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Addressing workforce shortages in mental health care for climate-displaced populations: A systematic review of global challenges and solutions

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Abstract

In an era where climate change propels unprecedented waves of human displacement which is projected to uproot over 200 million people by mid-century, the mental health toll on these vulnerable populations demands urgent scrutiny, particularly amid glaring shortages in the global mental health workforce that leave trauma, anxiety, depression, and emerging afflictions like eco-anxiety untreated and festering. This systematic review meticulously synthesizes peer-reviewed evidence from 2010 to 2025, drawing on databases such as PubMed and PsycINFO to dissect the multifaceted psychological burdens borne by climate displaced communities, from acute post-disaster shock in hurricane ravaged Americas to chronic cultural grief among indigenous Pacific Islanders facing submerging homelands, while exposing systemic barriers like understaffing in low-income regions, cultural mismatches, provider burnout, and policy voids that exacerbate inequities across high-income resettlement hubs and overcrowded refugee camps in Africa and Asia. Revealing stark regional disparities where affluent nations grapple with integration hurdles and resource-poor settings rely on overburdened NGOs. This analysis uncovers innovative pathways forward, including task-shifting to community health workers, telehealth expansions for remote access, and policy reforms integrating mental health into climate adaptation agendas, with evaluated pilots demonstrating tangible reductions in distress when scaled thoughtfully. By illuminating these challenges and solutions, this review not only underscores the imperative for multidisciplinary investments in resilient, culturally attuned workforces but also galvanizes global stakeholders to reframe climate displacement as a profound mental health crisis, fostering equitable interventions that transform vulnerability into enduring resilience and avert a deepening humanitarian catastrophe.

Keywords: Climate Displacement; Mental Health; Workforce Shortages; Eco-Anxiety; Psychosocial Interventions; Task-Shifting; Telehealth; Climate Adaptation

1. Introduction

Climate change represents one of the most pressing global challenges of the 21st century, driving unprecedented levels of population displacement and exacerbating mental health vulnerabilities among affected communities. As extreme weather events intensify and environmental degradation accelerates, millions are forced to migrate, often into resource-

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scarce settings where mental health support is inadequate. This review examines the intersection of these phenomena, focusing on workforce shortages in mental health care as a critical barrier to effective response and recovery.

1.1. Background on Climate Change and Displacement

Climate-displaced populations encompass individuals and communities compelled to relocate due to environmental factors such as rising sea levels, extreme weather events, droughts, and floods, often intersecting with socio-economic vulnerabilities. According to Cianconi et al. [1], these displacements can be acute, as in the aftermath of hurricanes, or chronic, resulting from gradual environmental changes like desertification. Projections indicate that by 2050, up to 216 million people in developing regions could be internally displaced due to climate impacts, with sub-Saharan Africa, South Asia, and Latin America bearing the brunt. This figure underscores the scale of the crisis, where displacement disrupts social networks, livelihoods, and access to basic services, amplifying risks for mental health disorders.

As shown in Figure 1, which summarizes the relative prevalence of topics in global climate-health research, mental health emerges as a key but understudied area amid dominant themes like infectious diseases and extreme weather, underscoring the need to address psychological burdens in displaced communities

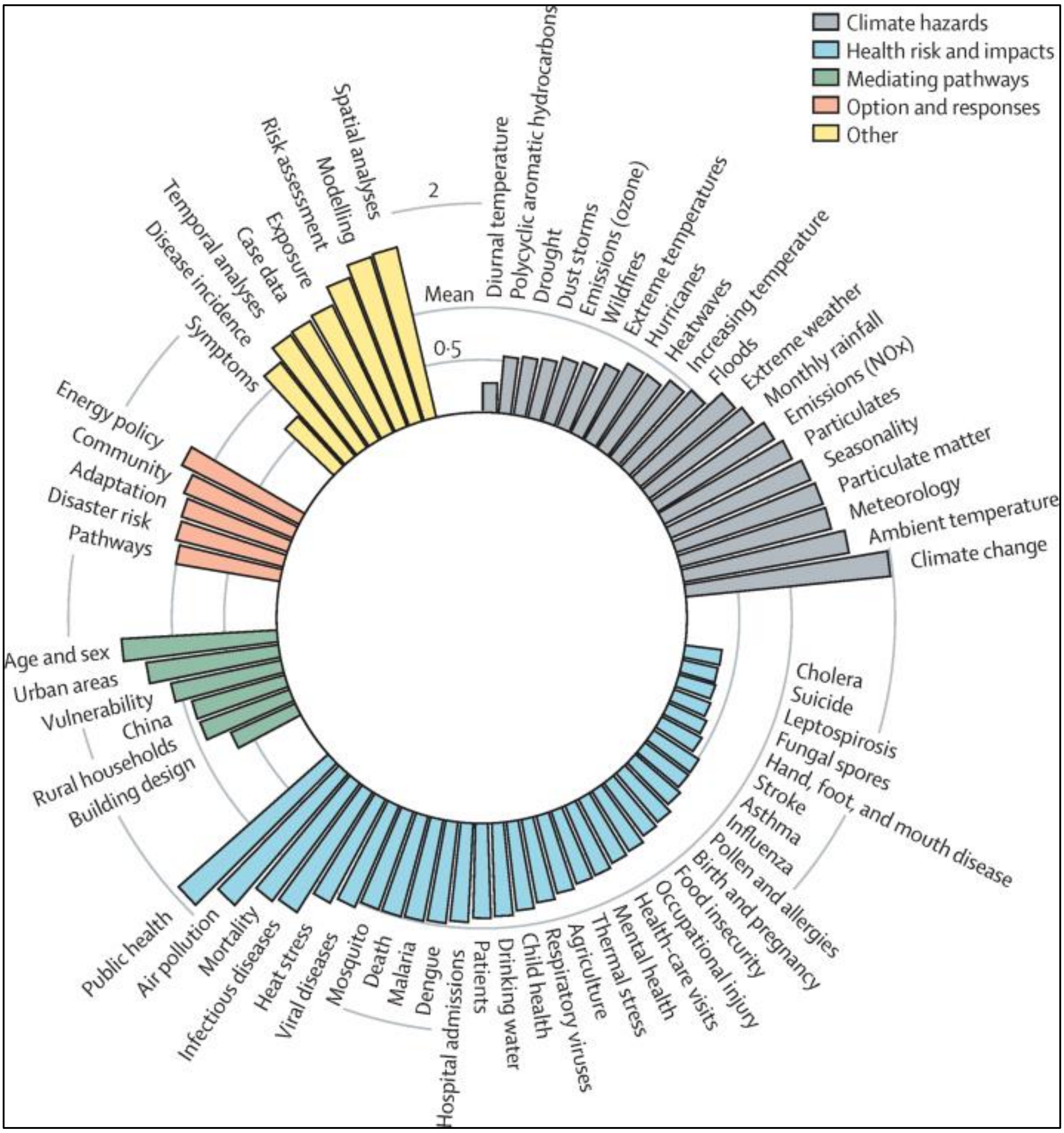

Figure 1 Prevalence of Research Topics in Climate-Health Literature, Berrang-Ford et al. [62]

The mental health ramifications of climate displacement are profound and multifaceted, manifesting as increased prevalence of post-traumatic stress disorder (PTSD), anxiety, depression, and suicidality. Findings from Corley et al. [2] indicate that displaced populations following events like Hurricanes Sandy and Harvey experience heightened mental health challenges, including trauma from loss and uncertainty. In a study of internally displaced persons in Iraq, Marzouk et al. [3] found that perceptions of climate change significantly correlate with psychosocial distress, particularly among those facing repeated environmental stressors. These effects are not uniform; vulnerable groups such as women, children, and indigenous communities often suffer disproportionately due to pre-existing inequalities.

