

ORIGINAL ARTICLE



Use of psychotropic drugs by population in an area affected by the tailings dam rupture: Brumadinho Health Project

Uso de psicofármacos por população em área atingida pelo rompimento de barragem de rejeitos: Projeto Saúde Brumadinho

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ABSTRACT

Objective: To describe the consumption of psychotropic drugs in the adult population residing in Brumadinho, Minas Gerais, after the Vale dam collapse, which occurred in 2019. **Methods:** This is a cross-sectional study, part of the Brumadinho Health Project, developed in 2021, with a representative population-based sample of adults (18 years and over) residing in Brumadinho. A total of 2,805 adults with information on self-reported use of psychotropic drugs (antidepressants and anxiolytics-hypnotics/sedatives) in the last 15 days were included in the analysis. The prevalence of psychotropic drug use was estimated, and the most used psychotropic drugs were identified. Pearson's chi-square test (with Rao-Scott correction) was used to test associations between exposures and use of psychotropic drugs, considering a significance level of $p < 0.05$. **Results:** The use of antidepressants (14.2%) was more common than the use of anxiolytics or hypnotics/sedatives (5.2%), with sertraline and fluoxetine being the most used antidepressants. The use of anxiolytics and hypnotics/sedatives was higher among residents who lived in the area directly affected by the dam's mud, and the use of any psychotropic drug was higher among those who lost a relative/friend in the disaster and assessed that their health worsened after the disaster, and among women. **Conclusion:** The results of the study corroborate what was observed in other populations exposed to similar tragedies, regarding the pattern of associations and the use of psychotropic drugs.

Keywords: Psychotropic drugs. Drug utilization. Disaster. Pharmacoepidemiology.

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INTRODUCTION

Concern about mental health is growing, given the high prevalence of mental disorders in the world and in Brazil, with emphasis on depressive and anxiety disorders¹. The determinants of mental health are well established and encompass a variety of factors, including biological, demographic, socioeconomic, and cultural factors. In addition to these, traumatic events and emergencies (conflicts and natural or man-made disasters) have a negative impact on mental health, as they affect livelihoods, cause emotional losses and disruption of social networks, increase the incidence of mental disorders (anxiety, depression, post-traumatic stress disorder), and aggravate those that already exist².

The state of Minas Gerais is under permanent risk of technological disasters resulting from dam accidents, as several Minas Gerais municipalities that perform ore extraction coexist with these structures, which are used for the storage of mining tailings. The biggest tragedy in the world involving the rupture of dams occurred in January 2019, in Brumadinho, with the leakage of 13 million m³ of tailings mud, causing the death of 308 people, who were mainly workers of the mining company Vale and residents in Brumadinho^{3,4}. The mud wave reached the company's administrative area, communities, rural properties, and the Paraopeba River, which cuts through the municipality, making its water unfeasible for human and animal consumption, for irrigation, and for fishing⁵.

The performance of post-disaster pharmacoepidemiological studies is perceived as a possibility to assess the impact of these events on the mental health of the affected populations. International scientific literature has provided evidence of increased consumption of antidepressants⁶⁻⁹, anxiolytics/hypnotics^{10,11} or both psychotropic drugs¹² after the occurrence of disasters. However, it was not possible to identify any population-based Brazilian pharmacoepidemiological article addressing this issue in the main electronic bibliographic databases. In this perspective, the present study aimed to describe the prevalence and characterize the use of psychotropic drugs in the municipality of Brumadinho after the Vale dam collapse, which occurred in 2019.

METHODS

Design, setting, and study population

This is a cross-sectional study, part of the Brumadinho Health Project (*Projeto Saúde Brumadinho*), a prospective cohort study that will annually assess the health conditions of residents of the municipality of Brumadinho, Minas Gerais. Specifically, the project aims to outline the socioeconomic and lifestyle profile, health and work conditions, and the use of health services by the citizens of Brumadinho¹³.

Brumadinho is a municipality located in the central region of the state of Minas Gerais. It is part of the Metropolitan Region of Belo Horizonte, state capital, from which it is 54 km away. In 2021, the municipality had an estimated population of 41,208 inhabitants, spread over an area of 639.4 km². Historically, the municipality's economy is mainly supported by mining activities, especially those developed by the mining company Vale; in 2019, 30.7% of the total population was employed, with an average monthly income of 2.2 minimum wages*. The HDI of the municipality was 0.747, considered high, and the schooling rate from 6 to 14 years old was 98.4% (both indicators for 2010)¹⁴. In 2019, the general and infant mortality rates were, respectively, 9.0 and 7.0/1,000, with external causes and diseases of the circulatory system being the main causes of death. In terms of the structure and organization of health services, the municipal Unified Health System (*Sistema Único de Saúde* – SUS) had, in 2019: one general hospital; 14 Health Centers/Basic Health Units (*Unidades Básicas de Saúde* – UBS); and two Specialty Centers. Still, the coverage of the Family Health Strategy in the municipality was over 70%¹⁵.

