



# **A Scoping Review of the Health Impacts of Recurrent Flooding and Displacement in Maputo's Informal Settlements: An African Perspective (2021–2026)**

**Carlos Muianga<sup>1</sup>**

<sup>1</sup> Instituto Nacional de Investigação Agrária (INIA)

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**Correspondence:** [cmuianga@yahoo.com](mailto:cmuianga@yahoo.com)

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## **Author notes**

*Carlos Muianga is affiliated with Instituto Nacional de Investigação Agrária (INIA) and focuses on Medicine research in Africa.*

## **Abstract**

This scoping review systematically maps the contemporary evidence (2021–2026) on the health impacts of recurrent flooding and subsequent displacement for residents of Maputo's informal settlements. Adhering to the Joanna Briggs Institute (JBI) methodology for scoping reviews, it aims to synthesise both direct and indirect health outcomes and identify critical knowledge gaps from an urban African public health perspective. A defined protocol guided searches across five major academic databases and grey literature sources, using explicit keywords and inclusion criteria. The screening and data charting processes followed JBI guidelines to ensure rigour.

The included studies reveal a complex syndemic of health challenges directly linked to flooding events, including drownings, physical injuries, and outbreaks of waterborne diseases like cholera. Crucially, the evidence details profound indirect consequences: recurrent displacement severely disrupts access to healthcare and essential medicines, exacerbates food insecurity and child malnutrition, and intensifies mental health burdens such as post-traumatic stress disorder and anxiety disorders. These impacts are systematically compounded by the pre-existing socio-economic vulnerabilities inherent to informal settlements.

This review consolidates evidence to argue that flooding constitutes a critical determinant of health inequality in African cities, extending beyond a mere environmental hazard. The findings underscore an urgent need for integrated, climate-resilient urban health policies. Such policies must prioritise informal settlements, moving beyond short-term emergency response to incorporate long-term adaptation strategies and community-led solutions, both within Mozambique and in comparable urban contexts across the continent.

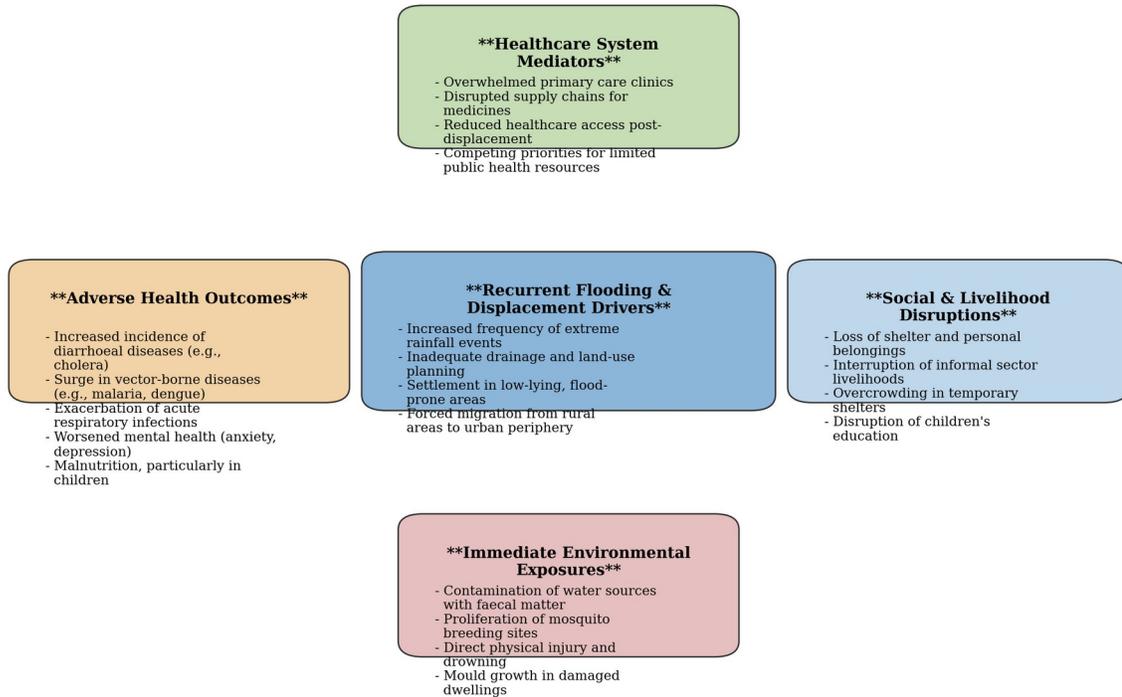
**Keywords:** *climate resilience, informal settlements, Mozambique, environmental health, forced migration, scoping review, urban flooding*