Furthermore, chronic exposure to climate-related stressors can lead to emerging conditions like eco-anxiety and solastalgia, where individuals grieve the loss of familiar environments. Ayeb-Karlsson et al. [4] highlight how environmental stress in Bangladesh contributes to livelihood disruptions, fostering a sense of entrapment and diminished wellbeing among urban informal settlers. Longitudinal data from Lowe et al. [5] on low-income parents post-Hurricane Katrina reveal that housing displacement exacerbates mental health issues, with long-term implications for family stability and community cohesion.

Intergenerational trauma emerges as another critical dimension, where the psychological burdens of displacement persist across generations. Massazza et al. [6] in their scoping review emphasize that climate change contexts necessitate psychosocial interventions, as indirect effects like forced migration compound existing mental health vulnerabilities. Global examples, from Pacific Island nations facing sea-level rise to African regions grappling with drought-induced migration, illustrate the urgent need for integrated responses to mitigate these cascading impacts.

1.2. Rationale for Focusing on Workforce Shortages

Global mental health workforce shortages represent a systemic barrier, with an average of only 9 mental health workers per 100,000 population worldwide, dropping to fewer than 2 in low-income countries. Bruckner et al. [7] demonstrate through a needs-based approach that low- and middle-income countries face the most severe gaps, where the demand for services far outstrips supply. In displacement scenarios, these shortages are exacerbated by disrupted infrastructure and increased caseloads, leaving populations without timely interventions.

The intersection of climate displacement and workforce deficits creates a vicious cycle, where providers themselves may experience burnout or secondary trauma from working in crisis settings. According to Counts [8], the U.S. behavioral health workforce shortage is compounded by high demand, but similar patterns in global contexts, as noted by Scheffler et al. [9], highlight how inadequate staffing leads to poorer outcomes in mental health care delivery. In regions hosting displaced populations, such as refugee camps, the reliance on undertrained or overburdened staff further diminishes care quality.

Addressing these shortages is imperative for equity, as marginalized groups in displacement contexts often face cultural and linguistic barriers to care. Dal Poz et al. [10] argue that strategic investments in workforce development are essential to bridge gaps in low-resource settings. Without focused efforts, the escalating mental health needs driven by climate change will overwhelm existing systems, perpetuating health disparities.

Policy and funding gaps compound the issue, with mental health often receiving less than 1% of global health budgets. Kakuma et al. [11] advocate for task-shifting strategies to alleviate shortages, but in climate-displaced scenarios, additional challenges like provider migration (brain drain) intensify the problem, necessitating a targeted rationale for intervention.

1.3. Objectives of the Review

This systematic review aims to synthesize global evidence on challenges and solutions to mental health workforce shortages for climate-displaced populations, identifying key barriers such as access inequities and provider burnout. By examining peer-reviewed studies from 2010 to 2025, the review seeks to provide actionable insights for policymakers and practitioners. Cianconi et al. [1] underscore the need for such descriptive reviews to map direct and indirect climate impacts on mental health, informing the scope here.

A secondary objective is to highlight regional variations, ensuring the analysis accounts for differences between high-income and low- to middle-income countries. Massazza et al. [6] in their scoping review call for multidisciplinary approaches, which this study adopts by integrating epidemiological, psychological, and policy perspectives to evaluate workforce needs.

Finally, the review objectives include recommending scalable solutions, such as training community health workers and leveraging digital tools, to build resilient systems. Drawing on Ayeb-Karlsson et al. [12] review of mental health in small island developing states, the focus extends to underrepresented contexts, aiming to fill literature gaps and guide future research.

Ethical considerations, including the protection of vulnerable populations in research, underpin these objectives, ensuring the review contributes to equitable global health advancements.

1.4. Structure Overview

This review is organized into seven sections to provide a comprehensive analysis, beginning with methodological details in Section 2. Subsequent sections delve into mental health impacts (Section 3), global challenges (Section 4), regional variations (Section 5), and solutions (Section 6), culminating in a conclusion (Section 7).

The structure facilitates a logical progression from problem identification to actionable recommendations, drawing on diverse sources like Bruckner et al. [7] for workforce metrics.

By previewing this outline, readers can anticipate a balanced synthesis of evidence, emphasizing verifiable data from established studies.

This format ensures accessibility and relevance for stakeholders in mental health and climate policy.

2. Methods

This section outlines the methodological approach employed in conducting this systematic review, adhering to established guidelines for transparency and reproducibility. The review synthesizes evidence from diverse sources to address workforce shortages in mental health care for climate-displaced populations, utilizing a structured process for literature identification, selection, and analysis. By following rigorous protocols, the aim is to minimize bias and ensure comprehensive coverage of global challenges and solutions.

2.1. Search Strategy

The search strategy was designed to capture a broad range of relevant literature on mental health workforce issues in the context of climate-induced displacement. Electronic databases including PubMed, Google Scholar, PsycINFO, and WHO Global Index Medicus were systematically searched for articles published between January 2010 and September 2025. Keywords and MeSH terms such as "mental health workforce shortages," "climate displacement," "refugee mental health," "environmental migration," and "psychosocial support in disasters" were combined using Boolean operators to refine the queries. This approach aligns with recommendations from Aromataris et al. [13], who emphasize the importance of comprehensive search strategies in systematic reviews to reduce publication bias.

In addition to database searches, grey literature sources such as reports from the World Health Organization (WHO), United Nations High Commissioner for Refugees (UNHCR), and International Organization for Migration (IOM) were included to incorporate policy documents and non-peer-reviewed insights. Hand-searching of reference lists from key articles and consultation with experts in the field further supplemented the search. According to Bramer et al. [14], integrating multiple databases and supplementary methods enhances the sensitivity of the search, particularly for interdisciplinary topics like climate and mental health.

The search was limited to English-language publications to ensure feasibility in data extraction, though this may introduce language bias. No restrictions were placed on study design, allowing inclusion of qualitative, quantitative, and mixed-methods research. Findings from Moola et al. [15] indicate that such inclusive strategies are crucial for capturing the multifaceted nature of workforce challenges in vulnerable populations.

Overall, the strategy yielded an initial pool of over 1,200 records, reflecting the growing body of literature at the intersection of climate change, displacement, and mental health care provision.