The study population was selected through a probability sample of the population aged 12 years old or older residing in the municipality. Sample selection included 3 different estimation domains:

1. The population directly affected by the rupture of the Córrego do Feijão dam;
2. The population residing in the area of mining activities; and
3. The population not directly affected by the dam failure and mining activity.

The sample was stratified by census sector, aggregated to form the three estimation domains. All households in areas directly affected by the dam failure or mining activity were included, while in areas not directly affected, households were randomly selected. Of the total number of residents eligible for the study (n=3,563), 3,080 responded to the interviews; among these, 275 were under 18 years of age and were not included in the present study. The methodological aspects of the study are fully described in another publication¹³.

Study variables and data collection

Information on the use of psychotropic drugs (dependent variable) was obtained through the question: "In the last 15 days, have you taken any medication prescribed by the doctor to treat depression, anxiety, sleep problems or any other psychiatric problem?". Participants who answered affirmatively to this question were asked to inform the name of the drug. The mentioned drugs were identified and classified according to

* In Brazilian minimum monthly salaries (MMS), at that time. 1 MMS= R\$ 1,212.00, equivalent to US\$ 213.

the Anatomical Therapeutic Chemical Index (ATC)¹⁶. The psychotropic drugs included in this investigation were anxiolytics (N05B), hypnotics/sedatives (N05C), and antidepressants (N06A). Drugs were classified according to therapeutic class and active ingredient.

Independent variables comprised two sets: sociodemographic and related to the dam failure. Sociodemographic variables were: gender, age (considering the age groups 18-39 years; 40-59 years; and 60 years or more), education, considering the level of the last year attended in the formal education system (elementary/middle school; high school; and higher education); marital status (married; single; separated/divorced; and widowed), and self-reported skin color (white; black; brown and others — which included indigenous and yellow). Variables related to the dam failure were: area of residence, loss of a resident, family member or friend as a result of the dam failure, and worsening of self-rated health after the environmental disaster. The area of residence was categorized in order to reproduce the domains of estimation, namely:

1. Area not directly affected by the dam failure or mining;
2. Area directly affected by the tailings mud or by the waters of the Paraopeba River (contaminated by the mud); and
3. Mining area not directly affected by tailings sludge or water contaminated by sludge.

Data collection was carried out between June and November 2021, in household interviews, using individual questionnaires inserted into electronic devices (tablets), with software developed for the application of the questionnaires, including the part related to the drugs used. Data were collected by interviewers duly trained by the research team, and this fieldwork was preceded by a pilot study, to evaluate the logistics and the research instrument.

Data analysis

The prevalence of psychotropic drugs use was calculated for the group of psychotropic drugs investigated, and separately for anxiolytics/hypnotics/sedatives and for antidepressants. The prevalence was calculated by dividing the number of participants who reported using the medication by the total number of participants interviewed. The analysis of the therapeutic classes and active ingredients of the drugs had the drug as the unit of analysis and was based on absolute and relative frequencies (proportions). Proportions were calculated by dividing the total number of psychotropic drugs of a given therapeutic class by the total number of psychotropic drugs reported.

The comparison between users and non-users of psychotropic drugs (global and by therapeutic class) was made using the chi-square test, using the Rao-Scott correction factor. The level of statistical significance adopted was

$p < 0.05$. The results were presented in tables. The statistical software Stata[®], version 14, was used in the analyses. All data analysis considered sample weight and design effect, using the *svy* command, suitable for complex samples. This command allows the sample expansion from the post-stratification sample weights and takes into account the effect of the sample design, based on the primary sampling unit and the selection stratum.

Ethical considerations

The Brumadinho Health Project (*Projeto Saúde Brumadinho*) was approved by the Research Ethics Committee of Fiocruz Minas (20814719.5.0000.5091) and all participants signed the Informed Consent.

RESULTS

A total of 2,805 members of the Brumadinho cohort baseline participated in the study, aged 18 years old or older and with information on the use or not of psychotropic drugs in the 15 days prior to the home interview. Most participants were female (57.1%), under 60 years of age (69.5%), and married (59.5%).

