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From fragmented risk communication to climate-mental health resilience: A syndemic preparedness framework for climate change, mental health and health misinformation

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ABSTRACT

Climate change is no longer only an environmental emergency; it is becoming a community mental health and information-integrity crisis. Extreme heat, floods, droughts, wildfires, displacement, food insecurity and livelihood loss are increasingly linked with anxiety, depression, grief, trauma, suicide risk and climate-related distress. At the same time, health misinformation and climate misinformation weaken public trust, delay protective behaviour and reduce acceptance of preparedness messages. We argue that these three forces should be treated as a syndemic: climate hazards intensify psychological vulnerability, psychological distress increases susceptibility to fear-based misinformation, and misinformation undermines collective action before, during and after climate-related emergencies. Current public health systems often respond to these domains separately through climate adaptation plans, mental health services or risk communication units. That separation is no longer sufficient. We propose a community resilience and public health preparedness framework that integrates climate-health surveillance, psychosocial risk mapping, infodemic management, trusted local messengers, primary-care mental health support, social protection, youth engagement and digital accountability. The goal is not only to reduce exposure to climate hazards, but to protect trust, mental wellbeing and community agency in a destabilising information environment.

Keywords: climate change; mental health; misinformation; infodemic; community resilience; public health preparedness; syndemic; risk communication.

INTRODUCTION

Climate change is reshaping the conditions in which communities live, work, make decisions and seek care. The health effects of delayed climate action are now evident across heat exposure, food insecurity, air pollution, climate-sensitive infectious diseases and health-system strain [1]. The Intergovernmental Panel on Climate Change has similarly concluded that warming increasingly affects health, livelihoods, food systems, water security and social stability, with the greatest harms occurring where exposure is high and adaptive capacity is limited [2]. Public health preparedness must therefore be understood as a climate adaptation function, not only as an emergency response function.

A key gap remains: the interaction between climate stress, mental health vulnerability and misinformation is still insufficiently integrated into community medicine and preparedness planning. Climate change affects mental health through direct exposure to traumatic events, indirect pathways such as displacement and livelihood loss, and anticipatory distress, including eco-anxiety and climate-related worry [3-5]. Recent evidence has strengthened the association between environmental exposures and mental health harms, including suicide-related outcomes and mental disorder-related service use [6]. These harms are socially patterned; groups with greater exposure, fewer resources or stronger dependence on climate-sensitive livelihoods are often less able to avoid or recover from them [7].

Misinformation adds a third layer of vulnerability. WHO defines an infodemic as excessive information, including false or misleading information, in digital and physical environments; it causes confusion, encourages risky behaviour, erodes trust and undermines public health responses [8]. Although the term became prominent during COVID-19, the same dynamics are relevant to climate-related emergencies. False claims about heat risk, flood warnings, disease outbreaks, vaccines, relocation, humanitarian assistance or the causes of extreme events can delay protective behaviour and weaken

confidence in local authorities [9]. Climate and health misinformation are therefore not separate communication problems; they are preparedness risks.

This Perspective argues for a shift from fragmented risk communication to syndemic preparedness. Public health systems should treat climate change, mental health and misinformation as interacting threats that require one integrated community resilience architecture. The proposed framework is designed for community medicine, primary health care, emergency preparedness, risk communication and local climate-health adaptation.

Sources and approach

This article is a narrative evidence synthesis rather than a primary field study or systematic review. Relevant peer-reviewed and policy literature was identified through targeted searches of PubMed, Google Scholar, Google Scholar-linked journal pages, WHO publications, Lancet Countdown materials, European Centre for Disease Prevention and Control guidance and recent public health preparedness reports. Search terms included "climate change mental health", "eco-anxiety", "climate anxiety", "health misinformation", "climate misinformation", "infodemic management", "risk communication", "community resilience", "public health preparedness" and "climate-health surveillance".

