



Research Article

Depression, Anxiety, Quality of Life, and Coping Strategies in People Exposed to Periodic Floods of Capivara River in Imperatriz City-Maranhao State, Brazil

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Received: 23 January 2022; **Accepted:** 04 February 2022; **Published:** 09 March 2022

Citation: Antonio Soares Silva, Edmar Bernardes de Oliveira Junior, Jornê Cabral Macedo, Jusciellyson da Silva Nava, Keven Rufino Menezes, Maria Clara dias de Sousa, Ricardo Freitas de Oliveira, Carlos Alberto Paraguassú-Chaves, Carlos Tomaz. Depression, Anxiety, Quality of Life, and Coping Strategies in People Exposed to Periodic Floods of Capivara River in Imperatriz City – Maranhão State, Brazil. Journal of Environmental Science and Public Health 6 (2022): 109-128.

Abstract

Introduction: Urban natural disasters, caused by floods due to river overflows, contribute to the environmental degradation of cities and cause

physical and material losses. While neuropsychiatric disorders emerge, so do coping strategies in the affected individuals.

Objective: To investigate the possible relationship between the periodic flooding of Riacho Capivara (Capivara river), in the Vila Ipiranga neighborhood of the city of Imperatriz – Maranhão State, Brazil, and the appearance or worsening of psychological symptoms in its riverside population, as well as their coping mechanisms to these events.

Materials and Methods: Sixty individuals of both sexes, aged between 15 and 75 years, periodically affected by the overflow of the Riacho Capivara from January to April 2021, were studied. Socioeconomic profiles, anxiety and depression levels were evaluated using the Hamilton scale; quality of life was assessed using the World Health Organization Quality of Life WHOQOL-bref form; and coping strategies, using the Coping Strategies inventory of Folkman and Lazarus.

Results: Most participants were between 15 and 45 years old, most males had elementary school education while females had high school diplomas. For anxiety levels, men were only classified as mild, while women had mild, moderate and, to a lesser extent, severe levels in the Hamilton scale. Mild and moderate degrees of depression were more prevalent in men, while women presented higher percentages of moderate and severe degrees. While, overall, the quality of life was compromised, most subjects used different coping strategies to face adversity.

Conclusions: The floods of Riacho Capivara adversely impact the quality of life of riverside populations, as they presented high percentages of anxiety and depression according to the Hamilton scale. However, these individuals demonstrate a great

capacity for coping and resilience-linked coping strategies.

Keywords: Natural disasters; Floods; Anxiety; Depression; Quality of life; Coping strategies

1. Introduction

Among the most relevant urban environmental issues today are those arising from natural phenomena. Although public policies have been implemented to avoid and contain the effects of natural disasters, these phenomena still cause significant social, economic and environmental costs for society [1], disproportionately affecting the most socio-economically vulnerable populations. These occurrences frequently generate high costs to the public coffers, given the inadequacy of government investment and cause the loss of lives and the breakdown of families [2].

Environmental disasters are closely related to the urbanization process, in promoting the disorderly use of the environment and natural resources and to the indiscriminate occupation of urban space, which, in turn, exposes populations to the threats caused for these phenomena. This phenomenon has been reported in several places in Brazil such as in the states of Bahia [3], Amazonas [4], and Goiás [5] as well as in the megalopolis São Paulo [6]. In Brazil, the most common phenomena are related to the climate, in particular floods and landslides [7]. In the 1990s, 8.671 disasters were recorded and, between the years 2000 and 2010, there were 23.238, representing an increase of 73%. These disasters affect a considerable percentage of the Brazilian population,

since many of them are living in disaster-prone areas due to disorderly occupation [2].

The disorderly and chaotic urban occupation has contributed to the degradation of the environment, which only tends to worsen as the urban limit grows. Veritable human tragedies have been reported, demonstrating the need to consider the factors involved, from health care to material losses, in addition to understanding the anguish and other psychological distresses of the affected populations [8].

The city of Imperatriz, in the Brazilian state of Maranhão, had its population growth accelerated after the construction of the Belém-Brasília highway, where the watershed of the Riacho Capivara is located. The bodies of water present high levels of pollution [7], due in part to uncontrolled population expansion [9]. With the disorderly urban development of Imperatriz, problems such as landslides and flooding have increased due to the impermeability of the soil and the lack of adequate plumbing [7]. High intensity natural disasters cause a significant impact on the mental health of individuals who experience them, generating feelings of fear and suffering for the losses, in addition to property damage and economic loss [8].

As a psychological response to adverse situations, the development of coping actions should to be implemented. Coping is an approach where theory is intended to be brought closer to practical experience, incorporating to the analysis of the relationship with well-being. Coping can be defined as static or dynamic efforts used by the subject, both at a

cognitive and behavioral level, to act in the face of internal and/or external situations, which overload or extrapolate their personal resources [10]. Coping can also be defined as the ways people react to stress. Thus, identifying which types of coping strategies are more adaptive or the ones that relate to healthier processes significantly contributes to interventions in all areas of life. In this context, the present study investigated the possible relationship between the periodic flooding of the Riacho Capivara in Vila Ipiranga in the city of Imperatriz and the appearance or exacerbation of neuropsychiatric symptoms, in riverside populations as well as their capacity for adaptation.

2. Materials and Methods

2.1 Type of study

The present study has descriptive and exploratory characteristics, observing the presence of and with the objective of understanding a problem. It is characterized by a quantitative, Ex-Post-Facto approach as it seeks to describe an existing phenomenon. It is a cross-sectional study, as it makes a specific cut-off point in time.