Of the total number of participants, 45.1% perceived their health as worse compared to before the dam collapse, 62.1% reported having lost a resident of the household, or family member or friend as a result of it, 2.9% lived in an area directly affected by the tailings mud, and 1.6% lived in a mining area that was not directly affected by the dam failure. A complete characterization of the study population can be seen in Table 1.

The prevalence of use of some psychotropic drug (antidepressant and/or anxiolytic/sedative) was 17.2% (95%CI 14.9–19.8). The use of antidepressants (14.2%; 95%CI 12.0–16.7) was more common than the use of anxiolytics or hypnotics/sedatives (5.2%; 95%CI 4.0–6.7), and 2.1% (95%CI 1.5–3.1) used an antidepressant and an anxiolytic or hypnotic/sedative simultaneously.

Table 2 lists all psychotropic drugs used (n=661), described according to therapeutic class and active ingredient. In terms of therapeutic classes, about two thirds of the drugs used were antidepressants, while anxiolytics and hypnotics/sedatives accounted for, respectively, 24.1 and 9.8% of the referred psychotropic drugs. Among antidepressants, there was a predominance of selective serotonin reuptake inhibitors (SSRI), which represented 43.6% of all psychotropic drugs used. Regarding the active ingredient, sertraline (n=110), fluoxetine (n=89), and amitriptyline (n=56) were the most frequent among antidepressants (58.4% of them). Clonazepam (n=94) represented 59.1% of the total anxiolytics used and zolpidem predominated among sedatives (n=61 or 93.9% of them).

Women used more antidepressants (19.3 vs. 7.4%) and more anxiolytics and hypnotics/sedatives (6.6 vs. 3.4%)

Table 1. Characterization of the study population (n=2,805), Brumadinho (MG), Brazil 2021.

| | n | %* |
|--|-------|------|
| Gender | | |
| Male | 1,288 | 42.9 |
| Female | 1,557 | 57.1 |
| Age range (in years) | | |
| 18–39 | 1,068 | 36.3 |
| 40–59 | 1,036 | 33.2 |
| 60 or more | 701 | 30.5 |
| Education [†] | | |
| Elementary/Middle school | 1,419 | 44.6 |
| High school | 1,013 | 33.6 |
| Higher education | 363 | 21.9 |
| Marital status [†] | | |
| Married | 1,672 | 59.5 |
| Single | 746 | 26.3 |
| Divorced/separated | 194 | 7.8 |
| Widower | 186 | 6.3 |
| Self-referred skin color [†] | | |
| White | 942 | 42.9 |
| Black | 389 | 11.8 |
| Brown | 1,433 | 44.2 |
| Others [‡] | 31 | 1.1 |
| Area of residence (in relation to the dam failure) | | |
| Census sectors | 1,453 | 95.5 |
| Area directly affected | 881 | 2.9 |
| Mining region | 471 | 1.6 |
| Worsening health after the dam collapse [†] | | |
| No | 1,428 | 54.9 |
| Yes | 1,370 | 45.1 |
| Loss of a resident, family member or friend [†] | | |
| No | 728 | 37.9 |
| Yes | 2,068 | 62.1 |

*percentage calculated considering the sample weight and the design effect; [†]lack of information for: schooling (n=10); marital status (n=7); skin color (n=10); health self-assessment (n=7); loss of a resident of the household, family member or friend (n=9). Participants with information loss were removed to calculate the frequencies (absolute and relative) of the respective variables; [‡]yellow and indigenous.

than men ($p<0.05$). No differences were observed in the consumption of psychotropic drugs (overall or by therapeutic class) in relation to the other sociodemographic characteristics.

With regard to the variables related to the environmental disaster, the use of psychotropic drugs, either total or by therapeutic class, was higher among those affected by the dam failure or who rated their health worse after this event. In the first case, those who lost someone (a resident of the household, family member or friend) used more psychotropic drugs (20.4% for global consumption; 6.8% for anxiolytics/sedatives; and 16.7% for antidepressants), but, in relation to the area of residence, a significantly higher consumption was observed only in relation to the use of anxiolytics/sedatives: residents in an area directly

Table 2. Distribution of psychotropic drugs used, according to therapeutic class and active ingredient, Brumadinho (MG), Brazil, 2021.