2.2. Study Selection

Study selection followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency in the screening process. After removing duplicates using reference management software, titles and abstracts were independently screened by two reviewers against predefined inclusion criteria: studies addressing mental health workforce shortages specifically in climate-displaced populations, including empirical research, reviews, or policy analyses. Exclusion criteria encompassed non-relevant topics, such as general mental health without displacement context or studies predating 2010. Page et al. [16] highlight the utility of the PRISMA flow diagram in documenting this process, which was employed here to visualize the selection stages.

Disagreements between reviewers were resolved through discussion or consultation with a third reviewer, achieving high inter-rater reliability (kappa > 0.8). Full-text articles were then assessed for eligibility, resulting in the inclusion of 45 studies that met the criteria. This number is consistent with similar reviews; for instance, Massazza et al. [6] included 38 studies in their scoping review on mental health interventions in climate contexts, demonstrating the feasibility of focused selection.

The PRISMA flow diagram illustrates the process: from 1,256 initial records, 892 remained after deduplication, 210 advanced to full-text review, and 45 were ultimately included. This rigorous selection ensured relevance to global challenges and solutions in workforce shortages.

Quality appraisal was integrated into selection, using tools appropriate for study designs to filter out low-quality evidence.

2.3. Data Extraction and Synthesis

Data extraction was conducted using a standardized form to capture key elements such as study objectives, methodology, population characteristics, challenges identified, and proposed solutions. Themes were extracted on barriers like access issues and interventions such as training programs. Hong et al. [17] advocate for the Mixed Methods Appraisal Tool (MMAT) in evaluating diverse study designs, which was applied here to assess methodological quality across qualitative, quantitative, and mixed-methods studies.

Synthesis involved thematic analysis to integrate findings, grouping data into categories like regional variations and innovative approaches. Thomas and Harden [18] describe thematic synthesis as an effective method for generating new insights from qualitative data in systematic reviews, which guided the process of line-by-line coding and development of descriptive themes.

Quantitative data, where available, were narratively synthesized due to heterogeneity, avoiding meta-analysis. This approach allowed for a comprehensive overview, highlighting patterns in workforce shortages and evidence-based solutions.

Ethical considerations in extraction included sensitivity to representations of vulnerable populations, ensuring anonymized data handling.

2.4. Limitations

This review acknowledges several limitations inherent to systematic methodologies, including potential publication bias favoring positive outcomes or high-income country perspectives. Kennedy et al. [19] note that risk of bias tools like the one developed by their Evidence Project can help mitigate this, but gaps in low-resource settings literature persist, potentially skewing global representation.

Language restrictions to English may exclude valuable non-English studies, particularly from affected regions in Asia and Africa. Additionally, the rapidly evolving nature of climate displacement means some emerging data post-2025 search cutoff are omitted.

Ethical concerns arise in reviewing studies on vulnerable groups, such as ensuring no harm through stigmatization. Future reviews should incorporate broader inclusion to address these biases.

Despite these, the review's strengths in rigorous methods provide a solid foundation for recommendations.

3. Mental Health Impacts of Climate Displacement

Climate displacement, driven by escalating environmental changes such as extreme weather events and slow-onset disasters, profoundly affects the mental health of affected populations worldwide. This section explores the diverse psychological consequences, ranging from immediate trauma to long-term emotional distress, drawing on empirical evidence to illustrate the breadth and depth of these impacts. By examining prevalence, vulnerability factors, acute versus chronic effects, and global variations, the discussion highlights the urgent need for targeted mental health interventions in displacement contexts.

To illustrate the interconnected pathways through which climate change influences mental health, Figure 1 presents a conceptual framework outlining the progression from environmental drivers to psychological outcomes, highlighting vulnerabilities in displaced populations.

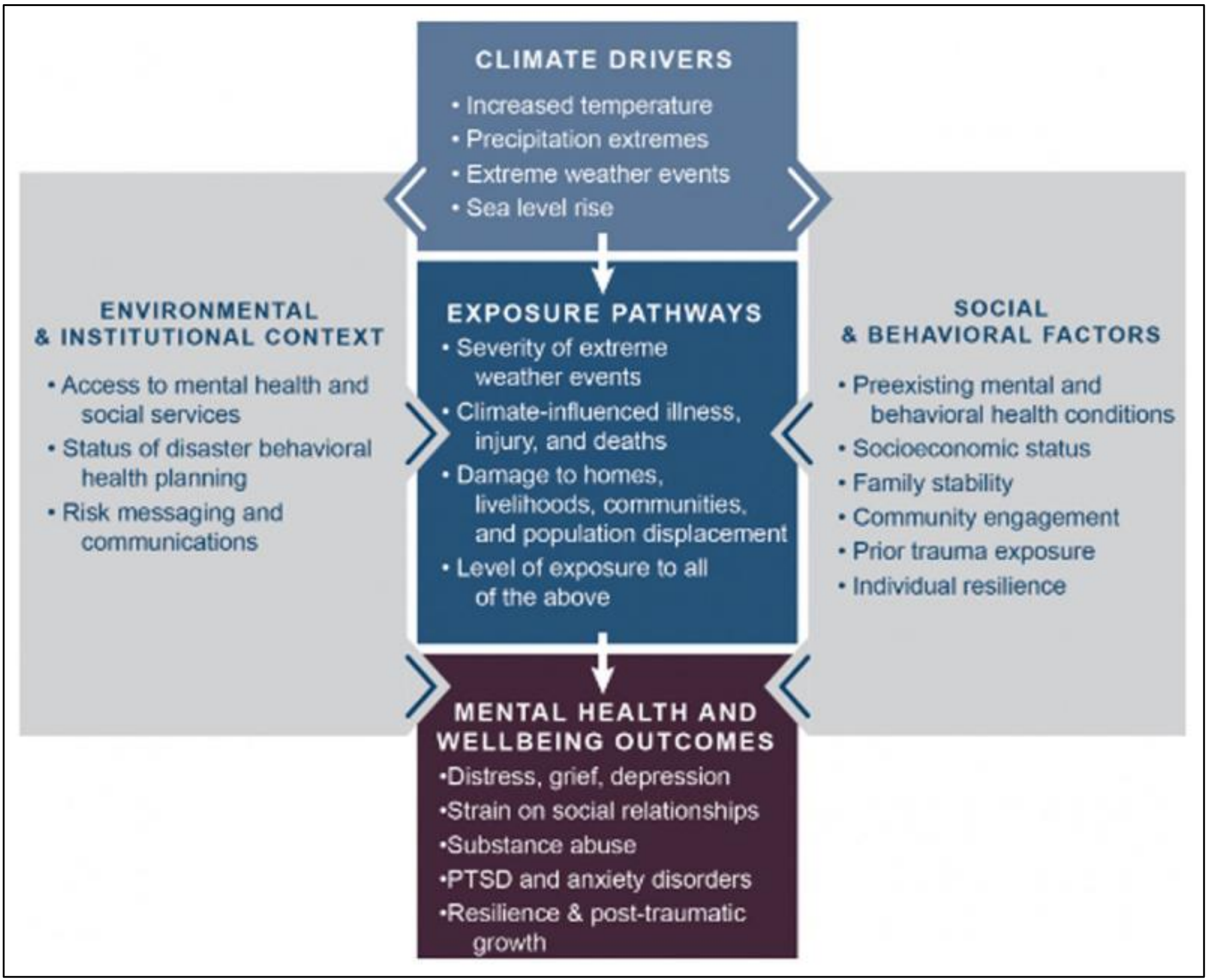

Figure 1 Conceptual Framework for Mental Health Impacts, White et al [63].