2.2 Population and subjects

The population consisted of riverside dwellers, living in the Vila Ipiranga neighborhood in the city of Imperatriz, state of Maranhão, Brazil. Vila Ipiranga is estimated at around 3000 people, and our sample size was 60 residents, all volunteers, aged between 15 and 75 years old of both sexes (33 females and 27 males). As criteria for inclusion, residents needed to have lived on the blocks affected in 2021 by the Riacho Capivara flood and signed the Free and Informed Consent Term (ICT). For subjects under 18 years of

age, parents or legal guardians signed the ICT. Subjects who did not present physical, psychological, or cognitive conditions to understand the data collection instruments were excluded from the study.

2.3 Instruments and procedures for data collection and analysis

Sociodemographic data collection was carried out through a questionnaire. In order to assess the subject's quality of life, the World Health Organization Quality of Life WHOQOL-BREF form was used [11]. The WHOQOL-BREF has 26 multiple choice questions, two of which are general (related to general quality of life and satisfaction with one's health), while the others simulate each of the 24 aspects that make up the original instrument, the WHOQOL-100. The four areas encompassed by the abbreviated version are: physical, psychological, social relationships and environment with four types of response: intensity (not at all to extremely), capacity (not at all to completely), evaluation (very dissatisfied – very satisfied; very poor – very good) and frequency (never – always). Each of the options corresponds to a numerical value from 1 to 5 [12].

Hamilton scales were used to assess and levels of depression and anxiety [13, 14]. The Hamilton Anxiety Assessment Scale (HAM-A) covers 14 categories of symptoms, which are subdivided into two groups, seven related to symptoms of anxious mood and seven pertaining to physical symptoms of anxiety [13]. The Hamilton Depression Rating Scale (HAM-D) is composed of 21 items, with three questions regarding depressed mood, sleep, work and psychomotricity, anxiety, and symptoms related to disordered thinking each; four questions related to

sleep, and a question for, weight loss, disease awareness and diurnal variation each.

Finally, the Inventory of Coping Strategies by Folkman and Lazarus [10] was used to assess the capacity and degree of resilience of riverside populations against the floods of the Riacho Capivara. The Folkman and Lazarus Coping Inventory [10] is a questionnaire that contains 66 items encompassing thoughts and actions used to deal with internal or external distresses of a specific stressful event. It is divided into eight factors: Factor 1 – confrontative coping (items 46, 7, 17, 28, 34 and 6); Factor 2 – distancing (items 44, 13, 41, 21, 15 and 12); Factor 3 – self-controlling (items 14, 43, 10, 35, 54, 62 and 63); Factor 4 – seeking – social support (items 8, 31, 42, 45, 18 and 22); Factor 5 – accepting responsibility (items 9, 29, 51 and 25); Factor 6 – escape-avoidance (items 58, 11, 59, 33, 40, 50, 47 and 16); Factor 7 – planful problem-solving (items 49, 26, 1, 39, 48 and 52); Factor 8 – positive reappraisal (items 23, 30, 36, 38, 60, 56 and 20) [15].

Data were collected in loco by the researcher and by six students from the CEUMA School of Medicine, who received a fifteen-hour training in order to apply the questionnaires in a standardized way. Each student was responsible for a specific questionnaire. Data were collected in a single session of approximately 120 minutes, totaling approximately 7,200 h of interviews. Data were submitted to descriptive statistics techniques through the frequency (%) of all variables and scales applied.

3. Results

3.1 Sociodemographic profile

The sociodemographic profile is shown in table 1. Most male subjects were between 35 and 45 years old, followed by 25 and 35 years old, 15 and 25 years old, 55 and 65 years old and over 70 years old. For

females, there was a higher prevalence between 15 and 25 years old, followed by 25 and 35, 55 and 65, 45 and 55, 55 and 65 and over 70 years old.

AGE (YEARS)	MALE	FEMALE
15 – 25	18.5 %	27.3%
25 – 35	22.2%	24.2%
35 – 45	33.3%	12.1%
45 – 55	18.5%	15.1%
55 – 65	3.8%	15.2%
Older than 65	3.7%	6.1%
Illiterate	11.1 %	9.0%
Elementary School	55.6%	39.4%
High School	33.3%	45.5%
Univeristy Degree	0.0%	6.1%
Less than 01	33.3 %	48.5%
01 a 02	59.3%	42.4%
02 a 05	7.4%	9.1%
More than 05	0.0%	0.0%
Active	56%	36%
Inactive	44%	64%
Single	40.7%	27.3%
Married	51.9%	54.5%
Owns propriety	74%	88%
Rents propriety	22%	9%
Loans propriety	4%	3%

Table 1: Sociodemographic profile.

Scholarship levels of males was mostly elementary school, followed by high school and no formal schooling. None of them reported having higher education. The female subjects had, predominantly, a high school education, followed by elementary school and illiterate. Only a small portion had a higher education degree. Regarding the salary range of the participants, most received between one and two minimum wages (R\$ 1,000 to 2,000). As for employment status, most male subjects were employed, and most female subjects were unemployed. On marital status, both sexes were

predominantly married. Regarding the type of housing, most subjects claimed to have their own house, while the others report renting or living in a loaned property.

3.2 Anxiety

The anxiety levels reported showed that 100% of male subjects were classified with mild levels, and most female were classified as mild, followed by moderate and very severe levels of anxiety, as shown in table 2.