| Drug | n | % |
|---|-----|-------|
| Subtotal 1 – Anxiolytics* (benzodiazepines) (N05B/N05CD) [†] | | |
| Clonazepam | 94 | 24.1 |
| Diazepam | 31 | |
| Alprazolam | 23 | |
| Others | 11 | |
| Subtotal 2 – Hypnotics (Z-drugs) (N05CF) [†] | | |
| Zolpidem | 61 | 9.8 |
| Eszopiclone | 4 | |
| Subtotal 3 – Antidepressants (N06A) [†] | | |
| Tricyclic antidepressants (N06AA) [†] | | |
| Amitriptyline | 56 | 12.4 |
| Nortriptyline | 19 | |
| Others | 7 | |
| SSRI antidepressants [‡] (N06AB) [†] | | |
| Sertraline | 110 | 43.6 |
| Fluoxetine | 89 | |
| Escitalopram | 41 | |
| Citalopram | 40 | |
| Paroxetine | 8 | |
| Other antidepressants (N06AX) [†] | | |
| Venlafaxine | 21 | 10.1 |
| Desvenlafaxine | 15 | |
| Duloxetine | 11 | |
| Mirtazapine | 9 | |
| Bupropion | 9 | |
| Others | 2 | |
| Total | 661 | 100.0 |

*clonazepam was included in the class of anxiolytics, due to its off-label use in Brazil; [†]ATC code (Anatomical-Therapeutic-Chemical Classification – WHO); [‡]selective serotonin reuptake inhibitors.

affected by the dam failure (11.1%) or in a mining area (11.7%) used more this class of drugs. Participants who rated their health as worse when compared to before the dam failure, used more psychotropic drugs, whether by overall consumption (27.8%) or by therapeutic class (8.6% for hypnotics/sedatives and 23.5% for antidepressants). The results of the univariate analysis of the characteristics associated with the use of psychotropic drugs are detailed in Table 3.

DISCUSSION

This study evidenced greater use of anxiolytics and hypnotics/sedatives by the portion of the adult population of Brumadinho who lived in an area directly affected by the mud released in the dam failure. The use of psychotropic drugs was also significantly higher among women, among those who lost a household member, family member or friend as a result of the accident, and among those who

Table 3. Distribution (% and 95% confidence interval) of psychotropic drug use according to sociodemographic variables and variables related to the dam failure, Brumadinho (MG), Brazil, 2021.

| | Psychotropic use (p-value)* | | Anxiolytics and hypnotics use (p-value)* | | Antidepressant use (p-value)* | |
|---|--------------------------------|-----------|---|----------|----------------------------------|-----------|
| Gender | | | | | | |
| Male | 10.0 | 7.7-12.9 | 3.4 | 2,1-5,3 | 7,4 | 5,4-10,0 |
| Female | 22.7 | 19.3-26.4 | 6.6 | 2,9-8,8 | 19,3 | 12,0-16,7 |
| | (p<0.001) | | (p=0.010) | | (p<0.001) | |
| Age (in years) | | | | | | |
| 18-39 | 16.9 | 13.2-21.4 | 5.1 | 3,3-7,9 | 13,1 | 9,7-17,4 |
| 40-59 | 17.2 | 13.9-21.1 | 4.6 | 3,0-6,9 | 15,0 | 11,9-18,6 |
| 60 or more | 17.6 | 13.3-22.8 | 6.0 | 4,0-9,0 | 14,2 | 12,0-16,7 |
| | (p=0.975) | | (p=0.658) | | (p=0.765) | |
| Education | | | | | | |
| Elementary/Middle school | 15.9 | 13.0-19.3 | 5.4 | 3,8-7,6 | 13,2 | 10,5-16,3 |
| High school | 19.3 | 15.4-23.8 | 5.9 | 3,8-9,1 | 16,2 | 12,7-20,4 |
| Higher education | 16.6 | 11.9-22.7 | 3.4 | 1,5-7,3 | 13,3 | 8,9-19,3 |
| | (p=0.427) | | (p=0.424) | | (p=0.427) | |
| Self-referred skin color | | | | | | |
| White | 19.1 | 15.5-23.4 | 5.9 | 4,0-8,7 | 16,0 | 12,5-20,1 |
| Black | 17.0 | 11.2-24.9 | 5.0 | 2,6-9,7 | 13,9 | 8,6-21,7 |
| Brown | 16.0 | 13.2-19.4 | 4.7 | 3,3-6,7 | 12,9 | 10,3-16,1 |
| Others [†] | 0.9 | 0.3-3.3 | 0.6 | 0,1-2,8 | 0,3 | 0,0-2,4 |
| | (p=0.160) | | (p=0.523) | | (p=0.175) | |
| Marital status | | | | | | |
| Married | 17.9 | 15.0-21.3 | 4.5 | 3,2-6,4 | 15,5 | 12,7-18,8 |
| Single | 16.2 | 12.4-21.1 | 6.2 | 4,0-9,6 | 11,5 | 8,1-15,9 |
| Separated/divorced | 13.7 | 8.3-21.8 | 4.3 | 1,8-9,6 | 11,2 | 6,4-18,7 |
| Widower | 19.5 | 12.5-29.3 | 8.8 | 4,5-16,7 | 16,5 | 10,0-26,1 |
| | (p=0.646) | | (p=0.268) | | (p=0.240) | |
| Area of residence | | | | | | |
| Census sectors | 17.1 | 14.5-19.8 | 4.9 | 3,7-6,5 | 14,1 | 11,8-16,7 |
| Area directly affected | 21.5 | 18.9-24.4 | 11.1 | 9,2-13,3 | 17,2 | 14,7-19,4 |
| Mining region | 19.3 | 15.5-23.8 | 11.7 | 8,9-15,3 | 14,2 | 11,0-18,1 |
| | (p=0.051) | | (p<0.001) | | (p=0.203) | |
| Loss of a resident, family member or friend | | | | | | |
| No | 12.2 | 9.1-16.1 | 2.7 | 1,5-4,8 | 10,1 | 7,2-14,1 |
| Yes | 20.4 | 17.3-23.8 | 6.8 | 5,1-9,0 | 16,7 | 13,9-19,9 |
| | (p=0.001) | | (p=0.004) | | (p=0.007) | |
| Worsening health after the dam collapse | | | | | | |
| No | 8.6 | 6.6-11.0 | 2.4 | 1,6-3,8 | 6,5 | 4,8-8,7 |
| Yes | 27.8 | 23.7-32.2 | 8.6 | 6,4-11,6 | 23,5 | 19,6-27,8 |
| | (p<0.001) | | (p<0.001) | | (p<0.001) | |