Priority was given to recent peer-reviewed studies, major reviews, public health agency guidance and high-quality reports published between 2021 and 2025. Older sources were retained only where they were conceptual landmarks, such as the ecological grief literature [10]. The aim was to develop a practical preparedness argument rather than to estimate pooled effects or rank interventions.

From fragmented communication to syndemic preparedness

The current model is often fragmented. Climate adaptation teams may focus on heat plans, flood preparedness, early warning systems and infrastructure. Mental health services often respond after distress has already escalated. Communication teams may address rumours only after public trust has been damaged. This separation is administratively familiar, but it does not reflect how crises are experienced by communities.

A syndemic model starts earlier. Syndemic thinking is useful because it emphasises interacting problems that cluster within populations and are amplified by social conditions. In a climate emergency, physical exposure, psychological distress and misinformation can reinforce one another. A flood can destroy homes, interrupt medicines, trigger grief and anxiety, and create uncertainty about relief, infection risk and relocation. In that uncertainty, rumours may spread rapidly through social media, messaging applications, local radio or informal networks. If institutional trust is already weak, accurate information may arrive too late or through messengers people do not believe.

Preparedness must therefore protect three assets at once: physical safety, mental wellbeing and information trust. This does not require merging every service into one programme. It requires climate-health preparedness to plan early warning, psychosocial support and information integrity together before emergencies occur. WHO Regional Office for Europe has framed risk communication, community engagement and infodemic management as integral to the emergency cycle rather than an optional add-on [11]. That principle should now be extended to climate-health planning.

Why climate change, mental health and misinformation belong together

Climate change increases community-level stress through repeated exposure to hazards. Heatwaves can affect sleep, irritability, aggression, productivity and psychiatric vulnerability. Floods, storms and wildfires can generate trauma, bereavement, displacement and long recovery periods. Drought and crop failure can produce financial strain, food insecurity, migration pressure and despair. WHO has called for mental health support to be integrated into climate policy, surveillance, preparedness and health-system strengthening [5].

Young people require particular attention. In a global survey of 10,000 young people aged 16-25 years, climate anxiety and distress were widespread and were associated with perceptions of inadequate government response [12]. More recent evidence has strengthened the link between eco-anxiety, psychological distress and symptoms of major affective disorders, although the field still needs stronger longitudinal and intervention studies [13]. Public health systems should avoid pathologising all climate concern, but they should recognise when distress impairs functioning, trust or preparedness behaviour.

Misinformation exploits uncertainty. Reviews have shown that health misinformation is amplified through digital platforms, sustained by emotional appeals and cognitive biases, and associated with reduced adherence to public health measures, vaccine hesitancy and erosion of trust [14-16]. The climate-health interface is likely to become an increasingly important site for misinformation, including claims that dismiss climate risks, deny links between extreme weather and health, misrepresent public health interventions or attack institutions during emergencies [9]. Climate communication research also highlights the importance of public health framing and trusted social media communication when addressing climate risks [17].

The interaction matters because psychological vulnerability can shape information processing. People who are frightened, exhausted, displaced or grieving may have reduced capacity to evaluate competing claims. Conversely, misinformation can deepen distress by amplifying helplessness, anger or fatalism. The psychology of misinformation literature shows that false beliefs can persist after correction, particularly when claims are emotionally salient, repeated or aligned with identity and distrust [18,19]. Community medicine must therefore consider misinformation not only as a digital problem, but also as a psychosocial and equity problem.

A climate-mental health-misinformation preparedness platform

A practical preparedness platform should combine eight linked functions. First, climate-health surveillance should track heat, floods, drought, wildfire smoke, food insecurity, infectious disease risks and health-service disruptions. These indicators should be linked to mental health and trust-related measures rather than monitored in separate systems. The Lancet Countdown demonstrates the value of tracking climate-sensitive health risks, but local preparedness requires community-level indicators that are actionable [1].

Second, psychosocial risk mapping should identify groups at higher risk of distress, including children, older adults, people with pre-existing mental illness, displaced households, farmers, informal workers, Indigenous peoples, land-dependent communities and disaster responders. Such mapping should be used to plan outreach, referral pathways and continuity of essential care before climate shocks occur [4,7].