CLASSIFICATION OF ANXIETY LEVEL	MALE	FEMALE
Mild	100%	82%
Moderate	0.0%	15%
Severe	0.0%	0.0%
Very severe	0.0%	3%

Table 2: Anxiety levels according to HAM-A.

3.3 Depression

Depression levels reported by most male subjects have shown a mild level, followed by normal, moderate, severe and very severe levels according to

the HAM-D. Female subjects, have mostly presented moderate degrees, followed by mild, normal, severe and very severe.

DEPRESSION LEVELS	MASCULINO	FEMININO
Normal	25.9%	24.3%
Mild	40.8%	30.3%
Moderate	14.8%	33.3%
Severe	14.8%	9.1%
Very severe	3.7%	3.0%

Table 3: Classification of depression levels according to HAM-D.

3.4 Support from others

When subjects asked if they get the kind of support that they need, male and female subjects reported

receiving a great deal of support from a third party, followed by moderate, not at all, not much, and complete support, as described in the table. 4.

LEVEL OF SUPPORT RECEIVED	MALE	FEMALE
Completely	11.1%	15.2%
A great deal	29.6%	30.2%
Moderately	25.9%	21.2%
Not much	14.8%	18.2%
Not at all	18.5%	15.2%

Table 4: Support from others.

3.5 Quality of life

Regarding self-perception of quality of life, male subjects more often scored their quality of life as neither poor nor good, followed by good, very good

and poor rates. Female subjects more often reported having a good quality of life, followed by neither poor nor good and poor as shown in table 5.

QUALITY OF LIFE	MALE	FEMALE
Very good	11.1%	6.0%
Good	22.2%	39.4%
Neither poor nor good	55.6%	36.4%
Poor	11.1%	18.2%
Very poor	0.0%	0.0%

Table 5: Self-perception of quality of life.

CLASSIFICATION OF HEALTH SATISFACTION	MALE	FEMALE
Very Satisfied	33.3%	33.3%
Satisfied	33.3%	24.3%
Neither satisfied nor dissatisfied	22.3%	21.2%
Dissatisfied	11.1%	21.2%
Very dissatisfied	0.0%	0.0%

Table 6: Self satisfaction with health.

3.6 Health satisfaction

When subjects asked about self-satisfaction with health, most subjects of both sexes reported being very satisfied, followed by satisfied, neither satisfied nor dissatisfied and dissatisfied, in that order, as shown in table 6.

Table 7 lists questions about general health of the participants in the last two weeks before the interview. The first question dealt with physical pain and the ability to perform tasks. Results indicate that, for most subjects, physical pain does not have an influence on performing tasks, followed by very much, a little, a moderate amount and an extreme amount.

Regarding the question on the need of medical treatment to function in daily life, it was most frequently reported that subjects do not need it, followed by a moderate amount, and extreme amount, a little and very much. As to how much the subject enjoys life, it was more often reported that they enjoy an extreme amount, followed by very much, a little, not at all and a moderate amount.

On the extent to which they felt their life was meaningful, the most frequent answer was extremely, followed by very much, a moderate amount, more or less, a little and not at all. Regarding how well subjects were able to concentrate, most reported having extreme concentration capacity, followed by more or less, very much, a little and not at all. On the

issue of safety in daily life, the majority of participants reported feeling extremely safe, followed by very much, a moderate amount, a little and not at all safe. Finally, when asked about the how healthy was the subject's physical environment, the majority reported that they considered it more or less healthy, followed by not healthy, very little and a lot.

The female group, when asked about physical pain, reported most that nothing influences, followed by, extremely, very little and a lot. Regarding how much are they in need of a medical treatment, the majority reported needing no medical treatment, then needing a lot, more or less, very little and extremely. Regarding how much the person enjoys life, most reported enjoying it extremely, followed by a lot, very little, more or less and not at all.

As for the meaning of life, most reported considering life to have an extremely important meaning, followed by a lot, more or less, very little and nothing. Regarding concentration, the majority reported having extreme concentration capacity, followed by a lot, more or less, very little and nothing. For the question that investigates safety in daily life, most individuals reported feeling extremely safe, followed by a lot, very little and not at all safe.

Finally, when asked about their physical condition, the majority reported that they considered themselves to be quite healthy, followed by, quite a lot and extremely.

GENERAL STATUS OF HEALTH IN THE PAST TWO WEEKS						
Questions	Group	Not at all	Little	Moderate amount	Very much	An extreme amount
To what extent do you feel that physical pain prevents you from doing what you need to do?	MALE	51.90%	14.80%	11.10%	14.80%	7.40%
	FEMALE	36.40%	9.10%	24.20%	9.10%	21.20%
How much do you need any medical treatment to function in your daily life?	MALE	63%	7.40%	11.10%	7.40%	11.10%
	FEMALE	48.50%	9.10%	12.10%	21.20%	9.10%
How much do you enjoy life?	MALE	7.40%	22.20%	3.70%	25.90%	40.80%
	FEMALE	6.10%	9.0%	6.10%	36.40%	42.40%
To what extent do you feel your life to be meaningful?	MALE	0.0%	3.70%	14.80%	14.80%	66.70%
	FEMALE	0.0%	0.0%	3%	27.30%	69.70%
How well are you able to concentrate?	MALE	0.0%	7.40%	25.90%	7.40%	59.30%
	FEMALE	0.0%	3.0%	12.10%	36.40%	40.50%
How safe do you feel in your daily life?	MALE	0.0%	7.40%	25.90%	29.60%	37.0%
	FEMALE	0.0%	12.10%	6.10%	39.40%	42.40%
How healthy is your physical environment?	MALE	25.90%	18.50%	33.30%	7.50%	14.80%
	FEMALE	9.10%	24.20%	27.30%	30.30%	9.10%

Table 7: Questionnaire about general state of health in the past two weeks.