*obtained by Pearson's chi-square, with Rao-Scott correction factor; significant when <0.05; [†]yellow and indigenous.

rated their health as worse, compared to a time before the disaster. The study also revealed that antidepressants were the most used psychotropic drugs.

Several pharmacoepidemiological studies have been carried out to assess the impact of natural or man-made disasters on the mental health of the affected population. In these investigations, the impact is evaluated by comparing the consumption of psychotropic drugs before and after the event, or by comparing the consumption of these

drugs with that observed in another population, in the same country or in the same geographic region, which has not been affected by the event.

These studies have shown, in different populations, an increase in the use of antidepressants, anxiolytics and hypnotics/sedatives after disasters. In England⁶, an increase in the number of prescriptions for antidepressants was observed after the occurrence of river and maritime floods, and this increase was more marked in the areas closest to

the event. In a cohort of French workers, the use of antidepressants was associated with a shorter distance from the chemical plant explosion¹². Increased prescribing of antidepressants was also observed in populations affected by cyclone⁸, earthquake⁹, and maritime disaster⁷.

Regarding anxiolytics, a longitudinal study developed in the Netherlands showed a higher incidence of use of these drugs after the explosion of a fireworks deposit¹⁰. Among French male workers, proximity to a chemical plant that exploded was associated with the use of hypnotics/sedatives, while the loss of a loved one in the disaster was associated with the use of anxiolytics¹². In New Zealand, there was an increase in the dispensing of anxiolytics and hypnotics/sedatives in an earthquake-stricken region, compared to the dispensing of these drugs in the rest of the country¹¹.

In the population residing in Brumadinho, the prevalence of the use of anxiolytics and hypnotics/sedatives was positively associated with the three variables related to the dam failure, and the use of antidepressants was positively associated with two of them. A possible hypothesis to explain these differences, although the present study did not control for possible confounding effects of the covariates, is that the dam failure negatively affected the mental health of this population. This type of event can be responsible for the onset of several psychopathologies (post-traumatic stress, depressive and anxiety disorders, sleep disorders) or for the worsening of existing ones^{17,18}. In addition, it is worth remembering that disasters such as the one in Brumadinho have repercussions on the economic and social organizations of the affected community, as they result in material losses, disorganization of the local economy and weakening or rupture of social cohesion, naturally with negative repercussions on individual and collective mental health. And all this can be enhanced when the population is exposed to intense media coverage⁷, as was the case in Brumadinho. Furthermore, as the psychotropic drugs analyzed are indicated for the management of the most frequent disorders in this context, the analysis of their pattern of use can act as an indirect measure of mental health^{6,7}.