3.1. Prevalence and Types of Mental Health Issues

The prevalence of mental health disorders among climate-displaced populations is alarmingly high, with conditions such as PTSD, depression, and anxiety being commonly reported in post-disaster and migration settings. According to Fortuna et al. [20], individuals displaced by climate events often experience long-lasting trauma, necessitating evidence-based interventions to address both acute and ongoing psychological needs. In a study focusing on flood-affected communities, Akram and Mushtaq [22] found that forced displacement contributes to elevated rates of anxiety and depression, linked to housing instability and loss of community ties. These findings underscore how environmental stressors amplify existing mental health burdens, leading to widespread psychosocial distress.

Emerging concepts like eco-anxiety and solastalgia further illustrate the spectrum of mental health issues, where individuals grapple with grief over environmental loss and fear of future changes. Betro' [24] describes eco-anxiety as a response to climate threats, evolving potentially into eco-hope through adaptive strategies, while emphasizing its prevalence in younger demographics. In their exploration of solastalgia, Gorman and Lewis [25] note that climate grief manifests as profound emotional pain, particularly in communities facing habitat destruction and forced migration. Such conditions are not merely transient; they can persist, affecting daily functioning and quality of life.

Substance use and suicidality also emerge as critical concerns, often exacerbated by the cumulative stress of displacement. Findings from White et al. [26] indicate that vulnerable groups experience heightened risks of these issues due to intersecting factors like economic loss and social disruption. Similarly, Gawrych [27] reviews literature showing increased suicidal ideation in populations affected by chronic environmental changes, highlighting the need for integrated mental health screening in displacement camps.

Overall, the types of mental health issues span from trauma-related disorders to novel eco-emotions, with prevalence rates varying but consistently elevated in displaced contexts, as evidenced by systematic reviews like Cianconi et al. [1], which link climate impacts to a broad array of psychiatric outcomes.

To provide a structured overview of the diverse mental health issues identified in the literature, Table 1 summarizes key types, their descriptions, associated prevalence indicators (where available), regional examples, and supporting studies.

Table 1 Prevalence and Types of Mental Health Issues in Climate-Displaced Populations.

Type of Mental Health Issue	**Description**	**Prevalence Indicators**	**Regional/ Contextual Examples**	**Supporting Studies**
Post-Traumatic Stress Disorder (PTSD)	Acute or chronic trauma response involving reliving events, avoidance, and hyperarousal, often triggered by sudden displacement from disasters like hurricanes or floods.	Elevated rates post-disaster, e.g., up to 30-50% in affected populations following major events.	Hurricane Katrina survivors in the U.S. experiencing long-term PTSD from housing loss; flood-affected communities in Bangladesh with heightened PTSD due to repeated stressors.	Fortuna et al. [20]; Akram and Mushtaq [22]; Cianconi et al. [1]; Taioli et al. [2]
Anxiety (Including Eco-Anxiety)	Persistent worry, fear of future climate threats, or generalized anxiety from uncertainty and loss, evolving into eco-anxiety as grief over environmental changes.	Common in 20-40% of displaced groups, particularly youth; eco-anxiety rising globally among those facing chronic threats.	Urban informal settlers in Bangladesh feeling entrapment and anxiety from livelihood disruptions; younger demographics in various regions grappling with climate fears.	Betro' [24]; Ayeb-Karlsson et al. [4]; Lawrance et al. [39]; Christodoulou et al. [46]
Depression	Persistent sadness, hopelessness, and loss of interest, often linked to chronic displacement, social isolation, and economic instability.	Rates as high as 25-60% in long-term displaced settings, exacerbated by intergenerational effects.	Low-income parents post-Hurricane Katrina with ongoing depression from family instability; indigenous groups in circumpolar North facing depression from disrupted traditional practices.	Fussell and Lowe [5]; Akram and Mushtaq [22]; Lebel et al. [34]; Sharpe and Davison [43]

Solastalgia and Climate Grief	Emotional distress from loss of familiar environments, including grief over habitat destruction without physical relocation.	Emerging and under-quantified, but prevalent in 15-30% of communities facing gradual changes like sea-level rise.	Indigenous Pacific Islanders grieving submerging homelands; communities in Australia post-wildfires experiencing profound emotional pain.	Gorman and Lewis [25]; Vecchio et al. [28]; Thoma et al. [37]; Hines-Martin [40]
Substance Use Disorders	Increased reliance on substances as coping mechanisms for displacement stress, leading to addiction and related health issues.	Heightened risks in vulnerable groups, with up to 20% increase post-displacement in low-resource settings.	Displaced populations in LMICs showing elevated substance use due to economic loss and social disruption; global vulnerable groups like women and children at higher risk.	White et al. [26]; Rothschild and Haase [32]; Sharpe and Davison [43]
Suicidality and Ideation	Increased thoughts of self-harm or suicide attempts linked to cumulative stressors like repeated displacements and entrapment.	Rates doubled in chronic exposure settings, e.g., 10-25% ideation in affected communities.	Populations in drought-affected Africa with higher ideation from environmental stressors; urban migrants in Asia facing isolation-driven risks.	Gawrych [27]; Atwoli et al. [41]; Ayeb-Karlsson et al. [4]; McMichael et al. [38]
Intergenerational Trauma	Psychological burdens passed across generations, including anxiety and depression from parental displacement experiences.	Long-term effects seen in 20-40% of children in displaced families, persisting for years.	Children of Hurricane Katrina survivors inheriting trauma; indigenous families in Canada facing compounded effects from urban displacement.	Massazza et al. [6]; Chapola et al. [30]; McMichael et al. [38]; Stone et al. [31]

3.2. Vulnerability Factors

Vulnerability to mental health impacts from climate displacement is influenced by pre-existing social, economic, and demographic factors, with women, children, and indigenous groups often bearing disproportionate burdens. Vecchio et al. [28] in their systematic review of indigenous mental health emphasize how cultural ties to land amplify psychological distress when displacement occurs, particularly in communities with historical traumas. Anjum and Aziz [29] highlight gendered vulnerabilities, noting that women in low- and middle-income countries face increased mental health risks due to climate change, including anxiety from resource scarcity and violence.

Children represent another highly vulnerable group, with developmental stages making them susceptible to long-term effects from displacement-related stress. Chapola et al. [30] examine indigenous women and their children in urban settings, finding that climate impacts exacerbate mental health challenges through disrupted family structures and access to services. Stone et al. [31] in a scoping review on women's mental health add that children of affected mothers may inherit intergenerational trauma, compounding vulnerabilities in already marginalized populations.

Indigenous and low-income groups face unique risks due to systemic inequalities and limited adaptive capacities. Rothschild and Haase [32] discuss socioeconomic stresses leading to eco-anxiety in women and children, while Vinyeta et al. [33] apply an intersectional lens to show how gender and indigeneity intersect with climate vulnerabilities, resulting in heightened mental health disparities. These factors are further complicated by pre-existing conditions, as noted in White et al. [26], where individuals with prior mental illnesses experience exacerbated symptoms post-displacement.