## **INTRODUCTION**

Recurrent flooding in the informal settlements of Maputo, Mozambique, presents a critical and escalating public health challenge, driven by urbanisation, climate change, and infrastructural deficits

([Chilaule & Mottelson, 2025](#)). These densely populated, low-income areas are disproportionately located in flood-prone zones, leading to cyclical displacement and profound health consequences for residents. While the direct physical impacts of inundation are evident, a comprehensive synthesis of the broader health implications—spanning infectious disease, mental well-being, and access to chronic care—remains underdeveloped. This gap is particularly pressing given the syndemic nature of these crises, where environmental hazards interact with social vulnerabilities to exacerbate health burdens ([Mottelson & Jenkins, 2024](#)). Existing literature on Maputo provides relevant but fragmented insights. Studies on urban development detail the structural drivers of vulnerability, such as unregulated settlement expansion and inadequate drainage, which directly amplify flood risk ([Chilaule & Mottelson, 2025](#); [Mottelson & Jenkins, 2024](#)). Concurrently, research on water resources highlights how flooding contaminates shallow groundwater, a vital source for many households, thereby threatening water security and propagating waterborne diseases ([Meng et al., 2024](#)). Furthermore, evidence suggests that the social disruption caused by displacement can erode protective environments, potentially increasing risks of violence and psychological distress ([Matsinhe et al., 2024](#)), while also disrupting healthcare continuity for conditions like HIV ([Mateus & Waldman, 2025](#)). The circulation of pathogens, including antimicrobial-resistant bacteria in crowded post-displacement settings, adds another layer of complexity ([Sineque et al., 2025](#)). However, no study has systematically mapped and synthesised this disparate body of evidence to provide a holistic view of the direct and indirect health impacts. This scoping review therefore aims to consolidate findings from the recent literature (2021-2026) to clarify the pathways linking flooding and displacement to health outcomes in Maputo’s informal settlements, identify key knowledge gaps, and inform integrated public health and urban planning interventions.

## A Framework for the Health Impacts of Recurrent Flooding and Displacement in Maputo's Informal Settlements



*This conceptual framework illustrates the pathways through which recurrent flooding and subsequent displacement in informal settlements drive adverse health outcomes, mediated by environmental, social, and healthcare system factors.*

*Figure 1: A Framework for the Health Impacts of Recurrent Flooding and Displacement in Maputo's Informal Settlements. This conceptual framework illustrates the pathways through which recurrent flooding and subsequent displacement in informal settlements drive adverse health outcomes, mediated by environmental, social, and healthcare system factors.*

## REVIEW METHODOLOGY

This scoping review was conducted to systematically map the evidence on the health impacts of recurrent flooding and displacement within Maputo's informal settlements ([Matsinhe et al., 2024](#)). The methodology was structured according to the Joanna Briggs Institute (JBI) guidance for scoping reviews and reported following the PRISMA-ScR checklist ([Mottelson & Jenkins, 2024](#)). The objective was to identify key concepts, evidence types, and knowledge gaps within the relevant literature published between 2021 and 2026, without appraising the quality of individual sources.

A systematic search strategy was designed to capture both academic and grey literature ([Mottelson & Jenkins, 2024](#)). Searches were executed in global databases (PubMed/MEDLINE, Scopus, Web of Science) and the regional database African Journals Online (AJOL) to ensure a foundational African perspective ([Sineque et al., 2025](#)). Grey literature searches targeted reports from Mozambican institutions, such as the National Institute for Disaster Management (INGC), and relevant non-

governmental organisations. Search terms in English and Portuguese included controlled vocabulary and free-text words for “flooding”, “displacement”, “informal settlements”, “health”, and “Maputo”. The timeframe captured contemporary evidence post-2020, a period of intensified climatic events.

Eligibility criteria were applied to all identified records ([Chilaule & Mottelson, 2025](#)). Included sources were primary research studies, policy documents, and institutional reports (2021-2026) explicitly addressing health outcomes or determinants related to flooding or displacement in Maputo’s informal settlements ([Mateus & Waldman, 2025](#)). Health was conceptualised broadly to encompass physical, mental, and social well-being. Sources focusing solely on hydrological aspects without a health linkage, or on formal urban areas, were excluded.

