio de los indígenas de Tabatinga es muy alto. Las estrategias de afrontamiento deben considerar la compleja relación entre el suicidio y el consumo de alcohol, las diferencias de sexo y la existencia de grupos vulnerables, como los jóvenes, especialmente aquellos con parientes cercanos que ya cometieron suicidio.

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## Introduction

The Global Burden of Disease study estimated that, in 2013, around 850 000 persons died due to suicide in the world.<sup>1</sup> However, although suicide is recognized as an important public health problem and that it occurs in different social classes, ethnic groups and in different contexts around the world, the official counts of suicide are normally underestimated, with a loss between 10 and 30%.<sup>2-5</sup>

The underreporting of suicides occurs not only in developing regions, such as Asia and Latin America,<sup>6,7</sup> but in developed country as well as, such as USA and England, which both have a recognized tradition in systematic and reliable registers of vital statistics.<sup>3,8</sup> Moreover, in regions where suicide is considered unacceptable and/or the attempt is considered a crime, there is evidence that underreporting is even greater.<sup>9-12</sup> The underreporting of suicides is also common in minority groups such as among indigenous peoples.<sup>13-15</sup>

In Brazil, suicide is considered to be a growing problem in the general population.<sup>15</sup> Among the indigenous people of the North and Midwestern regions, which represent around 40% of the total national population,<sup>12</sup> and despite the registered mortality rates being at least four times higher than among non-indigenous people,<sup>16</sup> suicide is still overall neglected public health problem.<sup>10,15,16</sup> The problem appears to be more acute among the young, since data from the Ministry of Health pointed out that suicide was the main cause of death in individuals between the ages of 15 and 29 years old, for the triennium 2012-2014.<sup>17</sup>

Studies on the reliability of official suicide statistics are incipient in Brazil and often prioritize the analysis of the death

certificates.<sup>18</sup> Besides, there are no studies that evaluate the underreporting of suicide in Brazil, both among indigenous and non-indigenous people.

Underreporting of suicides, mainly in small municipalities and/or small population groups, is a known problem<sup>10</sup> that not only gives unrealistic mortality estimates but also gives a distorted profile of important characteristics about the victims. Therefore, in order to understand the hidden side of suicide in indigenous people the coverage and the correct registration must be improved and so the adoption of approaches and strategies based on an until now unknown profile can be determined and applied to help cope with the problem in a more efficient and reliable manner. The aim of this study was to evaluate the coverage, characteristics and estimate the risk of suicide among the indigenous people of Tabatinga, a municipality in the Brazilian Amazon.

## Methods

Tabatinga is located in the extreme southeast of the State of Amazonas (Brazil), in the region where the three borders of Colombia, Brazil and Peru meet (figure 1). According to the last national census, around 29% of the total population of 52 272 inhabitants self-reported as being indigenous.<sup>17</sup> The largest indigenous ethnic group in Brazil is the Tikuna, with approximately 50 000 individuals, of which around 1/3 live in the Tabatinga region. Health care of the indigenous people of Tabatinga who live on the indigenous reserve is provided by the administrative districts of the Special Indigenous Healthcare Subsystem of the "Alto Rio Solimões" (DSEI/ARS).



**Figure 1 – Map of the Tabatinga municipality, State of Amazonas, Brazil.**

Hospitalization is exclusively provided by the Military Hospital of Tabatinga (*Hospital de Guarnição de Tabatinga* [HGuT]).

We carried out an epidemiological descriptive study in Tabatinga, from January 2007 to December 2011 of all the deaths recorded for individuals over 9 years of age. We used an active surveillance strategy of deaths to detect cases of hidden suicides. The strategy included a manual revision of all the official death certificates (DCs) of Tabatinga; of the official computerized records (online and offline) of the health secretariat municipality linked to the Informatics Department of the Unified National Health System (*Departamento de Informática do Sistema Único de Saúde*);<sup>17</sup> as well as the printed records of the HGuT hospital and the epidemiologic surveillance department of the DSEI/ARS, linked to the Special Secretariat of Indigenous Health of the Ministry of Health (SESAI/MS).

