SEVEN publicações acadêmicas
EM PARCERIA COM: IEMS UNIASSELVI

The effects of floods on mental health and the incidence of diseases

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ABSTRACT

Floods and floods represent natural disasters that occur frequently and bring devastation, profoundly affecting the health of affected communities. It is vital to understand how these events impact both physical health, especially about communicable diseases, and mental health, including problems such as depression and anxiety, as well as other psychosocial aspects. This theoretical study was based on a broad literature review carried out between January and June, analyzing publications on hydrological phenomena and enriched with case studies from various regions of Brazil. The discussion also explored how public policies and cooperation between different sectors can be essential strategies for reducing the damage from these disasters and managing related risks.

Keywords: Floods, Flooding, Physical health, Mental health, Public politic.

INTRODUCTION

Hydrological disasters cause significant devastation in communities around the world. In addition to the material and economic damage, these events have serious repercussions on the physical and mental health of the affected populations.

According to UN-ISDR (2002), floods and flooding are geoenvironmental problems that originate from hydrological or hydrometeorological phenomena. Such phenomena are of an atmospheric, hydrological or oceanographic nature. Floods, for example, are linked to the amount and intensity of atmospheric precipitation (SOUZA, 1998). The magnitude and frequency of floods depend on the intensity and distribution of rainfall, the capacity of the soil to absorb water, the level of soil saturation, and the characteristics of the drainage basin.

The current model of urbanization that occupies floodplains and, consequently, seals the soil and promotes the silting of the watercourse, denotes that the use of space is an affront to nature. Anthropogenic changes, even in cities with a relatively flat topography, where infiltration would be favored, in theory, the results are disastrous (TAVARES and SILVA, 2008).

In this perspective, the proposition of a theoretical-methodological review began with the discussion of the concepts of flood and flood and their typologies. Later, the theoretical foundation was

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subdivided and unfolded in the debate of the consequences of these events in the face of physical and mental health. The results of the literature review were analyzed and discussed. Discussions on public policies, multisectoriality among institutions, among others, were measures exposed to present strategies for mitigating impacts and risk management in the face of the scenario of flooding and flooding.

This study aimed to analyze the various impacts of flooding and flooding, with a focus on communicable diseases and mental health effects. It was intended to provide a comprehensive overview on how these disasters affect public health and in addition to discuss mitigation strategies and effective public policies. In addition, the study aimed to identify the most vulnerable populations and propose specific interventions to reduce the adverse impacts of flooding on the health of these communities.

FLOODS, INUNDATIONS AND WATERLOGGING

Floods, inundations and waterlogging, although treated as synonyms, are different events. Floods and inundations are natural hydrological phenomena related to the abnormal increase in water levels in water bodies, due to heavy and rapid or intense and prolonged rainfall. Waterlogging are characterized by an increase in the volume and consequent rise in the water level in a river, canal or watercourse, reaching its maximum level, but without overflow. Floods occur when this rise in the water level exceeds the capacity of the riverbed or canal, causing the water to overflow and invade floodplain areas (BRASIL, 2007).

Amaral and Ribeiro (2015) argue that the rise in the water level in drainage channels includes multiple causes in addition to rainfall. There is a combination of natural and anthropic conditions. Among the natural constraints, the landforms, drainage network of the watershed, soil characteristics and vegetation stand out. Anthropogenic factors, such as irregular land use and the presence of garbage on the banks of watercourses; decharacterization of the watershed, whether by flow, channeling of watercourses, soil sealing, among others; The process of soil erosion and silting of watercourses are also associated contributing factors and the occurrence of floods and flooding. According to Ramos (2013, p.11), floods are classified as fluvial, topographic, coastal or urban depressions. Each type has specific characteristics and impacts.