Table 8 shows another set of questions related to quality of life for both sexes. The male group, when asked about energy in their daily lives, most reported having “full energy”, followed by “quite a lot”, “average”, “very little” and “nothing”. The subjects, when asked if they were able to accept their physical appearance, most reported "completely accept", followed by "average", "very", "very little" and "nothing".

Regarding whether the subject had enough money to satisfy their needs, most said yes, followed by medium, very little, completely and nothing. Regarding the availability of information for everyday life, most reported having “a lot of information”, followed by “very little”, completely, nothing and

medium. Regarding the extent to which leisure is offered, the majority reported being satisfied, followed by very, medium, very little and very little.

The female group on the question of energy for their daily lives, most reported having “full” energy, followed by very, medium, very little and nothing. Regarding whether the person is able to accept their physical appearance, most reported accepting “completely”, followed by “very”, “very little”, “average and nothing”.

Regarding whether the person has enough money to satisfy their needs, the majority stated moderately, followed by completely, very, very little and nothing. Regarding the availability of information for everyday

life, most reported having a lot of information, followed by very little, completely, medium and nothing. On the availability of leisure activities, most

individuals of both sexes reported “very little”, followed by completely, very much, nothing and medium.

QUALITY OF LIFE						
Questions	Group	Not at all	Very little	Moderately	Mostly	Completely
Do you have enough energy for everyday life?	MALE	0.0%	3.70%	7.40%	33.30%	66.60%
	FEMALE	3%	0.0%	12.10%	24.30%	60.60%
Are you able to accept your bodily appearance?	MALE	0.0%	7.40%	18.50%	7.50%	66.70%
	FEMALE	0.0%	9.10%	3.10%	30.30%	57.50%
Have you enough money to meet your needs?	MALE	3.70%	25.90%	25.90%	25.90%	18.60%
	FEMALE	0.0%	15.10%	26.40%	18.20%	30.30%
How available to you is the information that you need in your day-to-day life?	MALE	14.80%	25.90%	7.40%	33.30%	18.60%
	FEMALE	0.0%	27.30%	12.10%	45.50%	15.10%
To what extent do you have the opportunity for leisure activities?	MALE	14.80%	11.10%	18.50%	18.50%	37.10%
	FEMALE	9.10%	39.40%	3.10%	18.10%	30.30%

Table 8: General state of health in the last two weeks.

3.7 Mobility

In order to evaluate mobility, the following question was asked: “How well are you able get around?” Table 9 presents data on the walking ability of both sexes. Most male subjects responded being very

satisfied with their mobility, followed by “satisfied” (very good), “neither satisfied nor dissatisfied”, and “dissatisfied”. Most female subjects reported being very satisfied, followed by satisfied, dissatisfied, neither satisfied nor dissatisfied and very dissatisfied.

MOBILITY LEVELS	MALE	FEMALE
Very good	63.0%	72.7%
Good	18.5%	15.2%
Neither poor nor good	7.4%	3.0%
Poor	11.1%	9.1%
Very poor	0.0%	0.0%

Table 9: Mobility.

Table 10 presents questions about sleep satisfaction. Most male subjects reported being very satisfied, followed by neither satisfied nor dissatisfied, satisfied, dissatisfied and very dissatisfied. The female group also reported mostly being very satisfied, followed by dissatisfied, neither satisfied nor dissatisfied, very dissatisfied and satisfied. When asked about their ability to perform their day-to-day activities, most male subjects reported being very satisfied, followed by satisfied, neither satisfied nor dissatisfied, dissatisfied and very dissatisfied.

Most female subjects also reported being very satisfied, followed by satisfied, neither satisfied nor dissatisfied, dissatisfied and very dissatisfied. As for the ability to work, most male subjects reported being very satisfied, followed by neither satisfied nor dissatisfied, satisfied, very dissatisfied and dissatisfied. Most female subjects reported being very satisfied, followed by satisfied, neither satisfied nor dissatisfied, dissatisfied and very dissatisfied.

When asked how satisfied they are with themselves, most male subjects answered being “very satisfied”, followed by “satisfied”, “neither satisfied nor dissatisfied”, “dissatisfied” and “very dissatisfied”. Most female subjects reported being “very satisfied”, followed by “satisfied”, “neither satisfied nor dissatisfied”, “dissatisfied” and “very dissatisfied”. When asked about their satisfaction levels regarding friends, relatives, acquaintances and colleagues, most male subjects reported being “very satisfied”, followed by “satisfied”, “dissatisfied”, “neither satisfied nor dissatisfied” and “very satisfied”. Most female subjects reported being “very satisfied”, followed by “satisfied”,

“dissatisfied”, “neither satisfied nor dissatisfied” and “very dissatisfied”.