All the DCs with underlying cause of death coded as self-inflicted injuries (codes X60 to X84) in the International Classification of Diseases, 10th revision (ICD-10), were considered suicide cases. On the other hand, all DCs that had no underlying cause of death code, such as self-inflicted injury were reviewed and reclassified as suicide cases, if two or more following conditions were met: a) codes from Y10 to Y19 ("Poisoning of undetermined intent"), or Y20 ("Hanging, strangulation and suffocation of undetermined intent") were among "causes of death"; b) suicide as "probable circumstance of unnatural death" (manner of death), and c) "Summary description of injury" suggestive of suicide.

Additionally, all digital records of the DSEI/ARMS with cause of death that were coded as X60 to X84 or whose

description was suggestive of a suicide case, were considered suicide cases. Finally, additional documents such as DCs identified at the local civil registry service office, the death registers of health professionals at DSEI/ARS, as well as other printed records at the National Indian Foundation (FUNAI) whose description was suggestive of indigenous suicide were classified as suicide cases. To avoid the input of any duplicate records each of these registered suicide cases was only validated after being carefully reviewed.

All registers not notified in the Mortality Information System of the Informatics Department of the Unified National Health System (SIM/DATASUS) as well as the DCs reclassified as suicide, were considered as "hidden suicides". The total suicide cases are all the "official suicides" that is the suicides notified to SIM/DATASUS plus the "hidden suicides".

The racial/ethnic classification was based on Hetero-Classification records available in the race or color field (white, brown, black, yellow and indigenous people) of the DCs and supplemented with information gathered together by health professionals who have worked with the local indigenous population.

The coverage of the suicide-cases was estimated from the difference between the total hidden suicides and the official suicide records available in SIM/DATASUS. The suicide-cases were described using the following data: name of victim and relatives; sex; race or color; marital status; age (years); primary cause of death; place of occurrence, and method of committing suicide.

Information on alcohol use or non-use prior to suicide was obtained from the descriptions of the circumstances of death

observed in all documents and records included in this study. The kinship level among suicide victims was based on names and surnames and checked with the health professionals of DSEI/ARS.

The risk of suicide was estimated from mortality rates per suicide. Population estimates were derived from the 2000 and 2010 census of the Brazilian Institute of Geography and Statistics (IBGE) that adopt a self-classification system for skin color or race. Intercensal and postcensal population were estimated by annual geometric interpolation. The rates were standardized by age, using the method of directly standardized rates with a 95% confidence interval (95%CI).<sup>19</sup> The World Health Organization (WHO) standard population was adopted as reference.<sup>20</sup>

The descriptive analysis included relative and absolute frequencies. The density estimated plot, via the Kernel method, was adopted to evaluate the age variable. Statistical differences in the age variable were tested using the Mann-Whitney's U test. Also the proportions analysis, the Fisher exact test and Pearson's  $\chi^2$  with Yates continuity correction were used. The significance level adopted was  $P < .05$ . Data was analyzed with R software, version 3.1.1.

The study was authorized by the National Research Ethics Commission (Comissão Nacional de Ética em Pesquisa [CONEP]), process no. 25000.066088./2012-03 and the authorization to enter the indigenous reserve was given by the National Indian Foundation (Fundação Nacional do Índio [FUNAI]), no. 28/AAEP/PRES/2013.

## Results

There were 64 suicide cases in Tabatinga between 2007 and 2011, all of which were Tikuna indians. In total 53 (82.8%) were considered as "official suicides" and 11 (17.2%) as "hidden suicides." Six "hidden suicides" were not recorded on the local civil registry; three records had DCs as well as being registered at the local civil registry, however these were not recorded by the official health services. One case with a DC and recorded at the local civil registry was also recorded on the official database, but with another cause of death.

Considering all the suicides identified ("official suicides" and "hidden suicides"), most were unmarried males, who died at home and hanging was the method used to commit suicide. Except for the variables of age and gender, there were no significant differences among the other characteristics of men and women (table).

A total of 13 women committed suicide and nearly 80.0% were less than 20 years old, were unmarried and did not have any children. According to figure 2, the density estimated function suggests that the probability of suicide varies according to age between men and women. In men around 70% of the estimated suicide probability was between 15 and 29 years old and for women it was between 12 and 20 years old.

Eleven (17.2%) suicide-records were associated to alcohol consumption before the suicide act, among which nine (81.8%) were less than thirty years old.