Flooding, in turn, is conceptualized by Amaral and Ribeiro (2009, p.42) as a momentary accumulation of water in certain places due to deficiencies in the drainage system, with or without relation to flooding. In general, it occurs in urban areas, where surface runoff tends to be higher due to the increase in impermeable surfaces. Flooding is a phenomenon that can be described more broadly as any area covered by water. The literature reviewed especially highlights flooding in urban areas, where it is more common due to a number of interconnected factors. Among them are the intensity of rainfall, extensive soil sealing, a significant increase in the volume of water in rainwater galleries and urban macro-drainage

systems. In addition, inadequate maintenance of urban cleanliness often leads to the obstruction of storm drains by branches, leaves, and garbage. All of these elements, combined, can exceed the capacity of urban drainage systems, resulting in water accumulation on streets and sidewalks. This is especially true after heavy rainfall, creating significant challenges for urban water management.

For methodological purposes, in the present work, the terms flood and flooding were used, which, in this context, are the most appropriate to describe the phenomena studied here, since they refer to the waters that overflow the canals and invade streets, lands, public areas and buildings.

Bergmann (2024) highlights that, in order to mitigate the effects of floods, it is essential to implement more sustainable land use policies in accordance with the Sustainable Development Goals (SDGs), in addition to investing in more resilient infrastructure, implementing water management and management policies, expanding environmental education, fostering territorial planning, and strengthening climate governance.

EFFECTS OF FLOODS AND FLOODING ON PHYSICAL HEALTH: INCIDENCE OF COMMUNICABLE DISEASES

Flooding and flooding are catastrophic events that not only affect the infrastructure and economy of the impacted areas, but also have serious implications for public health. Exposure to contaminated water during these events creates ideal conditions for the spread of communicable diseases. According to Costa and Santos (2020), leptospirosis is especially prevalent in flooded areas due to the presence of water contaminated with rodent urine. In addition, contamination of water by human and animal feces significantly increases the risk of gastrointestinal diseases such as diarrhea, which can be fatal, especially in children.

The implementation of resilient sanitation infrastructure and the distribution of water purification kits are essential to ensure access to safe drinking water and prevent contamination. These measures help protect the health of affected populations, as emphasized by Borges (2020), who also points out the long-term effects of flooding, including chronic complications such as respiratory diseases. Malnutrition and food insecurity, accentuated by these conditions, increase vulnerability to infectious and chronic diseases.

In addition, flooding often results in physical trauma and injury, requiring an emergency response that includes immediate medical care to prevent secondary infections and ongoing support for the rehabilitation of those affected. Health education during and after flooding events is crucial to reduce the incidence of communicable diseases and protect vulnerable communities.

EFFECTS OF FLOODS AND FLOODING ON MENTAL HEALTH

Post-Traumatic Stress Disorders (PTSD)

PTSD is a mental health condition that can develop after exposure to a traumatic event, such as a flood or flood. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), PTSD is characterized by the development of intrusive symptoms, avoidance behaviors, negative changes in cognition and mood, and a constant state of arousal and increased reactivity (American Psychiatric Association, 2013). According to Caminha (2002), Post-Traumatic Stress Disorder (PTSD) emerges as a reaction to a traumatic event, whether real or perceived, which carries a strong emotional impact. This implies that, in addition to the visible material losses, there is a deep grieving process for detachment from significant aspects of the individual's life, marking a rupture with important personal connections.

According to the World Health Organization – WHO (2013), Post-Traumatic Stress Disorder (PTSD) is the most frequently studied disorder after exposure to potentially traumatic events. Prevalence rates globally range between 0.3% and 6.1% in the general population, and can reach 15.4% in conflict-affected populations, often resulting in significant impairment in daily functioning.

Flooding exposes individuals to multiple simultaneous stressors, including loss of property, forced displacement, separation from family members, and disruption of everyday activities. These situations create an environment of uncertainty and insecurity, which can exacerbate PTSD symptoms. Studies indicate that the prevalence of PTSD in populations affected by natural disasters may be significantly higher than in the general population (World Health Organization, 2013).