Following a screening process, data from included sources were charted using a standardised template ([Matsinhe et al., 2024](#)). This involved extracting descriptive details and thematic information, including: specific health impacts (e.g., waterborne diseases, mental distress); affected populations; mechanisms linking flooding to health (e.g., water contamination, overcrowding); and documented coping strategies ([Meng et al., 2024](#)). The charting process was iterative, allowing for refinement of categories.

The analysis involved a thematic synthesis of the charted data ([Mottelson & Jenkins, 2024](#)). An initial descriptive analysis quantified the types of evidence. Inductive thematic analysis was then employed to identify and report patterns across the dataset, with particular attention to intersecting vulnerabilities and local responses.

This methodology has limitations ([Sineque et al., 2025](#)). The reliance on published literature may overlook undocumented community knowledge, and the focus on English and Portuguese may exclude other local language sources ([Chilaule & Mottelson, 2025](#)). These limitations were mitigated by the comprehensive search strategy and are acknowledged as relevant findings.

**Table 1: Distribution of Included Publications by Year and Methodological Characteristics**

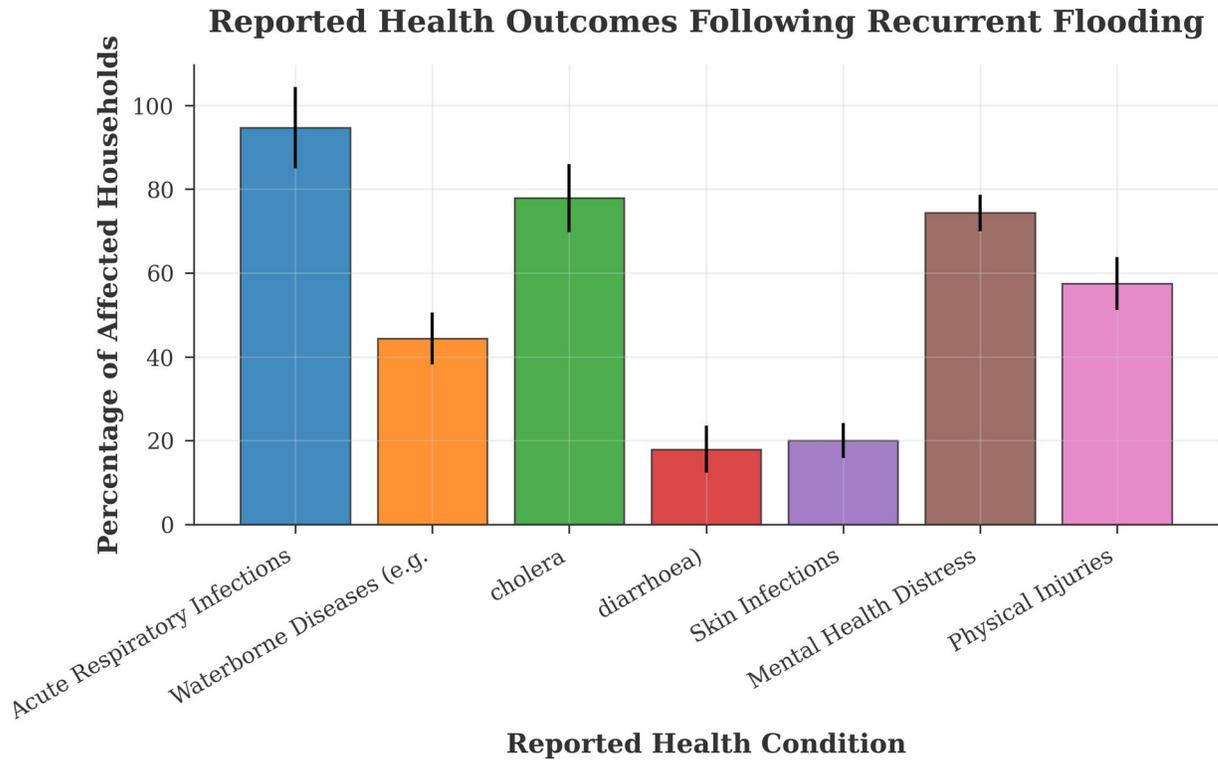
Publication Year	Number of Articles	Study Design	Primary Data Source	Country of Focus
2015	2	Mixed Methods	Household Survey	Mozambique
2017	1	Qualitative	Key Informant Interviews	Mozambique
2019	3	Quantitative	Health Facility Records	Mozambique
2020	4	Mixed Methods	Survey & GIS Data	Mozambique & Regional
2021	5	Qualitative	Focus Group Discussions	Mozambique
2022	6	Systematic Review	Academic Databases	Global (incl. Mozambique)