Third, infodemic listening should monitor rumours, distrust narratives and harmful misinformation before and during climate-related emergencies. Evidence from health misinformation research suggests that online interventions often use education, counter-speech and inoculation approaches, but many interventions remain insufficiently tailored to the characteristics of misinformation and the vulnerabilities of target groups [20]. Local rumour logs, social listening and rapid feedback from community health workers can help translate broad infodemic management into practical community medicine.

Fourth, trusted messenger networks should be built before crises. Community health workers, primary-care teams, religious leaders, teachers, youth leaders, survivor groups, local journalists and civil society organisations can translate warnings into trusted action. Risk communication and community engagement capacity has repeatedly been identified as central to emergency preparedness and response [11,21,22].

Fifth, primary-care mental health integration is essential. Frontline health workers should be able to recognise acute distress, provide psychological first aid, support continuity of treatment for people with mental disorders and refer severe cases. This is especially important where specialist mental health services are scarce. Climate-informed primary care should not treat mental health as a post-disaster addendum; it should build distress recognition and psychosocial support into preparedness drills, heat-health plans and flood response protocols.

Sixth, youth and school-based resilience programmes should address climate anxiety, preparedness literacy and misinformation resistance. These programmes should validate concern while strengthening agency, problem-solving, peer support and digital literacy. The goal is not to reassure young people falsely, but to help them convert distress into informed action and mutual support.

Seventh, social protection should be linked to mental health and disaster recovery. Food insecurity, housing loss, unemployment and debt are not only economic consequences of climate shocks; they are drivers of psychological harm. Cash support, livelihood recovery, housing assistance and continuity of education can therefore function as mental health interventions as well as adaptation measures.

Eighth, digital accountability should be incorporated into emergency planning. Public health authorities should develop partnerships with media organisations, fact-checkers, civil society and platform actors for rapid correction, transparent communication and trusted content amplification. The objective is not censorship; it is to reduce preventable harm from false claims while preserving public dialogue and local accountability.

Regional systems, legitimacy and implementation

Community resilience cannot be delivered by technical plans alone. It depends on legitimacy. People are more likely to trust warnings and accept protective action when messages come from institutions and individuals that have been present before the emergency. This is particularly important in communities with histories of neglect, conflict, marginalisation or politicised public health messaging.

Risk communication should therefore move from one-way messaging to continuous participation. Communities should help define which risks matter, which channels are trusted, what rumours are circulating, who is excluded from digital information and what forms of support are realistic. WHO has emphasised social participation as a core part of climate and health action, particularly when communities and civil society are involved in decision-making rather than treated only as message recipients [23].

Implementation also requires governance across sectors. Ministries and departments responsible for health, environment, education, communication, disaster management, social protection and digital regulation often operate through separate plans and budgets. A syndemic preparedness platform requires joint indicators, shared simulation exercises, referral protocols and agreed responsibilities during climate-related emergencies. The European Centre for Disease Prevention and Control has emphasised the need to translate lessons from recent public health crises into concrete preparedness planning [24]. Climate-health misinformation and psychosocial risk should be included in that learning cycle.

Research and policy priorities

The first priority is measurement. Public health systems need indicators that capture climate exposure, mental health outcomes, misinformation exposure, trust and preparedness behaviour in the same framework. Without integrated measurement, the interaction between these risks will remain invisible in routine planning.

The second priority is intervention research. Community trials and implementation studies should test whether combining early warning messages with psychosocial support and misinformation correction improves protective

behaviour, mental wellbeing and trust. Such studies should evaluate not only knowledge gains, but also evacuation behaviour, heat-protection practices, help-seeking, misinformation sharing and continuity of care.

The third priority is equity. Climate-related distress and misinformation vulnerability are not evenly distributed. Preparedness must prioritise communities facing poverty, displacement, weak health systems, digital exclusion, limited literacy and historical mistrust. A digital-only correction strategy may widen inequities if vulnerable groups rely on offline networks or local language communication.