"In the post-natural disaster, flood victims, when building devices to cope with losses, need to develop the ability to accommodate and rebalance to overcome the moment of crisis, that is, this is an experience lived in a resilient way" (GOMES and CAVALCANTE, 2009, n.p.). Resilience, both individual and community-based, is essential for disaster recovery. Resilience allows individuals to develop coping and adaptation strategies while minimizing the negative effects of trauma. Public policies that promote the construction of resilient infrastructures and the preparedness of communities for disasters are essential to mitigate the psychological impacts of floods (GOMES and CAVALCANTE, 2009).

Depression and Anxiety

Still on the spectrum of illnesses affecting mental health after disasters, depression and anxiety are common conditions among survivors of floods and flooding, often compounded by a lack of social and economic support. The loss of employment and possessions, the destruction of property, the death of loved ones, and the destabilization of everyday life can lead to feelings of hopelessness and powerlessness, resulting in depression and anxiety.

Rafaloski et al. (2020) state that, in the conditions in which reality is broken, trauma disrupts mental organization and causes an annulment in the continuity of life. Pain can be aggravated in the face of material and personal losses, requiring the individual to face grief and adapt to a new reality of life.

According to Brunnet (2016), who investigated the mental health of Haitian immigrants in Rio Grande do Sul, the prevalence of depression and anxiety symptoms is significantly high in populations exposed to traumatic events, such as natural disasters. The study highlighted that the experience of adverse living conditions, lack of social support, and experiences of loss and displacement are critical factors that contribute to the development of these symptoms. These findings suggest that flooding, by causing home destruction and forced displacement, may exacerbate symptoms of depression and anxiety in affected populations.

In addition, Reis and Carvalho (2016) explored the scientific production on Post-Traumatic Stress Disorder (PTSD) in the context of disasters, showing that exposure to traumatic events, such as flooding, is a significant precursor to the development of PTSD, depression, and anxiety. The literature review conducted by the authors indicates that the occurrence of natural disasters is strongly associated with an increase in the incidence of these mental disorders, highlighting the need for appropriate psychological interventions and ongoing support for affected populations. The responsiveness and resilience of communities also plays an essential role in mitigating negative effects on mental health.

The combination of these studies points to an urgent need for mental health care in disaster contexts. Interventions should focus not only on treating the symptoms of depression and anxiety, but also on prevention and strengthening social and community support. Effective public policies and integrated mental health programs are essential to provide the necessary support to vulnerable populations, minimizing the prolonged impact of these traumatic events on mental health.

Psychosocial Aspects

According to Carvalho and Oliveira (2020), socio-environmental disasters of geoclimatic origin, such as floods and flooding, have profound and long-lasting effects on the mental health of affected communities. These events are often associated with the development of mental disorders such as anxiety, depression, and Post-Traumatic Stress Disorder (PTSD). The authors' integrative review of the literature highlights that exposure to these disasters generates significant stress, due to the loss of material goods, forced displacement, and disruption of social ties, which exacerbates the psychological vulnerability of affected populations.

The research by Fernandes et al. (2020) reinforces these findings, pointing out that communities vulnerable to natural disasters often face intensified demands for psychosocial care. In their study, the authors noted that housing insecurity, loss of livelihoods, and uncertainty about the future are factors

contributing to the increased incidence of mental disorders. In addition, the lack of access to adequate mental health services further exacerbates the situation, preventing those affected from receiving the support they need to cope with the trauma and distress caused by flooding.

Londe, Marchezini and Conceição (2015) conducted a detailed study on the impacts of socio-environmental disasters on public health, focusing on the cases of the states of Santa Catarina in 2008 and Pernambuco in 2010. These catastrophic events resulted in significant human and material losses, as well as mass displacement. The study highlighted that the mental health consequences of affected populations were severe, with a substantial increase in cases of PTSD, depression and anxiety. The authors point out that the inadequate response of public health systems and the lack of psychological intervention strategies have increased the severity of the psychosocial effects of these disasters.