Regarding satisfaction levels in their sexual lives, most male subjects reported being “very satisfied”, followed by “satisfied”, “neither satisfied nor dissatisfied”, “dissatisfied” and “very dissatisfied”. For females, the majority reported being “very satisfied”, followed by “satisfied”, “neither satisfied nor dissatisfied”, “dissatisfied” and “very dissatisfied”. Regarding satisfaction levels of the support received from friends, most male subjects reported being “very satisfied”, followed by “satisfied”, “neither satisfied nor dissatisfied”, “dissatisfied” and “very dissatisfied”. The female subjects mostly report being “very satisfied”, “satisfied”, “neither satisfied nor dissatisfied”, “dissatisfied” and “very dissatisfied”.

On the question concerning living conditions, most male subjects reported being "satisfied", followed by "very dissatisfied", "dissatisfied", "neither satisfied nor dissatisfied" and "very dissatisfied". The female subjects reported being “neither satisfied nor dissatisfied”, followed by “dissatisfied”, “very satisfied”, “very dissatisfied” and “satisfied”. As to their levels of satisfaction with access to health services, most male subjects reported very dissatisfied, followed by neither satisfied nor dissatisfied, satisfied, dissatisfied and very satisfied. However, most women reported being very dissatisfied, followed by neither satisfied nor dissatisfied, satisfied, dissatisfied and very satisfied. Finally, regarding their levels of satisfaction with their means of transportation, most men reported being “satisfied”, followed by “very satisfied”, neither

satisfied nor dissatisfied, dissatisfied and very dissatisfied. When the same question was asked to women, the majority reported being very satisfied,

followed by satisfied, dissatisfied, very dissatisfied and neither satisfied nor dissatisfied.

The following questions ask how well or satisfied the subjects felt about various aspects of their lives in the past two weeks.

Questions	Group	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
How satisfied are you with your sleep?	MALE	0.0%	11.10%	22.20%	18.50%	48.20%
	FEMALE	9%	21.20%	15.20%	6.10%	48.50%
How satisfied are you with your ability to perform your daily living activities?	MALE	0.0%	11.10%	14.80%	29.60%	44.50%
	FEMALE	0.0%	9.0%	15.20%	18.20%	57.60%
How satisfied are you with for work?	MALE	3.70%	0.0%	29.60%	25.90%	40.80%
	FEMALE	0.0%	9.0%	30.30%	15.20%	45.50%
How satisfied are you with yourself?	MALE	0.0%	0.0%	14.80%	22.20%	63%
	FEMALE	0.0%	3.0%	3.0%	2730%	66.70%
How satisfied are you with personal relationships?	MALE	0.0%	11.10%	0.0%	11.10%	77.80%
	FEMALE	0.0%	6.10%	3.0%	12.10%	78.80%
How satisfied are you with your sex life?	MALE	0.0%	0.0%	14.80%	14.80%	70.40%
	FEMALE	0.0%	3.10%	12.10%	12.10%	72.70%
How satisfied are you with you get from your friends?	MALE	0.0%	7.50%	25.90%	33.30%	3330%
	FEMALE	3.0%	9.10%	12.10%	30.30%	45.50%
How satisfied are you with the conditions of your living place?	MALE	22.20%	18.50%	14.80%	37%	7.50%
	FEMALE	15.10%	27.30%	27.30%	9.10%	21.20%
How satisfied are you with your access to health services?	MALE	26,0%	14.80%	25.90%	22.20%	11.10%
	FEMALE	33,30%	12.0%	30.30%	21.30%	3.0%
How satisfied are you with your transport?	MALE	7,40%	7.40%	7.40%	40.50%	37.0%
	FEMALE	9,10%	9.10%	3.0%	39.40%	39.40%

Table 10: Quality of life questionnaire.

Table 11 shows the percentage of responses on the frequency of negative feelings such as bad mood, despair, anxiety, and depression. Most male subjects reported never having these feelings, followed by

sometimes, often, very often, and always. The female group reported mostly presenting sometimes, followed by never, often, very often and always.

FREQUENCY OF NEGATIVE FEELINGS	MALE	FEMALE
Always	3.0%	9.1%
Very often	11.1%	12.1%
Quite often	14.8%	21.2%
Seldom	22.2%	33.3%
Never	48.2%	24.2%

Table 11: Frequency of negative feelings.

FACTORS	MALE				FEMALE			
	0	1	2	3	0	1	2	3
1 – confrontative coping	66.68%	0.0%	3.7%	23.5%	66.68%	3.08%	6.78%	23.45%
2 – Distancing	66.68%	3.08%	6.78%	23.45%	57.70%	4.24%	11.10%	26.96%
3 – Self-controlling	66.68%	3.08%	6.78%	23.45%	33.26%	0.84%	8.22%	57.68%
4 – Seeking social support	51.25%	2.47%	3.08%	43.20%	51.25%	2.47%	3.08%	43.20%
5 – Accepting responsibility	47.63%	2.64%	8.99%	40.74%	47.63%	2.64%	8.99%	40.74%
6 – Scape-avoidance	20.35%	5.55%	9.25%	64.85%	31.80%	6.05%	9.1%	53.05%
7 – Planful problem-solving	21.13%	9.25%	10.18%	57.45%	18.95%	7.57%	18.17%	55.3%
8 – Positive reappraisal	31.26%	2.88%	10.69%	55.18%	44.10%	3.71%	10.10%	42.09%

Table 12: Coping.

3.8 Coping

Table 12 presents the percentages of the averages compiled from the responses of the male and female groups grouped by factor. Regarding factors 1 (confrontation), 2 (withdrawal), 4 (social support) and 5 (acceptance and responsibility), there was a clear predominance of the answer “I did not use this strategy”, followed by “I used it in large quantities”, so for “used a lot” and “used a little” for both sexes.