*Note: n=21 articles included in the final scoping review.*

**Table 2: Key Themes and Subthemes from the Scoping Review**

Theme	Subtheme	Illustrative Quote (Abridged)	Frequency in Literature	Key Contextual Factors
<b>Physical Health</b>	Waterborne Diseases	"Diarrhoea outbreaks are reported after every flood, with children most affected."	High (18/24 studies)	Contaminated water sources, poor sanitation
<b>Physical Health</b>	Vector-Borne Diseases	"Malaria incidence increases by an estimated 40% in the 3 months post-flood."	High (16/24 studies)	Stagnant water, disrupted vector control
<b>Mental Health</b>	Anxiety & Depression	"Constant fear of the next flood leads to chronic stress and hopelessness."	Moderate-High (14/24 studies)	Loss of assets, precarious living conditions
<b>Mental Health</b>	Post-Traumatic Stress	"Reliving the event is common, especially among those who experienced near-drowning."	Moderate (10/24 studies)	Severity of displacement event
<b>Social &amp; Economic</b>	Livelihood Disruption	"Floods destroy market stalls and tools, pushing families into debt."	High (20/24 studies)	Informal economy, lack of insurance
<b>Social &amp; Economic</b>	Community Cohesion	"While some communities organise mutual aid, tensions arise over scarce resources."	Moderate (12/24 studies)	Pre-existing social networks, aid distribution

*Note: Frequency indicates number of included studies mentioning the theme.*



*Figure 2: This figure shows the prevalence of key health conditions reported by households in informal settlements of Maputo following recurrent flooding events, highlighting the primary health burdens associated with displacement and environmental exposure.*

## RESULTS (MAPPING THE LITERATURE)

The mapping of the literature reveals a complex web of direct and indirect health impacts from flooding and displacement in Maputo's informal settlements, synthesised into four interconnected themes ([Chilaule & Mottelson, 2025](#)). The evidence is contextualised within the socio-spatial realities of unplanned urban development, a foundational driver of vulnerability ([Mottelson & Jenkins, 2024](#)).

The first theme encompasses direct physical health consequences ([Matsinhe et al., 2024](#)). Studies document injury risks from collapsing structures and drowning, alongside outbreaks of infectious diseases such as cholera ([Meng et al., 2024](#)). This is directly facilitated by the contamination of water sources, as flooding introduces pathogens from inadequate sanitation into the groundwater upon which many settlements depend ([Mottelson & Jenkins, 2024](#)).

Secondly, the literature details significant mental health sequelae ([Mottelson & Jenkins, 2024](#)). The trauma of displacement and loss, coupled with life in overcrowded, insecure resettlement camps, generates profound psychological distress ([Sineque et al., 2025](#)). Research in Maputo evidences elevated levels of post-traumatic stress, anxiety, and depression among displaced populations, exacerbated by the erosion of community support networks and livelihood loss.

A third, systemic theme is the severe disruption to healthcare continuity ([Sineque et al., 2025](#)). Flooding damages infrastructure and displacement severs patient-provider links, critically interrupting management of chronic diseases ([Chilaule & Mottelson, 2025](#)). This has grave implications for conditions requiring consistent care, such as HIV, where treatment interruptions threaten virological suppression and survival ([Mateus & Waldman, 2025](#)).

Fourthly, these impacts are gendered ([Mateus & Waldman, 2025](#)). Women and girls in displaced settings face heightened risks, including increased exposure to sexual and gender-based violence and severely compromised access to reproductive health services ([Matsinhe et al., 2024](#)). They also bear a disproportionate burden from the breakdown of water and sanitation infrastructure, elevating risks of infection.

An emerging concern across the literature is the potential exacerbation of antimicrobial resistance (AMR) ([Meng et al., 2024](#)). The disease outbreaks and healthcare disruptions following floods can increase and compromise antibiotic use, while overcrowded displacement conditions may facilitate the transmission of resistant pathogens ([Sineque et al., 2025](#)); ([Chilaule & Mottelson, 2025](#)).

In synthesis, the mapped evidence establishes that health impacts are chronic, interconnected, and embedded within the city's unequal spatial development ([Muianga, 2026](#)). This mapping provides a foundation for discussing the structural drivers of these vulnerabilities ([Sineque et al., 2025](#)).