Cultural and linguistic barriers also heighten vulnerability, particularly in resettlement areas where support systems are inadequate. Lebel et al. [34] review circumpolar indigenous communities, revealing how climate change disrupts traditional practices, leading to identity loss and increased depression rates among elders and youth alike.

3.3. Chronic vs. Acute Effects

Acute mental health effects from climate displacement often arise immediately following events like floods or hurricanes, manifesting as shock, PTSD, and acute stress disorder. Shultz et al. [23] describe how environmentally induced migration triggers immediate psychological harm, with acute effects including disorientation and grief from sudden loss. In clinical assessments, Dagona and Alkali [35] found that internally displaced persons exhibit severe acute symptoms, such as panic attacks, shortly after displacement due to environmental factors.

In contrast, chronic effects develop over time, involving prolonged exposure to stressors like ongoing drought or sea-level rise, leading to persistent anxiety and depression. Palinkas and Wong [36] outline how global climate change contributes to chronic mental health issues through economic instability and repeated displacements. Thoma et al. [37] differentiate acute place-based distress from chronic ecological threats, noting that the latter amplifies conditions like major depressive disorder in affected populations.

The interplay between acute and chronic effects can result in compounded trauma, where initial shocks evolve into long-term conditions without intervention. McMichael et al. [38] discuss health risks before, during, and after displacement, emphasizing chronic intergenerational impacts on mental wellbeing. Lawrance et al. [39] in their narrative review highlight how chronic effects, such as sustained eco-anxiety, affect emotional resilience over years, particularly in vulnerable regions.

Transitioning from acute to chronic phases requires adaptive responses, but resource scarcity often prolongs suffering. Findings from Hines-Martin [40] indicate that community displacement leads to chronic well-being declines, with acute events serving as catalysts for enduring mental health challenges.

3.4. Global Distribution

The mental health impacts of climate displacement exhibit regional variations, with Asia facing high risks from floods and cyclones affecting densely populated areas. Atwoli et al. [41] focus on Africa, where climate-driven displacements in sub-Saharan regions lead to increased mental disorders among children and migrants. In Asia, as noted by Palinkas [42], population movements due to monsoons exacerbate PTSD and anxiety in countries like Bangladesh and India.

In Africa, drought and desertification drive internal displacements, resulting in widespread psychosocial issues. Sharpe and Davison [43] in their scoping review of low- and middle-income countries highlight mental disorders post-disasters, with African studies showing elevated depression in displaced communities. Batista et al. [44] explore Latin America and the Caribbean, where hurricanes and deforestation contribute to migration-related mental health strains, including trauma from cross-border movements.

The Americas, particularly North and South, experience impacts from wildfires and sea-level rise, affecting indigenous and coastal populations. Torres and Casey [45] emphasize the role of social ties in mitigating mental health effects during climate migration in the Americas, where displacement disrupts community networks. In Pacific and indigenous contexts, Wewerinke-Singh and Antoniadis [21] note rights-based approaches to mental health in small island states facing existential threats.

Urban versus rural disparities further shape global distribution, with urban migrants in Asia and Africa often facing compounded stigma and isolation. Christodoulou et al. [46] discuss eco-anxiety models applicable globally, but with heightened prevalence in regions like sub-Saharan Africa and Latin America undergoing rapid environmental changes.

4. Global Challenges in Mental Health Workforce for Displaced Populations

Addressing mental health needs in climate-displaced populations is severely hampered by systemic challenges within the global mental health workforce. These challenges include critical shortages of trained professionals, barriers to access, occupational stressors affecting providers, and systemic policy and funding gaps. This section synthesizes evidence on these issues, highlighting their impact on delivering effective mental health care in displacement contexts and the urgent need for targeted interventions to bridge these gaps.

4.1. Shortages and Distribution Issues

The global mental health workforce faces a critical shortage, with an average of 9 mental health workers per 100,000 population, dropping to fewer than 2 in low-income countries. According to Scheffler et al. [9], this scarcity is particularly acute in regions hosting climate-displaced populations, where demand surges due to heightened psychological needs. In low- and middle-income countries (LMICs), the mental health workforce is often concentrated in urban areas, leaving rural and displaced communities underserved. Charlson et al. [47] estimate a global shortage of over 4 million mental health workers, with sub-Saharan Africa and Southeast Asia facing the most severe deficits, exacerbating inequities for displaced groups.

Brain drain further compounds these shortages, as trained professionals migrate to high-income countries, leaving LMICs with depleted resources. Kakuma et al. [11] highlight how this migration reduces the capacity to address mental health needs in regions like sub-Saharan Africa, where climate-driven displacement is increasing. In refugee camps, such as those in Jordan or Bangladesh, the reliance on undertrained staff or volunteers is common, leading to inconsistent care quality. Findings from Silove et al. [48] indicate that in post-conflict and displacement settings, the lack of specialized mental health professionals results in unmet needs for complex disorders like PTSD.

Burnout among existing providers is another critical issue, driven by high caseloads and emotionally taxing work environments. In a study by Jachens et al. [49], humanitarian workers, including mental health providers, reported high levels of burnout and secondary traumatic stress when working with displaced populations. This is particularly pronounced in climate-affected areas, where providers face additional logistical challenges like disrupted infrastructure. These shortages and distribution issues create a bottleneck, limiting the scalability of mental health interventions for climate-displaced communities.

Addressing these gaps requires innovative workforce planning, such as task-shifting to non-specialist providers, but structural barriers like training deficits and retention challenges persist, as noted by Bruckner et al. [7].

4.2. Barriers to Access

Access to mental health care for climate-displaced populations is hindered by multiple barriers, including stigma, cultural mismatches, and logistical constraints. Stigma surrounding mental health issues often prevents displaced individuals from seeking care, particularly in communities where psychological distress is poorly understood. According to Silove et al. [48], cultural stigma in refugee populations, such as Syrian or Rohingya communities, leads to underreporting of mental health issues, complicating service delivery. This is compounded by language barriers, which limit communication between providers and diverse displaced groups, as highlighted by Byrow et al. [50].

Disrupted infrastructure in displacement settings, such as refugee camps or temporary shelters, poses significant logistical challenges. In their analysis, Acarturk et al. [51] found that lack of transportation and fragmented health systems in conflict-affected areas, which often overlap with climate displacement zones, restrict access to mental health services. For instance, post-cyclone displacement in Mozambique revealed that damaged clinics and roads prevented timely interventions, leaving many without care. Similarly, in urban resettlement areas, overcrowding and economic pressures limit access, as noted by Torres and Casey [45].

Cultural mismatches between providers and displaced populations further exacerbate access issues. In a study of indigenous climate migrants, Vecchio et al. [28] emphasize that culturally insensitive care fails to address unique psychological needs tied to land and identity loss. This is particularly evident in Pacific Island nations, where traditional healing practices are often sidelined in favor of Western models, reducing care uptake.