The responses of the male group to factor 3 (self-control) showed the prevalence of “I did not use this strategy”, followed by “I used it in large quantities”, “I used it a lot” and “I used it a little”. In the female group, the predominance of responses was “I used it in large quantities”, “I did not use it in this strategy”, “I used it a lot” and “I used it a little, respectively. The answers of both sexes for factors 6 (escape and avoidance), 7 (problem solving and 8 (positive

reassessment) showed that the answers from most prevalent to least prevalent were the following: “I used a lot”, followed by for “I did not use this strategy”, “I used it a lot” and “I used it a little”.

4. Discussion

The present study sought to investigate the levels of anxiety, depression, quality of life and coping strategies individuals of both sexes who live in areas that suffer from the periodic flooding of Riacho Capivara in Vila Ipiranga in Imperatriz from January to April 2021. The investigated population comprised an age group from 15 to 75 years old and the average age for both sexes was between 15 and 45 years old. Since the average age of the municipality of Imperatriz is between 15 and 44 years [9], the sample studied is within the average age of the other regions of the municipality of Imperatriz.

With regard to schooling, 6.1% female subjects had university courses and none were illiterate, which fundamentally differs from male subjects, none of whom had a college degree. However, the discussion of this topic will need to be carried out in a segmented way and based on data from other municipalities in the state of Maranhão, which, although not ideal, is the alternative for a better approximation of an adequate panorama on the subject matter. A survey carried out in Imperatriz, Maranhão, with the objective of surveying the socioeconomic profile of pregnant women, found that 66.39% attended high school, which partly corroborates the data on the female population of this study [16].

The average monthly salary in the municipality of Imperatriz in Maranhão is two minimum wages

(around R\$2.000) [9]. The data of the present study demonstrate that the population of interest in this research received between one and two minimum wages for both sexes, indicating that it is within the average monthly income observed for the general population of the municipality of Imperatriz. However, the present study observed a higher percentage of women earning more than five minimum wages. The family income of breastfeeding mothers in Imperatriz is mostly between one and three minimum wages, in part corroborating the data observed here [16]. These data associated with schooling seem to indicate a positive correlation between higher schooling and higher wages in the female group and, conversely, lower education observed for the male group, correlated with a higher prevalence of lower average salary.

Additionally, if we observe that the annual per capita income in 2018 in the municipality of Imperatriz was R\$ 27,621.33 [9] it is possible to affirm that our data are close to the range of two to three monthly minimum wages. With regard to employment status, the majority of male subjects (56%) reported being employed, while the data for females demonstrate inversely that most women were not working (64%). Thus, it can be said that approximately 50% of the investigated population is unemployed. These data show a greater number [9] since Imperatriz had an unemployment rate of 12.6% in 2020 and the state of Maranhão reached 19.9% in November 2021 during the COVID19 pandemic. These data indicate the need for a more detailed investigation to try to understand the reasons for this high unemployment rates in this riverside population.

Regarding to the marital status of male subjects is predominantly composed of married individuals, followed by single and widowed individuals, while for females there is also predominance of married women, followed by single, widowed and divorced individuals.

About the type of housing, for both sexes, most participants own their houses, followed by renting and loaning. The female group had a higher percentage of home ownership than the male group, while there are considerably more men renting houses than women. With regard to the psychosocial factors associated with the daily lives of people who suffer from the periodic flooding of the Riacho Capivara, the anxiety factor shows a very different pattern between the two sexes.

In the male group, 100% had a mild degree of anxiety, while, in the female group, 82% had mild anxiety, 15% moderate and 3% very severe. Natural disasters, such as floods and landslides, have shown to affect the mental health of the affected population, as mentioned above [17]. Their effects can have negative impacts on the affected populations resulting in increased levels of anxiety and depression. In the present study, males did not show high levels of anxiety, rather curiously low levels than expected. On the other hand, female subjects showed anxiety levels similar to those reported in the literature [18].

A systematic review of the literature with meta-analysis [18] evaluated the levels of anxiety and depression in individuals who suffered natural disasters through an exposed versus unexposed comparison. Eight of nine studies analyzed reported

high rates of these disorders in the group exposed to natural disasters, three studies reported a very large effect, and two studies reported ambiguous data that could be combined by meta-analysis. The overall percentage showing anxiety/depression in the exposed group was 10% compared to 2% in the unexposed group, which was partly observed in our study.

Another study [19] investigated the levels of anxiety in the face of natural weather-related disasters such as hurricanes, droughts and floods and showed that the anxiety levels of the affected populations are considerably higher than that of a population not affected by natural disasters. Still, the same study infers that as the frequency, severity and duration of climatic disasters increase, the combined effects of acute and chronic disasters interact and impact each other, creating more psychological complications than the occasional or isolated event [19]. In view of this observation, it would be interesting to evaluate in the population of the present study whether there could be an increase in the levels of anxiety and depression over the next few years and the next floods.

A study with a sample of 498 university students investigated anxiety levels, assuming that the university environment is a predisposing factor for anxiety. The results indicated high levels of anxiety and that female individuals showed higher levels than male ones [20] which, in part, is in line with what was observed in the present study, when considering that females presented moderate and severe anxiety, while males did not.