The reviewed studies identify several factors that contribute to the negative effects of flooding and flooding on mental health. Among them, the following stand out:

a. **Displacement and Loss of Shelter:** The need to evacuate and loss of housing are traumatic experiences that contribute significantly to increased stress and anxiety;
b. **Loss of Assets and Livelihoods:** The destruction of property and the interruption of economic activities place victims in situations of financial insecurity, which is a risk factor for mental health;
c. **Disruption of Social Ties:** Floods often result in family and community separations, causing a sense of isolation and helplessness;
d. **Uncertainty about the Future:** Uncertainty and lack of control over the situation increase levels of anxiety and despair among victims.
e. To mitigate these effects, the authors recommend implementing comprehensive psychosocial interventions that include:

a) Immediate Psychological Assistance: Provision of immediate and ongoing psychological support to help victims cope with trauma;
b) Strengthening Social Support Networks: Fostering community ties and social support networks to provide a sense of community and security;
c) Rehabilitation and Recovery Programs: Development of rehabilitation programs that address both the physical and psychological needs of victims;
d) Training of Health Professionals: Capacity building of health professionals to identify and treat mental disorders related to natural disasters.

The mental health effects of flooding are complex and multifaceted, requiring an integrated approach that addresses both the physical and psychosocial aspects of the disaster. The literature reviewed highlights the urgent need for effective public policies and integrated mental health programs to provide

the necessary support to vulnerable populations. Investments in mental health infrastructure and psychosocial intervention strategies are essential to mitigate the negative impacts of these disasters and promote the resilience of affected communities.

ANALYSIS AND DISCUSSION

Analysis of the effects of flooding on mental health reveals a complex interplay between environmental, social and individual factors. The reviewed studies demonstrate that exposure to natural disasters can have devastating effects on mental health, exacerbating pre-existing conditions and precipitating new disorders.

The physical characteristics of disasters (environmental factors), such as the magnitude and duration of floods, directly influence the severity of mental health impacts. Large-scale events that cause extensive destruction and long-term displacement tend to result in higher levels of stress and trauma among affected populations (Carvalho and Oliveira, 2020). In addition, the increasing frequency and intensity of these events, exacerbated by climate change, increase the strain on mental health resources and emergency services.

Social support networks (social factors) play a crucial role in mitigating the psychological impacts of flooding. Communities with strong social ties and access to community resources demonstrate greater resilience and resilience. On the other hand, the rupture of social ties and isolation, common in large-scale disasters, contribute to increased psychological vulnerability (Fernandes et al., 2020). Lack of adequate social support can lead to the development of depressive and anxious symptoms, aggravating the situation for victims.

Individual resilience, or an individual's ability to adapt to and recover from adverse events (individual factors) is a determining factor in responding to trauma caused by flooding and flooding. People with greater resilience tend to develop better coping strategies and have lower levels of PTSD, depression, and anxiety symptoms (Londe et al., 2015). However, individuals with a history of mental disorders or previous traumatic experiences are at a higher risk of developing severe symptoms after a natural disaster.

The study also highlights the importance of a coordinated and efficient response, which includes collaboration between different levels of government, non-governmental organizations, and local communities, to develop and implement effective mitigation strategies. Community education and the strengthening of social support networks are fundamental measures to improve the resilience of communities and mitigate the impacts of floods.

Other areas of research include assessing the impact of climate change on the frequency and severity of flooding and its implications for public health. Research on the role of advanced technologies

in predicting and monitoring these types of disasters can also contribute to the improvement of risk management strategies.

CONCLUSION

Floods are hydrological phenomena that, in addition to causing material destruction and significant economic losses, have a devastating impact on the physical and mental health of affected populations. The relationship between these natural disasters and public health is complex, involving an interplay of environmental, social, and individual factors that exacerbate the vulnerability of communities.

From an environmental point of view, the magnitude and duration of floods are directly proportional to the severity of the mental health impacts. Large-scale events, which result in extensive destruction and long-term displacement, cause heightened levels of stress and trauma among populations. The increasing intensity and frequency of these events, exacerbated by climate change, places additional pressure on mental health resources and emergency services, which are often unprepared to cope with the increased demand.

Socially, the breakdown of community ties and isolation are crucial factors that increase psychological vulnerability. Communities with strong social support networks tend to demonstrate greater resilience, while a lack of adequate support exacerbates symptoms of depression and anxiety. The loss of property forced displacement, and separation from family members create an environment of uncertainty and insecurity, which contributes significantly to the development of mental disorders such as post-traumatic stress disorder (PTSD).