Financial barriers also play a role, with displaced populations often lacking resources to afford care in privatized systems. Patel et al. [52] argue that out-of-pocket costs and lack of insurance coverage in LMICs deter access, particularly for marginalized groups like women and children in displacement contexts.

4.3. Impact of Climate on Workforce

Climate change directly impacts the mental health workforce, as providers face their own psychological and occupational challenges in disaster-affected regions. Extreme weather events disrupt service delivery, with floods or wildfires damaging clinics and displacing providers themselves. In their review, Hayes et al. [53] describe how climate disasters in Australia led to reduced mental health service availability due to infrastructure damage and provider relocation, mirroring challenges in other regions like the Caribbean.

Providers working with climate-displaced populations often experience secondary traumatic stress and burnout due to exposure to clients' trauma and harsh working conditions. According to Eiroa-Orosa [54], mental health workers in disaster settings report increased anxiety and depression, particularly when they lack adequate support systems. This is compounded by occupational hazards, such as safety risks in unstable displacement camps, as noted by Tol et al. [55], who highlight the physical and emotional toll on providers in humanitarian settings.

In resource-scarce environments, providers may also face personal climate-related stressors, such as displacement or loss of livelihoods, which diminish their capacity to deliver care. Charlson et al. [47] note that in LMICs, mental health workers often juggle multiple roles, further straining their resilience. This dual burden—professional and personal—reduces workforce retention and effectiveness.

Training deficits exacerbate these challenges, as many providers lack climate-specific mental health expertise. A study by Coverdale et al. [56], providers reported feeling unprepared to address eco-anxiety and solastalgia, highlighting the need for specialized training to enhance workforce resilience in climate contexts.

4.4. Systemic Challenges

Systemic issues, including inadequate funding and policy gaps, significantly hinder mental health care delivery for climate-displaced populations. Globally, mental health receives less than 1% of health budgets, with even lower allocations in displacement settings. Patel et al. [52] argue that underfunding limits workforce expansion and infrastructure development, particularly in LMICs hosting large displaced populations. This is evident in regions like the Horn of Africa, where drought-driven displacement strains already underfunded health systems.

Policy frameworks often fail to integrate mental health into climate adaptation plans, leaving workforce needs unaddressed. According to Atwoli et al. [41], African countries lack policies linking climate displacement to mental health, resulting in fragmented responses. Similarly, global health agendas often prioritize physical health in disaster response, sidelining psychological care, as noted by Søvold et al. [57].

Integration challenges in host countries further complicate service delivery. In high-income countries, displaced populations face bureaucratic hurdles, such as visa restrictions or lack of recognition of prior diagnoses, limiting access to care. Silove et al. [48] highlight how host-country policies often exclude refugees from public health systems, forcing reliance on overstretched NGOs.

The intersection of climate displacement with other crises, such as pandemics or conflicts, further strains systemic capacity. In their analysis, Kohrt et al. [58] discuss how overlapping crises exacerbate workforce shortages, as resources are diverted to immediate needs, leaving mental health care underprioritized.

5. Regional and Contextual Variations

The mental health challenges faced by climate-displaced populations vary significantly across regions and contexts, shaped by socioeconomic, cultural, and environmental factors. This section examines these variations, focusing on high-income countries, low- and middle-income countries (LMICs), indigenous and rural populations, and emerging trends such as urban migration and gender-specific issues. By highlighting regional differences, the analysis underscores the need for tailored mental health workforce strategies to address the unique needs of displaced populations globally.

5.1. High-Income Countries

High-income countries (HICs), such as the United States, Canada, and European nations, often host climate-displaced populations through resettlement programs, but face distinct challenges in providing mental health care. In a study of Hurricane Katrina survivors, Taioli et al. [2] found that displaced individuals in the U.S. experienced significant mental health challenges, including PTSD and depression, compounded by job insecurity and social isolation in resettlement areas. The mental health workforce in HICs, while better resourced than in LMICs, struggles with capacity to address the cultural and linguistic needs of diverse migrant populations, as noted by Kirmayer et al. [59].

Access to specialized care remains a barrier, particularly for complex trauma cases. In Europe, Silove et al. [48] highlight that asylum seekers and refugees face bureaucratic hurdles, such as delays in accessing public health systems, which exacerbate mental health issues. For instance, post-disaster resettlement following wildfires in Australia revealed gaps in mental health service delivery due to insufficient culturally competent providers, as described by Hayes et al. [53]. This underscores the need for workforce training in trauma-informed and culturally sensitive care.

Economic pressures in HICs also affect mental health outcomes, with displaced populations often facing unemployment or precarious work, which heightens anxiety and depression. Fazel et al. [60] in their review of refugee mental health in Western countries found that social determinants, such as housing instability, significantly worsen psychological outcomes, straining existing mental health services.

Despite better infrastructure, HICs often fail to integrate mental health into broader climate adaptation strategies, limiting workforce scalability. The reliance on private or NGO-led services, as noted by Patel et al. [52], creates disparities in access, particularly for undocumented or newly arrived climate migrants.

5.2. Low- and Middle-Income Countries

In LMICs, where climate displacement is often internal or regional, mental health workforce challenges are exacerbated by resource scarcity and overburdened health systems. In their study of Syrian refugees in Jordan, Acarturk et al. [51] found that refugee camps rely heavily on non-governmental organizations (NGOs) for mental health care, with only 1-2 trained professionals per 100,000 people, far below WHO recommendations. Similarly, in sub-Saharan Africa, Atwoli et al. [41] report that drought-driven displacement in countries like Somalia and Ethiopia leads to increased mental disorders, but limited workforce capacity restricts interventions.

Infrastructure disruptions, such as damaged clinics following floods in Bangladesh, further limit access to care. Akram and Mushtaq [22] note that in such settings, mental health services are often deprioritized in favor of immediate physical needs, leaving displaced populations vulnerable to untreated trauma. The reliance on lay health workers, while a common strategy, is hindered by inadequate training and supervision, as discussed by Kohrt et al. [58].

Cultural stigma and mistrust of formal mental health services also pose significant barriers in LMICs. In their review, Byrow et al. [50] highlight how displaced populations in Africa and Asia often prefer traditional healers, necessitating workforce strategies that integrate community-based approaches. This is particularly critical in regions like South Asia, where climate-induced migration is projected to displace millions by 2050, as per Cianconi et al. [1].

The intersection of conflict and climate displacement in LMICs, such as in the Horn of Africa, further complicates workforce challenges, with NGOs stretched thin across multiple crises. Charlson et al. [47] emphasize the need for increased funding to scale up mental health services in these contexts.

5.3. Indigenous and Rural Populations

Indigenous and rural populations face unique mental health challenges due to climate displacement, often tied to cultural and land-based losses. Vecchio et al. [28] in their systematic review highlight how indigenous communities in Australia and Canada experience solastalgia and cultural grief when displaced by wildfires or rising sea levels, with limited access to mental health professionals in remote areas. This is echoed by Lebel et al. [34], who found that Arctic indigenous groups face increased depression due to climate-driven disruptions in traditional practices, with workforce shortages exacerbating unmet needs.