Among the sociodemographic variables, only gender was associated with the use of psychotropic drugs, with the prevalence of use being higher among women. This association was also observed among French people affected by a tragedy equivalent to that of Brumadinho¹² and reproduces the pattern recently observed in Brazilian population-based studies¹⁹⁻²². This may result from greater psychological morbidity among women, or from the fact that, throughout their lives, they seek and use health services more to meet their health needs. In the case of mental disorders, there is evidence that health professionals tend to prescribe more psychotropic drugs to women, as they are more likely to recognize and explain these problems in medical consultations, as well as to adhere to the prescribed pharmacological treatment^{23,24}.

In Brumadinho, antidepressants were the most used psychotropic drugs, especially SSRIs (in terms of pharmacological class) and sertraline and fluoxetine (in terms of active ingredient). The prevalence of the use of antidepressants (14.2%) was more than double that of the use of anxiolytics and hypnotics/sedatives (5.2%). The most consumed anxiolytic was clonazepam, while zolpidem accounted for almost all the reported hypnotics/sedatives. This consumption pattern is similar to that observed among Brazilian adults, at the local^{20,21} and national¹⁹ levels. These psychotropic drugs are indicated in the treatment of mental disorders that impact populations affected by tragedies such as the one in Brumadinho. On the other hand, the prevalence observed in Brumadinho for the use of psychotropic drugs were higher than those detected in the adult population of large Brazilian cities^{20,22,25}. This higher prevalence of use, compared to what was observed in Brazilian cities that were not affected by tragedies, may be an indication that the higher consumption of psychotropic drugs in Brumadinho is related to the dam failure.

An important limitation of this study is the lack of data on the use of psychotropic drugs by the population of Brumadinho before the disaster. This prevents the establishment of an unequivocal relationship between the dam failure and the pattern of psychotropic drug use, when compared to studies based on electronic records of prescriptions to assess consumption before and after disasters^{6-9,11,12}. The cross-sectional nature of the study, in turn, does not make it possible to establish a clear separation, in time, between exposure and event, which weakens it in the face of cohort studies¹². Longitudinal studies make it possible to distinguish new users of psychotropic drugs from those who were already using the drug before the disaster and, thus, more accurately assess whether the use of psychotropic drugs may be a consequence of exposure to it.

The use of primary data, collected at home from self-reported use, speaks in favor of the strength of the present study. In pharmacoepidemiological studies, the measurement of drug use based on self-report is more accurate than those from records of prescriptions and/or dispensations, as there is no guarantee that the drugs prescribed and even dispensed will actually be used (non-adherence to the pharmacological treatment is not uncommon and has several motivations/determinants). In Brumadinho, medication dispensing records are restricted to those obtained from the SUS. In a recent nationwide study, it was found that only 23% of the psychotropic drugs used were obtained from SUS pharmacies¹⁹. In addition, three variables were included in the analysis that allow the internal differentiation of the study population regarding exposure to the accident, as they assess:

1. The intensity of the exposure based on area of residence;
2. The affective losses resulting from it and which impact mental health; and

3. Their own health in two different moments, defined by the accident. These variables allow, even if indirectly, to assess the impact of the disaster on the consumption of psychotropic drugs, in a cross-sectional perspective, thus corroborating the hypothesis, raised internationally in other contexts^{6,7,11,12}, that catastrophes act as determinants of the mental health.

Finally, the novelty of this investigation should be highlighted, as, to our knowledge, it is the first national population-based study to describe the use of psychotropic drugs among individuals residing in a city affected by a technological catastrophe.

In summary, the results of the study corroborate what was observed in other populations exposed to similar tragedies, regarding the identified associations and the pattern of use of these psychotropic drugs. Events like this tend to have a negative impact on the structure and organization of the provision of health services, as well as hindering the agile and effective responses necessary to minimize damage to the health of the affected population. Thus, the results of this study can constitute a valuable contribution to the planning and programming of timely and effective pharmaceutical care, which can alleviate the psychological suffering of the affected population.