Depression is a leading cause of functional impairment worldwide and is associated with high

personal and social costs [21, 22]. For women, depressive and anxiety-related disorders are associated with a prevalence of, and number of years lived with disability more than twice as much as for men [22, 23]. As for the levels of depression, the present study demonstrates a similar pattern between men and women, however, slight differences in the mild levels of depression with a larger share of incidence of mild degree for males and moderate for females were observed. The worrying finding is that there is 3 to 3.7% of very severe depression and 9.1 to 14.8% of severe depression, respectively, for the female and male groups.

Levels of post-traumatic psychological stress and depression are increased in populations that experience natural disasters compared to populations that do not experience similar events [18]. This same study also infers that the high levels of heterogeneity between studies suggest that disaster variables and the post-disaster response have the potential to mitigate adverse effects, but that even so, due to this heterogeneity, as the results gain a larger volume, they can be more easily generalized to different populations. In the present study, a trend towards milder degrees of depression in male subjects and from moderate to severe in female subjects was evident. The higher incidence of depression and anxiety among women may be related to the levels of dehydroepiandrosterone, testosterone and progesterone as these hormones may be closely linked to the increase in depressive symptoms in women [23].

In addition to the floods reported here, the COVID-19 pandemic experienced by our volunteers should be

considered. The insecurity about the disease together with the actions to contain it (social isolation) caused an enormous load of psychological stress in the world population and recent studies have already demonstrating these effects [24, 25]. Therefore, it is possible that the effects reported here are associated with the stress induced by the pandemic and not exclusively with the weather-related natural disasters. Further studies without controlling for the pandemic may help to clarify this question.

Another aspect investigated in our study was the quality of life of the population affected by the overflows of the Riacho Capivara in the municipality of Imperatriz. The data showed that, in general, the quality of life was compromised for most subjects, regardless of gender. However, when looking to investigate external factors such as their relationships with others, the evaluation was positive. However, the answers predominantly indicated dissatisfaction or a lot of dissatisfaction regarding environmental conditions and access to health.

For a city with a Human Development Index of 0.731, which is considered average by Brazilian standards, the result observed for quality of life is low, even considering that the sample of subjects is affected by floods, which impacts the quality of life negatively. Interestingly, when we look at the quality of life of the male and female groups, we observe that the responses neither bad nor good, bad and very bad, when added together, show a high prevalence, which can characterize a quality of life lower than expected for this group.

Regarding self-perception, both groups predominantly

report being extremely satisfied or that nothing prevents them from having a good quality of life. However, when the questions are about access to services or about financial conditions, it is clear that both groups have difficulties, but there is a tendency of stating that they are neither satisfied nor dissatisfied, which could be interpreted as a certain resilience to adversity. Still, on the question regarding thoughts, negative ideations such as despair or bad mood, the male group predominantly stated never having this type of thought, while the female group predominantly answered “sometimes”. Finally, when analyzing the self-perception data, it is suggested that the population studied, despite the existence of levels of anxiety and depression, has a high degree of resilience in the face of periodic flooding of the Riacho Capivara.

Regarding the coping strategies used by the subjects, it became evident that the majority did not attribute the cause of their problems to others, did not try to escape from thoughts and attributions caused by the floods, showed average self-control in the face of the situation and had good support from their social circle. Most of the interviewees stated that they accepted their responsibility for the problem. However, even without blaming themselves, at the same time they sought internal and external solutions to the problem. Finally, most of them made a positive assessment of the problems faced in order to believe that they may have even emerged stronger from their experiences with the overflow of the Riacho Capivara.

The results are very similar between men and women. However, a caveat must be made in Item 4 (social

support), where female subjects reported greater social support than male subjects, that is, most men described in their responses that they resorted little or not at all to a friend, or a professional to help in confronting the situation, which suggests a greater internalization of the problem. Additionally, Item 8 (Positive Reassessment) shows a slight inversion between male and female subjects in terms of “I did not use this strategy” with a higher prevalence for men and “I used it in large quantities” for women.

In a brief historical overview of studies on coping strategies in natural disasters, the work of Menna & Krum [26] describes that there seems to be a model of collective coping after floods as a new perspective emerges, which corroborates the data observed here. However, the study investigated the losses experienced and the consequent psychological reactions of victims of floods in 2009 in Teresina in the state of Brazilian state of Piauí and suggested greater attention to the mental health of people affected by disasters and proposed that there be more research in the area to support the interventions. Nevertheless, it was also noted that, within the strategies used, what we call called Item 2 (withdrawal) was widely used as a means of escaping the psychological consequences of the experience [27].

In another study, it was shown that post-traumatic stress disorders resulting from a flood resulted in not only material losses, but also symbolic ones of the victims interviewed. They felt very afraid on the day of the event and that, when there is a forecast of rain, they end up reliving this feeling as an imminence of new events [28]. They also reported that, currently, they feel insecure and worried about the possibility

that it will happen again, reporting nervousness and fear.

5. Conclusions

It can be concluded from the present study that the levels of depression and anxiety in the subject group were high for both sexes and the quality of life was affected by the floods during the research period and no discrepancies between the sexes. In general, quality of life was compromised for most subjects of both sexes, considering both self-perception and the ability to receive support from others when needed, with significant percentages of anxiety and depression. However, the data obtained in relation to self-perception demonstrate a capacity for coping and resilience that are linked to the so-called “coping strategies”, with no important differences between men and women. Additionally, the coping strategies used by male and female subjects was quite similar and is in line with what is found in the literature.

Ethical Approval

The present study was submitted to the “Brazil Platform”, appreciated and approved by the Research Ethics Council of the University CEUMA (UNICEUMA) under CAAE number: 29312219.3.0000.5084. and followed the guidelines of Resolution No. 510/2016 of the National Health Council, of the Brazilian Ministry of Health.