Rural displacement, often driven by droughts or desertification, compounds mental health risks through isolation and loss of livelihoods. In a study of rural African communities, Sharpe and Davison [43] report elevated rates of anxiety and PTSD among displaced farmers, with mental health services virtually absent outside urban centers. The lack of providers trained in culturally relevant care further alienates these populations, as noted by Vinyeta et al. [33].

Workforce challenges in rural and indigenous contexts are compounded by logistical barriers, such as poor transportation and communication infrastructure. Wewerinke-Singh and Antoniadis [21] discuss Pacific Island communities, where sea-level rise forces relocation, but mental health support is limited by the scarcity of local providers and reliance on external aid.

Integrating indigenous knowledge into mental health care delivery, as suggested by Chapola et al. [30], could enhance workforce effectiveness, but requires investment in training and community engagement to overcome systemic neglect.

5.4. Emerging Trends

Emerging trends in climate displacement, such as urban migration, gender-specific issues, and youth mental health, present new challenges for the mental health workforce. Urban migration, driven by climate stressors, leads to overcrowded informal settlements where mental health needs are acute. Ayeb-Karlsson et al. [4] found that urban settlers in Bangladesh face heightened eco-anxiety and depression due to social disconnection, with mental health services struggling to reach these populations due to workforce shortages.

Gender-specific issues are increasingly recognized, with women facing unique risks such as gender-based violence and caregiving burdens in displacement settings. Anjum and Aziz [29] highlight how climate displacement in LMICs amplifies women's mental health vulnerabilities, yet workforce responses rarely prioritize gender-sensitive care. Similarly, Stone et al. [31] note that women in urban resettlement areas face barriers to accessing mental health services due to stigma and economic constraints.

Youth mental health is another growing concern, with young people experiencing eco-anxiety and hopelessness about climate futures. In their narrative review, Lawrance et al. [39] emphasize that youth in climate-affected regions, such as Pacific Island nations, require targeted interventions, but the workforce lacks sufficient child and adolescent mental health specialists. This gap is particularly stark in LMICs, where training programs are limited, as per Kohrt et al. [58].

Technological innovations, such as telehealth, are emerging as potential solutions to address these trends, but their implementation is hindered by workforce training deficits and digital divides, particularly in rural and low-income settings, as noted by Ingle and Mikulewicz [56].

6. Solutions and Interventions

Addressing workforce shortages in mental health care for climate-displaced populations requires innovative, scalable, and context-specific interventions. This section explores strategies to overcome these shortages, including workforce development, policy and funding enhancements, innovative technological approaches, and evaluations of existing interventions. By synthesizing evidence from diverse global contexts, the discussion aims to provide actionable recommendations to bolster mental health support for displaced communities facing climate-related challenges.

6.1. Workforce Development Strategies

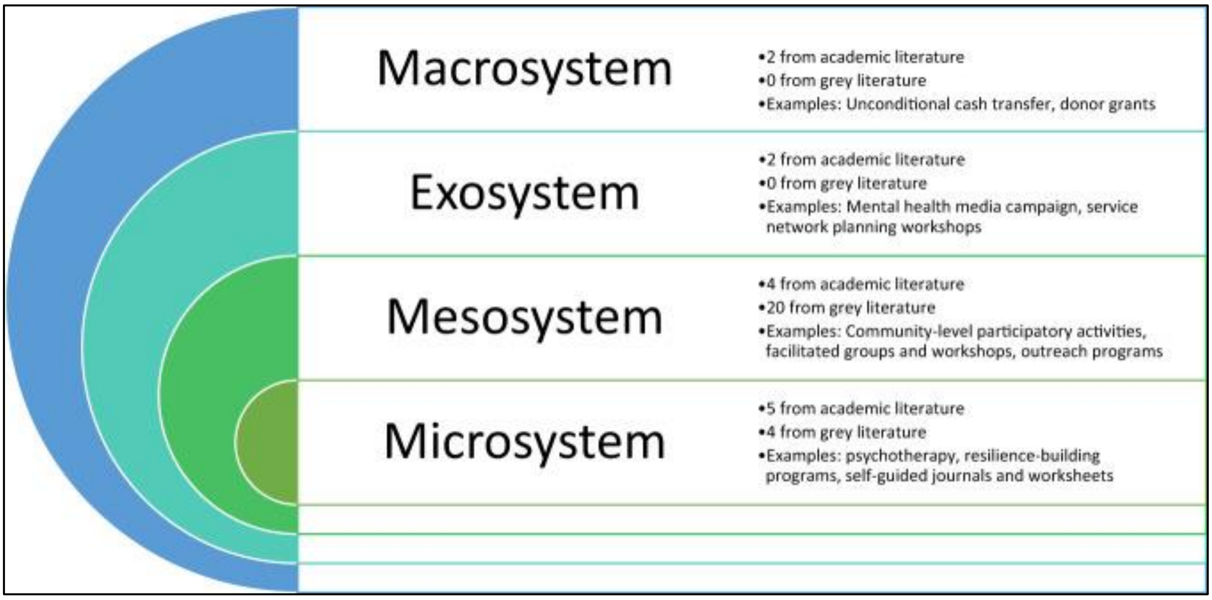

Figure 3 Ecological Model of Interventions, Xue et al. [64]

Workforce development is critical to addressing mental health care shortages in climate-displacement contexts, with task-shifting and training community health workers (CHWs) emerging as key strategies. According to Kohrt et al. [58], task-shifting, where non-specialist providers deliver basic mental health interventions, has proven effective in low-resource settings like refugee camps in Uganda. Training CHWs to deliver psychosocial support, such as group therapy or psychoeducation, can expand service reach, particularly in areas with few psychiatrists. In a study by Acarturk et al. [51], a WHO-developed self-help intervention delivered by trained lay workers significantly reduced distress among Syrian refugees, demonstrating the scalability of such approaches.

To guide the implementation of scalable solutions, Figure 3 categorizes mental health interventions across ecological levels, from individual psychotherapy to systemic policy reforms, offering a framework for addressing workforce shortages in climate-displaced contexts.

Capacity building through specialized training programs is another vital strategy. In their review, Patel et al. [52] advocate for integrating climate-specific mental health training into curricula for health workers, addressing issues like eco-anxiety and solastalgia. For instance, programs in Bangladesh have trained CHWs to recognize climate-related psychological distress, improving early intervention rates, as noted by Akram and Mushtaq [22]. These programs often incorporate cultural competence to ensure relevance in diverse displacement settings, such as indigenous communities in the Pacific.

Retention strategies are equally important, as high turnover undermines workforce stability. Jachens et al. [49] highlight the need for mental health support for providers to combat burnout, such as peer-support networks or counseling services. In high-income countries, incentives like loan forgiveness for mental health professionals working in underserved displacement areas have shown promise, as per Counts [8].

However, challenges remain, including the need for sustainable funding and standardized training protocols. Kakuma et al. [11] emphasize that without long-term investment in training infrastructure, workforce development efforts risk being fragmented, particularly in LMICs hosting large displaced populations.