A total of 11 (17.2%) suicide victims had some level of kinship. Four pairs had first-degree kinship (3 pairs were brothers

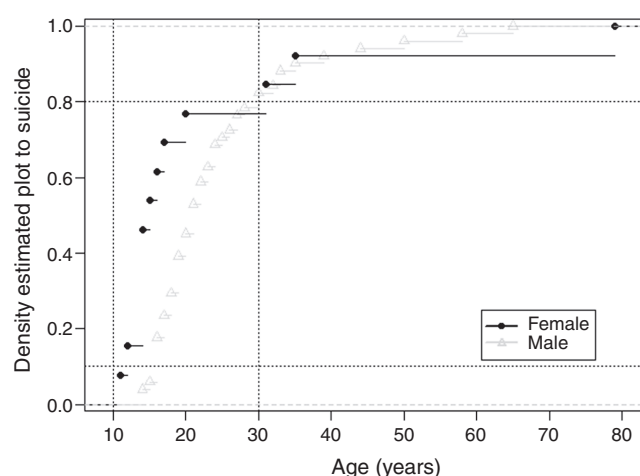
**Table – Epidemiological and demographic characteristics of indigenous people suicide (official suicides and hidden suicides), in the municipality of the Tabatinga, State of Amazonas, Brazil, 2007-2011.**

	Male (n=51), n (%)	Female (n=13), n (%)	P-value <sup>a</sup>
Weekend	36 (70.6)	6 (46.1)	.114
Sex	51 (79.7)	13 (20.3)	.001
Age (years), median	21	15	.013 <sup>b</sup>
Marital status			
Single	41 (82.0)	12 (92.3)	
Married	09 (18.0)	1 (7.7)	.672 <sup>c</sup>
Place of death			
Home	46 (93.9)	12 (100)	
Others	3 (6.1)	—	.893
Suicide method			
Hanging	46 (90.2)	12 (92.3)	
Poisoning	04 (7.8)	1 (7.7)	
Firearm	1 (2.0)	—	.878

<sup>a</sup> Pearson's  $\chi^2$  test.

<sup>b</sup> Mann-Whitney's U test.

<sup>c</sup> Fisher's Exact test.



**Figure 2 – Density estimated plot to age variable, between indigenous males and females, municipality of the Tabatinga, State of Amazonas, Brazil, 2007-2011.**

and another was father and son) and in the 3 remaining cases the victims had a second-degree kinship.

The standardized suicide mortality rate (SSMR), without correction for hidden suicides was 94.8/100 000 (95%CI, 69.1-130.1). After correction, this rate increased to 111.7/100 000 (95%CI, 84.6-148.6), with a global increase of 18% in all samples, 7% in women, 21% in men and 29% for individuals aged 15 to 24 years old.

The SSMR corrected among men was 174.6/100 000 (95%CI, 127.5-238.8), which was significantly higher than for women 42.9/100 000 (95%CI, 20.6-87.7). The relative risk of suicide for men compared to women was 4.1 (95%CI, 2.8-6.2) times higher. However, among the youth aged 15 to 24 years old the SSMR was 260/100 000 (95%CI, 182.6-360.2).

## Discussion

Suicide is a major public health problem among indigenous people of Tabatinga and the percentage of underreported cases is high, especially among young males. Furthermore, this study demonstrates the importance of alcohol use, of the familial clustering of cases, and the expressive difference between genders for suicides.

Moreover, all hidden suicide cases were obtained from the records of the local health service, such as the records of the health professionals, death investigation forms of the DSEI/ARS as well as from the death certificates. The localization of cases within the local health service and at the local civil service registry office of the municipality of Tabatinga reveals the serious problems of managing information at a local level, mainly in regard to the capacity to gather, systematize and input data into the official database correctly.

Problems of this nature are common in small Brazilian towns<sup>21</sup> with limited access to public services, and where the health professionals responsible for supervising the information have low or poor qualifications; moreover, this usually is exacerbated due to the high turnover of these health workers.<sup>22</sup>

The identification of 6 suicide cases without DCs issued by the health services and by the local civil service registry office points out the existence of records that are totally absent from any official information system. Burial without any official documents among indigenous peoples is possible, since there are traditional cemeteries still active in some indigenous villages in the Tabatinga region, according to fieldwork observations. This fact might have contributed to general underreporting of deaths among indigenous people, including suicides.