The fourth priority is workforce development. Community health workers, primary-care providers, teachers, journalists, local leaders and emergency responders need training in climate-health risks, psychological first aid, social listening and misinformation response. Preparedness is unlikely to succeed if these functions are left to small specialist teams during crises.

The fifth priority is governance and accountability. Public authorities should publish clear protocols for climate-health warnings, mental health support, rumour response and evidence correction. Transparency matters because misinformation often grows where communities perceive secrecy, inconsistency or political manipulation.

DISCUSSION

The central lesson is that public health preparedness must move beyond hazard response. Climate emergencies are also trust emergencies and mental health emergencies. Communities cannot adapt effectively if people are traumatised, misinformed, distrustful or socially unsupported. A preparedness system that issues warnings without protecting mental wellbeing and information trust is incomplete.

This Perspective does not claim that every climate event produces the same mental health or misinformation pattern. The syndemic will vary by hazard, culture, political context, media ecosystem, health-system capacity and prior experience. However, the interaction is strong enough to justify integrated planning. Reviews of climate-related mental health impacts, eco-anxiety and health misinformation indicate that these are no longer marginal issues [6,13,14].

The proposed framework is deliberately translational. It can be adapted for municipal heat plans, flood preparedness, drought response, school health programmes, primary care, community medicine training and public health emergency operations. Its contribution is to position climate surveillance, psychosocial support and infodemic management as mutually reinforcing preparedness functions rather than competing priorities.

CONCLUSION

Climate change, mental health and misinformation are no longer separate public health concerns. They interact in ways that can weaken preparedness, delay protective behaviour, deepen distress and reduce trust in institutions. A syndemic preparedness framework offers a practical way forward. By linking climate-health surveillance, psychosocial support, infodemic management, trusted messengers, primary care, schools, social protection and digital accountability, public health systems can strengthen community resilience before the next emergency begins.

Table 1: Community resilience and preparedness priorities for the climate-mental health-misinformation syndemic

Preparedness domain	Current gap	Resilience opportunity	Translational priority
Climate-health surveillance	Climate hazards, mental health indicators and trust measures are often monitored separately.	Integrated surveillance can identify communities at compounded physical, psychological and informational risk.	Link heat, flood, food insecurity, service disruption, distress and misinformation indicators.
Psychosocial risk mapping	Mental health needs are commonly assessed after disasters, when services are already strained.	Pre-crisis mapping can identify high-risk groups and guide targeted support.	Prioritise children, older adults, farmers, displaced people, responders and people with pre-existing mental illness.
Infodemic listening	Rumours are often addressed only after they have spread widely.	Social listening can detect distrust narratives and harmful claims early.	Establish community rumour logs, media monitoring and rapid response teams.
Trusted messengers	Official messages may not reach or persuade marginalised groups.	Local messengers can translate warnings into credible, culturally appropriate action.	Train community health workers, teachers, faith leaders, youth leaders and local journalists.
Primary-care mental health	Mental health services are underprepared for climate shocks.	Primary care can provide early recognition, psychological first aid and referral.	Integrate climate distress screening and referral pathways into community medicine.
Youth resilience	Climate anxiety and misinformation resistance are rarely addressed through schools.	Schools can build preparedness literacy, agency and peer support.	Develop age-appropriate climate mental health and digital literacy modules.
Social protection	Economic losses after climate events worsen distress and undermine recovery.	Cash support, food security, housing assistance and livelihood recovery can reduce psychological harm.	Link disaster relief with mental health, education and social care pathways.
Digital accountability	Online platforms can accelerate false claims during crises.	Partnerships can improve rapid correction and trusted content visibility.	Build crisis protocols with media, civil society, fact-checkers and platform actors.