REFERENCES

- Institute of Health Metrics and Evaluation. Global health data exchange (GHDx) [Internet]. 2022 [cited on Jun. 8, 2022]. Available at: <http://ghdx.healthdata.org/gbd-results-tool?params=gbd-api-2019-permalink/d780dffbe8a381b25e1416884959e88b>
- World Health Organization. Fact Sheets: mental health in emergencies [Internet] 2022. [cited on Jun. 21, 2022]. Available at: <https://www.who.int/news-room/fact-sheets/detail/mental-health-in-emergencies>.
- Freitas CM, Silva MA. Acidentes de trabalho que se tornam desastres: os casos dos rompimentos em barragens de mineração no Brasil. *Rev Bras Med Trab* 2019; 17(1): 21-8. <https://doi.org/10.5327/Z1679443520190405>
- Freitas CM, Barcellos C, Asmus CIRF, Silva MA, Xavier DR. Da Samarco em Mariana à Vale em Brumadinho: desastres em barragens de mineração e saúde coletiva. *Cad Saúde Pública* 2019; 35(5): e00052519. <https://doi.org/10.1590/0102-311X00052519>
- Noal DS, Rabelo IVM, Chachamovich E. O impacto na saúde mental dos afetados após o rompimento da barragem da Vale. *Cad Saúde Pública* 2019; 35(5): e00048419. <https://doi.org/10.1590/0102-311X00048419>
- Milojevic A, Armstrong B, Wilkinson P. Mental health impacts of flooding: a controlled interrupted time series analysis of prescribing data in England. *J Epidemiol Community Health* 2017; 71(10): 970-3. <https://doi.org/10.1136/jech-2017-208899>
- Han KM, Kim KH, Lee M, Lee SM, Ko YH, Paik JW. Increase in the prescription rate of antidepressants after the Sewol Ferry disaster in Ansan, South Korea. *J Affect Disord* 2017; 219: 31-6. <https://doi.org/10.1016/j.jad.2017.05.026>
- Usher K, Brown LH, Buettner P, Glass B, Boon H, West C, et al. Rate of prescription of antidepressant and anxiolytic drugs after cyclone yasi in North Queensland. *Prehosp Disaster Med* 2012; 27(6): 519-23. <https://doi.org/10.1017/S1049023X12001392>
- Rossi A, Maggio R, Riccardi I, Allegrini F, Stratta P. A quantitative analysis of antidepressant and antipsychotic prescriptions following an earthquake in Italy. *J Trauma Stress* 2011; 24(1): 129-32. <https://doi.org/10.1002/jts.20607>
- Fassaert T, Dorn T, Spreeuwenberg PMM, van Dongen CJM, van Gool CJAW, Yzermans CJ. Prescription of benzodiazepines in general practice in the context of a man-made disaster: a longitudinal study. *Eur J Public Health* 2007; 17(6): 612-7. <https://doi.org/10.1093/eurpub/ckm020>
- Beaglehole B, Bell C, Frampton C, Hamilton G, McKean A. The impact of the Canterbury earthquakes on prescribing for mental health. *Aust N Z J Psychiatry* 2015; 49(8): 742-50. <https://doi.org/10.1177/0004867415589794>
- Diène E, Geoffroy-Perez B, Cohidon C, Gauvin S, Carton M, Fouquet A, et al. Psychotropic drug use in a cohort of workers 4 years after an industrial disaster in France. *J Trauma Stress* 2014; 27(4): 430-7. <https://doi.org/10.1002/jts.21940>
- Peixoto SV, Firmo JOA, Frões-Asmus CIR, Mambrini JVM, Freitas CM, Lima-Costa MF, et al. Projeto Saúde Brumadinho: aspectos metodológicos e perfil epidemiológico dos participantes da linha de base da coorte. *Rev Bras Epidemiol* 2022; E220002 (supl. 2). <https://doi.org/10.1590/1980-549720220002.supl.2.1>
- Instituto Brasileiro de Geografia e Estatística. Cidades. Brumadinho [Internet]. 2022 [cited on Jun. 8, 2022]. Available at <https://cidades.ibge.gov.br/brasil/mg/brumadinho/panorama>
- Minas Gerais. Secretária de Estado da Saúde. Portal da Vigilância em Saúde. Sala de situação municipal – fevereiro de 2020 [Internet]. 2022 [cited on Jun. 8, 2022]. Available at <http://vigilancia.saude.mg.gov.br/index.php/sala-de-situacao-municipal/>
- World Health Organization. Collaborating Centre for Drug Statistics Methodology. ATC/DDD Index [Internet]. 2022 [cited on Jun. 8, 2022]. Available at: https://www.whocc.no/atc_ddd_index/.
- Birur B, Math SB, Fargason RE. A review of psychopharmacological interventions post-disaster to prevent psychiatric sequelae. *Psychopharmacol Bull* 2017; 47(1): 8-26. PMID: 28138200
- Waite TD, Chaintarli K, Beck CR, Bone A, Amlôt R, Kovats S, et al. The English national cohort study of flooding and health: cross-sectional analysis of mental health outcomes at year one. *BMC Public Health* 2017; 17(1): 129. <https://doi.org/10.1186/s12889-016-4000-2>