Added to this there is no Legal Medical Institute office, which is legally entitled to investigation and issue DCs in cases of violent deaths. The lack of this service can be seen in around 93% of the Brazilian municipalities and is practically universal among small municipalities that are not part of a greater metropolitan region. However, it is exactly in the small towns where almost all indigenous suicides in Brazil are notified. Moreover, until 2016 there was no official service legally recognized to investigate deaths and clarify the causes throughout the state of Amazonas.

As a general rule, most of the studies on hidden suicides are limited to the official mortality data, which is normally available in digital records; however these do not always have any additional information concerning the circumstances of death, whether inside or outside the health services.<sup>2,4</sup> Another strategy used to evaluate underreported suicide cases includes indirect estimates of possible suicide cases, from comparative studies of demographic characteristics to other causes of death, such as accidental injuries or events of undetermined causes, in comparison to suicide cases already reported at the official registration service.<sup>6</sup>

If this work had used only the reclassification strategy of official deaths, only 1 hidden suicide case (less than 10%) would have been identified. Most identified cases were outside the official digital database, which is deemed the official source of mortality data in Brazil. Although we did not apply

a more comprehensive methodology to further improve our data, such as household survey or case-finding in cemeteries inside and outside indigenous reserves, for instance, it was still possible to recovery an expressive number of hidden suicides.

The only case reclassified in this study was a poisoning of undetermined intent of one indigenous man that died at the local hospital, a few hours after ingesting a type of metal (lead) on the indigenous reserve. As this method is unusual among the Tikuna ethnic group, mainly among men, it is possible that the characteristic of this suicide act influenced the doctor to classify this case as poisoning of undetermined intent. This pattern is similar to those found in other studies, since sometimes the reclassification strategy not increase the overall official suicide statistics.<sup>23</sup>

Other factors might have influenced the small number of reclassified cases, such as the high percentage of men in the sample evaluated, the nonexistence of deaths due to hanging, strangulation and suffocation of undetermined intent during the period evaluated, as well as the limited number of poisoning or drowning as a result of an accident among the indigenous people of Tabatinga.<sup>17</sup> Some studies suggest that poisoning as much as drowning could be misclassified as poisoning or accident of undetermined intent, respectively,<sup>6</sup> increasing the underreport number of suicide cases.

The profile of indigenous suicides reported here was young, unmarried, men, who committed suicide at home by hanging and this is in line with the previous data found in the literature.<sup>16,24</sup>

As there is no specific field on the DC to record alcohol consumption before committing suicide, this data was extracted from descriptions in the records evaluated. However, there is little doubt that the consumption of alcohol is a current and important question, despite the fact that the Tikuna have traditionally used fermented alcoholic beverages for important cultural and symbolic connotations; this is true for many other indigenous groups.<sup>25</sup> In recent times the increased opportunities to consume alcohol and the easy access of industrialized alcoholic beverages, mainly distilled beverages,<sup>26</sup> has often been associated to various different circumstances, including conflicts. Among the Tikuna group alcohol consumption creates the opportunity not only for arguments, accusations and fighting followed by death, but it is also associated to idea that "it gives courage" to commit the act of suicide, mainly among the younger members. The alcohol consumption seems to be an important associated factor for suicide in other indigenous groups, mainly during the transitional period from late adolescence until young.<sup>27,28</sup>

Another important aspect reported in this study is the occurrence of familial clustering of suicide. Recent studies have indicated that familial aggregation suicides are strongly influenced by genetic factors but also shared with environmental factors. There is evidence that a detailed analysis of familial history is an important clinical and public health tool to identify risk groups that could benefit from individual or collective preventive approaches.<sup>4</sup>

Although the specific causes of suicides in certain familiar groups of the indigenous peoples in Tabatinga still remains an open subject for future studies, the identification of families at risk due to previous cases of suicide, should be a good starting

point to tackle this important social and public health issue among indigenous peoples.