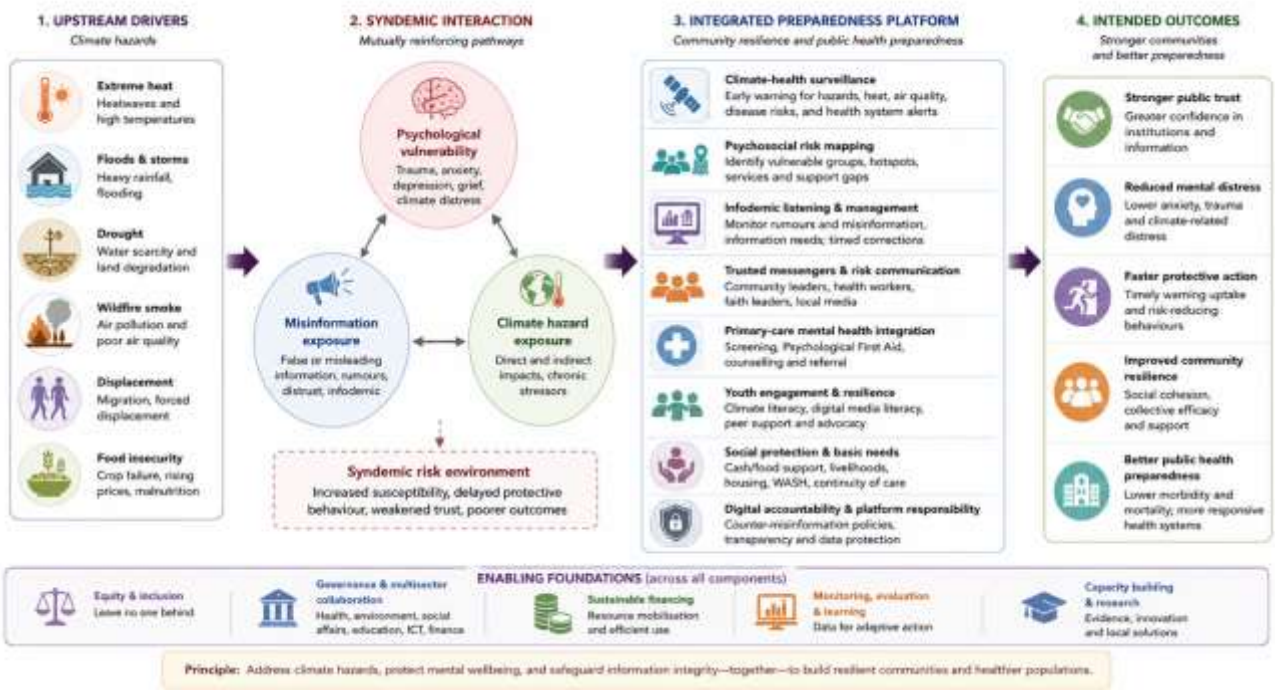

Figure 1: Conceptual framework for climate-mental health-misinformation syndemic preparedness

Climate hazards such as heat, floods, droughts, wildfire smoke, displacement and food insecurity act as upstream drivers. These hazards interact with psychological vulnerability and misinformation exposure to create a syndemic risk environment. The proposed preparedness platform includes climate-health surveillance, psychosocial risk mapping, infodemic listening, trusted messengers, primary-care mental health integration, youth resilience, social protection and digital accountability. Intended outcomes are stronger public trust, reduced distress, faster protective action, improved community resilience and better public health preparedness as shown in Figure 1 and Table 1.

Declarations

Conflict of interest

The authors declare no commercial or financial relationships that could be construed as a potential conflict of interest.

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Data availability statement

No original datasets were generated or analysed for this article. All sources discussed are publicly available.

Ethics statement

This Perspective did not involve human participants, human data, animal subjects or clinical intervention. Ethics committee approval was therefore not required.

Author contributions

Emmanuel Ikechukwu Obi contributed to conceptualisation, original drafting, scientific interpretation and manuscript revision. Thaddeus Chijioke Asogwa contributed to public health framing, literature synthesis and critical revision. Adaora Jane Amaechi contributed to clinical interpretation, manuscript editing and final approval. All authors reviewed and approved the final manuscript for submission.

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