Individually, an individual's resilience, or their ability to adapt to and recover from adverse events, is critical in responding to the trauma caused by flooding. Individuals with greater resilience develop better coping strategies, while those with a history of mental disorders or previous traumatic experiences are at a higher risk of developing severe symptoms. This aspect highlights the need for psychosocial interventions that not only treat the symptoms of depression and anxiety, but also strengthen social and community support.

Implementing immediate and ongoing psychological interventions is essential to mitigate the negative effects of flooding and waterlogging on mental health. These interventions should include individual and community psychological support, rehabilitation programs, and strengthening social support networks. In addition, building the capacity of health professionals to deal with disaster-related mental disorders is critical to ensure an effective and timely response.

Regarding the implications for public policies, it is necessary that these policies integrate health, education and environmental management to reduce the vulnerability of populations to disasters and include specific measures to strengthen the resilience of health systems and ensure the continuity of

services during and after floods and flooding. Creating psychological support programs and social support networks, for example, can help mitigate the impacts on the mental health of affected populations. Socio-economic factors should also be considered in public policymaking, and analysis of the economic and social costs of flooding can also provide valuable insights for policy-making and resource allocation. Vulnerable communities, which already face significant challenges, are disproportionately affected by these events, and targeted interventions are needed to reduce this inequality.

Implementing education and awareness programs that involve all stakeholders, including communities, schools, and businesses, is essential to foster a culture of prevention and resilience. The adoption of urban planning and environmental management practices that consider the risks of flooding and promote long-term sustainability is also a crucial measure to reduce the vulnerability of populations.

The key findings of this study highlight the need for an integrated, multidisciplinary approach to mitigate the impacts of flooding on physical and mental health and promote the resilience of affected communities. Not only do floods and waterlogging increase the incidence of communicable diseases such as leptospirosis and dengue fever, but they also have long-lasting effects on the mental health of affected populations, leading to the development of conditions such as post-traumatic stress disorder, depression, and anxiety. Public policies and preventive measures play a crucial role in reducing these impacts, with a focus on community education and resilient infrastructure.

In the future, it is essential to conduct more longitudinal studies to understand the long-term health effects of flooding and flooding. These studies should explore the effectiveness of different interventions and public policies in mitigating the impacts of flooding. In addition, it is important to investigate the interactions between socioeconomic factors and health vulnerability in the context of hydrological disasters.

REFERENCES

Amaral, R. do; Ribeiro, R. R. (2015). Inundação e Alagamentos. In L. K. Tominaga, J. Santoro, & R. do Amaral (Eds.), Desastres naturais: conhecer para prevenir (3rd ed., pp. 39–52). São Paulo: Instituto Geológico. Available at: https://www.infraestruturameioambiente.sp.gov.br/wp-content/uploads/sites/233/2017/05/Conhecer_para_Prevenir_3ed_2016.pdf.

Amaral, R.; Ribeiro, R. R. (2009). Inundações e enchentes. In L. D. Tominaga, J. Santoro, & R. Amaral (Eds.), Desastres naturais: conhecer para prevenir. São Paulo: Instituto Geológico. Chapter 3, pp. 39–52.

American Psychiatric Association. (2013). Manual Diagnóstico e Estatístico de Transtornos Mentais (5th ed.). Arlington, VA: American Psychiatric Publishing.

Bergmann, C. (2024). Alagamentos no Rio Grande do Sul: um chamado à ação coletiva. Movimento Nacional ODS Santa Catarina. Available at: https://sc.movimentoods.org.br/2024/05/13/alagamentos-no-rio-grande-do-sul-um-chamado-a-acao-coletiva/#.

Brasil. Ministério das Cidades/Instituto de Pesquisas Tecnológicas – IPT. (2007). Mapeamento de riscos em encostas e margens de rios. In C. S. Carvalho, E. S. de Macedo, & A. T. Ogura (Eds.). Brasília: Ministério das Cidades; Instituto de Pesquisas Tecnológicas – IPT. Available at: http://planodiretor.mprs.mp.br/arquivos/mapeamento.pdf.