The active surveillance strategy of deaths in this work has demonstrated that the estimated risk of death by suicide was underreported by about 20%. A study carried out in Taiwan estimated that the national suicide rate could be underreported by over 30%,<sup>6</sup> similar to that reported in different regions of the world. Among the indigenous peoples of Australia, the Aborigines, for instance, the underreporting of suicide rates was reported to be about 25%.<sup>29</sup>

Among the indigenous peoples of Tabatinga the standardized suicide mortality rate (SSMR), after correction was 111.7/100 000, a very high value; however among the youth, this rate was more than double: 260/100 000. Previous studies in indigenous settings have provided evidence that suicide is a serious public health problem, both in the Americas and elsewhere in the world.<sup>5,25,30</sup>

However, although reports of increased rates of mortality due to suicide is relatively commons among indigenous people around the world, the youth male are in the prime risk group for this cause of death.<sup>31-33</sup> Obviously there are remarkable differences within indigenous people groups and between the different countries in reported suicide rates, but rates of mortality due to suicide above 250/100 000 as reported in this study are not so frequent among youth. From 2009 to 2011, among the Guarani-Kaiowá and Gurani-Ñandeva of the Central-West region of Brazil, for instance, was observed a rate of suicide about 130/100 000 in the 15-24 age group.<sup>34</sup> On average, during the period 1993-2009, were found suicide rates about 70/100 000 among Innu and Inuit of the age group 15-24 years of Canada.<sup>35</sup> Recently the Australian Bureau of Statistics published updated suicide rates to 2011-2015 period for Aboriginal and Torres Strait Islander young people demonstrating wide disparities between indigenous and non-indigenous people, mainly among youth of the age group 15-24 years that presented a rate of 40/100 000, value about 4-folds higher than was that in non-indigenous people.<sup>36</sup>

Another important aspect in our study was the difference of gender among suicide rates, since the male SSMR was more than four times higher than the female suicide rate. Nevertheless, the female SSMR is far from being low, as these rates are extremely high values, when compared with rates commonly reported for non-indigenous women, for example. Moreover, the women who committed suicide were far younger than the men.

According to Erthal, traditionally speaking an 18-year-old man would be expected to be married and with two sons.<sup>26</sup> On the other hand the author also described situations where a marriage offer was denied by the father of the suitor because the young man had not yet dominated the basics techniques of subsistence, such as fishing and agriculture; thus keeping the young in a non-adult status and under fatherly guardianship, thereby exacerbating familial conflicts, especially between father and son.

Apart from the above considerations Erthal pointed out that these stages of life are also a very special moment for decision-making, such as to continue studying or not and to look for work, which usually represents a challenge branded by frustrations for the indigenous young.<sup>26</sup> Factors of various different natures such as ethnic prejudice, low educational

qualification level and/or weak job market; besides the lack of opportunities in small Amazonian towns such as Tabatinga, usually makes the problem even worse.<sup>26</sup>

Girls, who are at the age between 12 and 15 years old and near menarche, used to attend a female puberty ritual ("*Rito da Moça Nova*"), which is when the girl learns to be a fine wife and to continue to be a fine daughter, ensuring the ideal wedding, according to the ancestral cultural customs. However, due to various reasons, such as religious intolerance, for instance, these rituals have ceased to be practiced.<sup>26</sup> Knowledge concerning the impact of the elimination of this rite on a young girl's emotional state and its possible correlation with suicide remains an important question that should be investigated.

These traditional ancestral customs show that young man and girls experience different tensions at different ages. This aspect may be useful to help understand the remarkable age variation of suicidal behavioral between the male and female genders in indigenous young people of Tabatinga. Abrupt Cultural changes has been implicated as potentially harmful in Canadian Aboriginal youth, once among communities lacking sense of cultural continuity regular appear most vulnerable to suicide.<sup>37</sup>

The suicide rates among indigenous people of Tabatinga are broadly inaccurate and characterized by a high percent of hidden suicides. Therefore, it seems clear that there is a need for more evaluations, like this present work, to inform policymakers and service providers about the true magnitude of the Indigenous suicide rate. Furthermore, our study suggests possible links between suicide and alcohol consumption, gender differences and the existence of more vulnerable groups, such as the young, and especially for those with close relationships or family members who have already committed suicide. Finally, besides having access to reliable vital statistics, and knowledge of important characteristics of the suicidal profile in question, it is important that any program focused on prevention of indigenous suicides has to take into account social, cultural, ancestral and emotionally issues to overcome the alarming levels of suicide rates among indigenous people.

## Conflicts of interests

The authors declare that they have no competing interests.

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