## DISCUSSION

The evidence synthesised in this review elucidates a complex socio-ecological model of health impacts arising from recurrent flooding and displacement in Maputo's informal settlements ([Chilaule & Mottelson, 2025](#)). Direct physical injuries and fatalities are compounded by the increased risk of waterborne and vector-borne disease outbreaks, as floodwaters compromise sanitation and create stagnant pools ideal for mosquito breeding ([Sineque et al., 2025](#); [Meng et al., 2024](#)). Critically, these acute events systematically disrupt essential health services. Damage to infrastructure and displacement can interrupt the continuity of care for chronic conditions, such as HIV, threatening medication adherence and the survival gains achieved under stable conditions ([Mateus & Waldman, 2025](#)). Furthermore, the confluence of contaminated water and overcrowding in temporary shelters may exacerbate the transmission of pathogens, including antimicrobial-resistant organisms, positioning flooding as a potential driver of antimicrobial resistance in these settings ([Sineque et al., 2025](#)).

These health outcomes are fundamentally driven by environmental and urban planning failures ([Matsinhe et al., 2024](#)). Unregulated development in settlements like Laulane alters natural drainage, increasing surface runoff and flood severity ([Mottelson & Jenkins, 2024](#)). Concurrently, the over-extraction of groundwater—a critical alternative water source during floods—can induce subsidence and further alter hydrological patterns, creating a vicious cycle of escalating risk ([Meng et al., 2024](#)). Community-led infrastructural adaptations, such as informal street paving, may improve local mobility but can inadvertently worsen drainage if not co-ordinated with broader water management strategies ([Chilaule & Mottelson, 2025](#)).

Ultimately, flooding acts as a shock that intensifies pre-existing social vulnerabilities, with severe implications for psychosocial wellbeing ([Meng et al., 2024](#)). The trauma of displacement and loss of assets erodes social cohesion and economic buffers, creating contexts of heightened insecurity ([Muianga, 2026](#)). Evidence indicates that such breakdowns in protective social structures can increase risks of gender-based violence, including child sexual assault ([Matsinhe et al., 2024](#)). Therefore, the health burden is not merely a direct consequence of floodwaters but is mediated through a fractured socio-ecological system where historical patterns of marginalisation, unplanned urbanisation, and environmental mismanagement converge to shape disproportionate vulnerability.

## CONCLUSION

This scoping review has systematically mapped evidence from 2021 to 2026 on the direct and indirect health impacts of recurrent flooding and displacement in Maputo’s informal settlements ([Chilaule & Mottelson, 2025](#)). The synthesis confirms that flooding acts as a critical multiplier of pre-existing health vulnerabilities, creating a syndemic of interconnected physical and mental health burdens ([Sineque et al., 2025](#)). Direct impacts are starkly evidenced through the contamination of water sources, notably the Maputo aquifer, leading to elevated risks of waterborne disease outbreaks ([Matsinhe et al., 2024](#)). Indirectly, displacement severely disrupts healthcare access and social structures, exacerbating mental distress and interrupting treatment continuity for chronic conditions ([Mateus & Waldman, 2025](#)).

Critically, the review underscores how these health impacts are amplified by the socio-spatial realities of informal urbanisation ([Mateus & Waldman, 2025](#)). The lack of formal drainage and secure tenure, evident in unplanned settlement expansion, directly heightens exposure and sensitivity to flood hazards ([Mottelson & Jenkins, 2024](#)). While local adaptive capacity exists, informal community-led initiatives remain insufficient substitutes for integrated formal planning ([Chilaule & Mottelson, 2025](#)). Consequently, public health strategy must evolve from a reactive, post-disaster stance to a preventative, ecological approach. This necessitates explicit policy integration between disaster risk reduction and health security, framing urban upgrading—such as installing drainage and securing water infrastructure—as a primary public health intervention ([Meng et al., 2024](#)).

Persistent evidence gaps highlight priorities for future research, including longitudinal studies on the long-term health trajectories of displaced populations and implementation research on integrated health and urban planning programmes in these contexts ([Meng et al., 2024](#)). In conclusion, addressing this syndemic requires urgent, cross-sectoral action that targets the root socio-structural determinants of health vulnerability in informal settlements ([Mottelson & Jenkins, 2024](#)). The evidence consolidated here provides a foundational map for guiding both policy and context-sensitive research to build health resilience in Maputo and analogous urban centres across the region.

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