Brunnet, A. E. (2016). Prevalência e fatores associados a sintomas de estresse pós-traumático, depressão e ansiedade em imigrantes haitianos no Rio Grande do Sul (Master's thesis). Programa de Pós Graduação em Psicologia, PUCRS. Available at: https://tede2.pucrs.br/tede2/handle/tede/6944#preview-link0.

Caminha, R. M. (2002). Grupoterapia Cognitivo Comportamental Em Abuso Sexual Infantil. São Paulo: Arbytes Editora.

Carvalho, M. M.; Oliveira, S. S. (2020). Aspectos psicossociais em desastres socioambientais de origem geoclimática: uma revisão integrativa da literatura. Saúde em Debate, July. Available at: https://doi.org/10.1590/0103-11042020E223.

Fernandes, G. C. M., Bellaguarda, M. L. R., Silva, G. T., Guedes, M. A., Lopes, M. J., Oliveira, F. L. (2020). Demandas de atenção psicossocial de comunidades vulneráveis a desastres de origem natural. Rev Bras de Enferm, 73(Suppl 1), e20190213. Available at: http://dx.doi.org/10.1590/0034-7167-2019-0213.

Gomes, E. R. B., & Cavalcante, A. C. S. (2009). Desastres Naturais: Perdas e Reações Psicológicas de Vítimas de Enchente em Teresina – PI. Revista de Psicologia. Available at: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-71822012000300025.

Londe, L. R., Marchezini, V., Conceição, R. S. (2015). Impactos de desastres socioambientais em saúde pública: estudos dos casos dos Estados de Santa Catarina em 2008 e Pernambuco em 2010. Revista Brasileira de Estudos de População, 32(3), Sep-Dec. Available at: https://doi.org/10.1590/S0102-3098201500000031.

Rafaloski, A. R., Zeferino, M. T., Forgearini, B. A. O., Fernandes, G. C. M., Menegon, F. A. (2020). Saúde mental das pessoas em situação de desastre natural sob a ótica dos trabalhadores envolvidos. Saúde Debate, 44(especial 2), 230-241. DOI: 10.1590/0103-11042020E216.

Ramos, C. (2013). Perigos naturais devido a causas meteorológicas: o caso das cheias e inundações. Porto: e-LP Engineering and Technology Journal, 4, 11-16. Available at: https://recil.ulusofona.pt/server/api/core/bitstreams/b012b83a-9ea7-42ff-93f4-88d31571caec/content.

Reis, A. M., Carvalho, L. de F. (2016). Produção científica sobre o Transtorno de Estresse Pós-Traumático no contexto de desastres. Avaliação Psicológica, 15(2), 237–247. Available at: https://doi.org/10.15689/ap.2016.1502.12.

Souza, C. R. de G. (1998). Flooding in the São Sebastião region, northern coast of São Paulo state, Brazil. Anais Academia Brasileira Ciências, 70(2), 353-366. Available at: https://www.researchgate.net/publication/292776586_Flooding_in_the_Sao_Sebastiao_Region_Northern_Coast_of_Sao_Paulo_State_Brazil.

Tavares, A. C., Silva, A. C. F. (2008). Urbanização, chuvas de verão e inundações: uma análise episódica. Climatologia e Estudos da Paisagem, Rio Claro, 3(1). Available at: https://www.periodicos.rc.biblioteca.unesp.br/index.php/climatologia/article/view/1223/155.

UN-ISDR – United Nations International Strategy for Disaster Reduction. (2002). Living with Risk. A Global Review of Disaster Reduction Initiatives. Geneva, Switzerland: United Nations. Available at: http://www.unisdr.org/eng/about_isdr/bd-lwr-2004-eng.htm.

World Health Organization. (2013). Guidelines for the management of conditions specifically related to stress. Geneva: WHO. Available at: https://www.who.int/publications/i/item/9789241505406.