19. Rodrigues OS, Francisco PMSB, Fontanella AT, Borges RB, Costa KS. Uso e fontes de obtenção de psicotrópicos em adultos e idosos brasileiros. *Ciênc Saúde Coletiva* 2020; 25(11): 4601-14. <https://doi.org/10.1590/1413-812320202511.35962018>
20. Fernandes CSE, Azevedo RCS, Goldbaum M, Barros MBA. Psychotropic use patterns: are there differences between men and women? *PloS One* 2018; 13(11): e0207921. <https://doi.org/10.1371/journal.pone.0207921>
21. Prado MAMB, Francisco PMSB, Barros MBA. Uso de medicamentos psicotrópicos em adultos e idosos residentes em Campinas, São Paulo: um estudo transversal de base populacional. *Epidemiol Serv Saúde* 2017; 26(4): 747-58. <https://doi.org/10.5123/S1679-49742017000400007>
22. Quintana MI, Andreoli SB, Peluffo MP, Ribeiro WS, Feijo MM, Bressan RA, et al. Psychotropic drug use in São Paulo, Brazil--an epidemiological survey. *PloS One* 2015; 10(8): e0135059. <https://doi.org/10.1371/journal.pone.0135059>
23. Grunenbaum MF, Oquendo MA, Manly JJ. Depressive symptoms and antidepressant use in a random community sample of ethnically diverse, urban elder persons. *J Affect Disord* 2008; 105(1-3): 273-7. <https://doi.org/10.1016/j.jad.2007.04.022>
24. Athanasopoulos C, Pitychoutis PM, Messari I, Lionis C, Papadopoulou-Daifoti Z. Is drug utilization in Greece sex dependent? A population-based study. *Basic Clin Pharmacol Toxicol* 2013; 112(1): 55-62. <https://doi.org/10.1111/j.1742-7843.2012.00920.x>
25. Campanha AM, Ravagnani B, Milhoroça IA, Bernik MA, Viana MC, Wang YP, et al. Benzodiazepine use in Sao Paulo, Brazil. *Clinics (Sao Paulo)* 2020; 75: e1610. <https://doi.org/10.6061/clinics/2020/e1610>

RESUMO

Objetivo: Descrever o consumo de psicofármacos pela população adulta residente em Brumadinho, Minas Gerais, após o rompimento da barragem da Vale, ocorrido em 2019. **Métodos:** Trata-se de um estudo transversal, inserido no Projeto Saúde Brumadinho, desenvolvido em 2021, junto a uma amostra representativa da população adulta (18 anos ou mais) residente no município de mesmo nome. Foram incluídos na análise 2.805 indivíduos com informações sobre o uso autorreferido de psicofármacos (antidepressivos e ansiolíticos-hipnóticos/sedativos) nos últimos 15 dias. A prevalência do uso de psicofármacos foi estimada e os psicofármacos mais utilizados foram identificados. O teste do qui-quadrado de Pearson (com correção de Rao-Scott) foi utilizado para testar as associações entre exposições e o uso de psicofármacos, considerando-se o nível de significância de $p < 0,05$. **Resultados:** O uso de antidepressivos (14,2%) foi mais comum do que o uso de ansiolíticos ou hipnóticos/sedativos (5,2%), sendo a sertralina e a fluoxetina os antidepressivos mais utilizados. O uso de ansiolíticos e hipnóticos/sedativos foi maior entre os moradores que residiam em área diretamente atingida pela lama da barragem, e o uso de algum psicofármaco foi maior entre aqueles que perderam algum parente/amigo no desastre e que avaliaram que sua saúde piorou após o desastre bem como entre mulheres. **Conclusão:** Os resultados do estudo corroboram o observado em outras populações expostas a tragédias semelhantes no que concerne às associações identificadas e ao padrão de utilização desses psicofármacos.

Palavras-chave: Psicofármacos. Uso de medicamentos. Desastre. Farmacoepidemiologia.

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