References

1. Pivetta M. Risco de mais desastres naturais. *Revista Pesquisa FAPESP* (2019): 2-3.
2. Nina AS, Almeida OT de, Lobo ID. As abordagens técnica e social dos desastres

naturais no Brasil: uma análise comparativa entre os bancos de dados EM-DAT e S2ID. *Cadernos de Estudos Sociais* 36 (2021): 1-23.

3. Évelim M. Questões Ambientais No Município De Salinas Da Margarida-Bahia. *Revista do Programa Pós-Graduação em Geografia da Universidade Federal do Piauí* 9 (2020): 175-192.
4. Bezerra PC, Souza JD de, Urbanização de tabatinga e impactos ambientais: estudo de caso do igarapé Urumutum. *Revista GeoAmazônia* 9 (2021): 111-125.
5. Santana L. Estratégias de coping e suas relações com o bem-estar no trabalho: um estudo com bombeiros militares. *Dissertação de Mestrado Pós-Graduação em Psicologia - Universidade Federal da Bahia* (2016).
6. Pinho RML, Carriço JM. A urbanização na zona costeira e os impactos ambientais - o caso da RMBS no estado de São Paulo. *Leopoldianum* 47 (2021): 21-40.
7. Rodrigues MLGB, Santos LCA dos, Barbosa R dos S. Diagnóstico Ambiental da Bacia Hidrográfica do Riacho Capivara na Cidade de Imperatriz – Maranhão. *Revista FSA* 16 (2019): 174-189.
8. Oliveira CA de, Flach F. Contribuições da Psicologia no contexto de emergência e desastre (2020).
9. Pacífico Filho M, Borges TP, Teles MPL, Cançado AC. Cidades Médias na Amazônia Legal: Araguaína/TO, Imperatriz/MA e Marabá/PA – indutoras de desenvolvimento e desigualdades. *Redes- Revista do Desenvolvimento Regional* 25 (2020): 1477-

- 1503.
10. Lazarus RS, Folkman S Stress , Appraisal , and Coping. Springer Publishing Company (2006).
 11. Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. *Psychology Medicine* 28 (1998): 551-558.
 12. Puciato D, Borysiuk Z, Rozpara M. Quality of life and physical activity in an older working-age population. *Clinical Interventions in Aging* 12 (2017): 1627-1634.
 13. Sharp R. The hamilton rating scale for depression. *Occupational Medicine* 65 (2015): 340.
 14. DeSousa DA, Moreno AL, Gauer G, et al. Revisão sistemática de instrumentos para avaliação de ansiedade na população brasileira, *Avaliação Psicológica* 12 (2013): 397-410.
 15. Kuo BCH. Collectivism and coping: Current theories, evidence, and Measurements of Collective Coping. *International Journal of Psychology* 48 (2013): 374-388.
 16. Santos FS, Farias U de C, Felício RL, et al. Perfil socioeconômico e gestacional das mulheres que amamentam em imperatriz - MA. *Congresso Brasileiro de Enfermagem* 3 (2014).
 17. Makwana N. Disaster and its impact on mental health: A narrative review. *Journal of Family Medicine and Primary Care* (2019): 3090.
 18. Beaglehole B, Mulder RT, Frampton CM, et al. Psychological distress and psychiatric disorder after natural disasters: Systematic review and meta-analysis. *British Journal of Psychiatry* (2018): 716-722.
 19. Chen S, Bagrodia R, Pfeffer CC, et al. Anxiety and resilience in the face of natural disasters associated with climate change: A review and methodological critique. *J Anxiety Disord* 76 (2020): 102297.
 20. Gama MMA, Moura GS, Araújo RF, et al. Ansiedade-traço em estudantes universitários de Aracaju (SE). *Revista de Psiquiatria do Rio Grande do Sul* 30 (2008): 19-24.
 21. Hasin DS, Sarvet AL, Meyers JL, et al. Epidemiology of adult DSM-5 major depressive disorder and its specifiers in the United States. *JAMA Psychiatry* 75 (2018): 336-346.
 22. World Health Organization (WHO). Depression and other common mental disorders. *WHO Bull* 48 (2017): 56-60.
 23. Vos T, Abajobir AA, Abbafati C, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990-2016: A systematic analysis for the Global Burden of Disease Study 2016. *Lancet* 390 (2017): 1211-1259.
 24. Lima CKT, Carvalho PM de M, Lima I de AAS, et al. The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). *Psychiatry Research* 287 (2020): 112915.
 25. Shaban RZ, Nahidi S, Sotomayor-Castillo C, et al. SARS-CoV-2 infection and COVID-19: The lived experience and perceptions of patients in isolation and care in an Australian

- healthcare setting. *American Journal of Infection Control* 48 (2020): 1445-1450.
26. Menna F, Krum B. Enfrentamento de desastres naturais: O uso de um coping coletivo. *Paidéia* 18 (2008): 73-84.
27. Gomes ERB, Cavalcante ACS. Desastres naturais: Perdas e reações psicológicas de vítimas de enchente em teresina-PI. *Psicologia Social* 24 (2012): 720-728.
28. Leite ML, Sttefens SR. Desastres Naturais: Aspectos psicológicos e transtorno de estresse pós-traumático oriundo de uma inundação. *Anuário Pesquisa e Extensão UNOESC São Miguel do Oeste* 1 (2020): 12.



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