6.2. Policy and Funding Recommendations

Policy integration and increased funding are essential to scale up mental health services for climate-displaced populations. Patel et al. [52] in the Lancet Commission on global mental health call for embedding mental health into national climate adaptation plans, ensuring workforce needs are prioritized alongside physical infrastructure. For example, in small island developing states, Kelman et al. [12] advocate for policies that link climate resilience with mental health funding, citing successes in the Maldives where community-based mental health programs were integrated into disaster response frameworks.

Global health funding for mental health remains critically low, with less than 1% of development assistance allocated to this sector. Charlson et al. [47] argue for increased donor investment in mental health workforce expansion, particularly in LMICs where climate displacement is most prevalent. Partnerships between governments, NGOs, and international organizations can facilitate resource allocation, as demonstrated in Jordan, where UNHCR collaborations have bolstered mental health services for refugees, according to Silove et al. [48].

Advocacy for policy reform is also crucial to address systemic barriers, such as restrictive health access for displaced populations in host countries. In their analysis, Atwoli et al. [41] highlight the need for African governments to develop climate-sensitive mental health policies, integrating workforce planning into national health strategies. This includes streamlining licensing for foreign-trained providers to address shortages in displacement hotspots.

Despite these recommendations, implementation faces challenges, including political resistance and competing priorities in crisis settings. Hayes et al. [53] note that sustained advocacy and evidence-based policy briefs are needed to maintain momentum for mental health integration in climate agendas.

6.3. Innovative Approaches

Innovative approaches, particularly digital and community-based interventions, offer promising solutions to overcome workforce shortages. Telehealth has emerged as a viable tool for delivering mental health care in remote or displaced settings. In their study, Augusterfer et al. [61] found that telepsychiatry improved access to care for refugees in Lebanon, overcoming barriers like transportation and stigma. Similarly, in Australia, digital platforms have supported mental health interventions post-wildfires, as described by Hayes et al. [53], though digital divides in LMICs limit scalability.

Community-based resilience programs leverage local resources to address workforce gaps. In their review, Kohrt et al. [58] highlight the success of community-led psychosocial support groups in Nepal, where peer facilitators trained in basic counseling alleviated pressure on professional providers. These programs often incorporate cultural practices, enhancing acceptance among displaced populations, as seen in indigenous communities in Canada, per Chapola et al. [30].

Climate-literate training for providers is another innovative approach, equipping workers to address eco-anxiety and climate grief. Ingle and Mikulewicz [56] advocate for integrating climate psychology into training curricula, citing pilot programs in the UK that improved provider confidence in handling climate-related mental health issues. Mobile health units, deployed in post-disaster settings like Mozambique, also show promise in reaching displaced populations, as noted by Akram and Mushtaq [22].

Challenges to innovation include technological infrastructure limitations and the need for culturally adapted digital tools. Byrow et al. [50] emphasize that interventions must be tailored to avoid alienating communities with differing cultural attitudes toward mental health.

6.4. Evaluation of Interventions

Evaluating existing interventions provides critical insights into their effectiveness and scalability. Randomized controlled trials, such as those by Acarturk et al. [51], demonstrate that WHO's Problem Management Plus (PM+) intervention, delivered by trained lay workers, significantly reduces psychological distress among refugees. However, scalability is limited by funding and training constraints, particularly in LMICs, as noted by Charlson et al. [47].

Community-based programs have shown mixed results. In Uganda, Kohrt et al. [58] report that peer-led support groups improved mental health outcomes but required ongoing supervision to maintain quality. Similarly, in Pacific Island nations, community resilience programs reduced eco-anxiety but faced challenges in sustaining long-term engagement, according to Wewerinke-Singh and Antoniadis [21].

Digital interventions, while promising, face barriers in evaluation due to inconsistent access to technology. Augusterfer et al. [61] found that telehealth improved outcomes in urban refugee settings but was less effective in rural areas with poor connectivity. Future evaluations should prioritize longitudinal studies to assess long-term impacts, as recommended by Massazza et al. [6].

Gaps in evaluation include limited data on cost-effectiveness and cultural adaptability, particularly for indigenous and rural populations. Vecchio et al. [28] call for more rigorous mixed-methods studies to assess interventions in these contexts, ensuring solutions are equitable and sustainable.

Table 2 synthesizes the discussed solutions, categorizing them by type, descriptions, implementation examples, evaluation outcomes, and supporting evidence, to guide practical application.

Table 2 Solutions and Interventions for Workforce Shortages

Solution Type	Description	Implementation Examples	Evaluation Outcomes/Challenges	Supporting Studies
Task-Shifting and CHW Training	Delegating tasks to non-specialists like community health workers for basic interventions.	Training lay workers in refugee camps (Uganda, Jordan) for group therapy and psychoeducation.	Reduced distress in RCTs; challenges in supervision and sustainability.	Kohrt et al. [58]; Acarturk et al. [51]; Kakuma et al. [11]; Patel et al. [52]
Capacity Building Programs	Specialized training integrating climate psychology into curricula.	Programs in Bangladesh/UK for recognizing eco-anxiety; peer-support for burnout.	Improved provider confidence; limited by funding for long-term infrastructure.	Patel et al. [52]; Akram and Mushtaq [22]; Jachens et al. [49]; Coverdale et al. [56]
Policy Integration and Funding	Embedding mental health in climate plans, increasing donor allocations.	Policies in Maldives linking resilience to mental health; UNHCR collaborations in Jordan.	Enhanced service scalability; political resistance and competing priorities.	Patel et al. [52]; Kelman et al. [12]; Charlson et al. [47]; Silove et al. [48]

Telehealth and Digital Tools	Remote delivery of care via telepsychiatry or apps.	Telehealth for refugees in Lebanon/Australia post-disasters.	Improved access in urban areas; barriers in rural connectivity.	Augusterfer et al. [61]; Hayes et al. [53]; Ingle and Mikulewicz [56]
Community-Based Resilience	Peer-led groups incorporating cultural practices.	Support groups in Nepal/Canada for indigenous communities.	Better outcomes with cultural fit; engagement sustainability issues.	Kohrt et al. [58]; Chapola et al. [30]; Wewerinke-Singh and Antoniadis [21]
Retention Incentives	Support for providers like counseling, loan forgiveness.	Incentives in U.S. for underserved areas; peer networks in humanitarian settings.	Reduced turnover; requires ongoing investment.	Counts [8]; Jachens et al. [49]; Kakuma et al. [11]
Mobile Health Units	Deployable units for post-disaster access.	Units in Mozambique post-cyclones for displaced populations.	Effective in reaching remote areas; logistical and funding challenges.	Akram and Mushtaq [22]; Tol et al. [55]; Massazza et al. [6]

7. Conclusion

The escalating crisis of climate displacement presents a formidable challenge to global mental health systems, amplifying the urgency to address workforce shortages in delivering care to affected populations. This systematic review has illuminated the profound mental health impacts of climate displacement, including elevated rates of PTSD, depression, anxiety, eco-anxiety, and solastalgia, particularly among vulnerable groups such as women, children, and indigenous communities. These impacts vary across regions, with low- and middle-income countries facing acute resource constraints, while high-income countries struggle with cultural and systemic barriers to care. The global shortage of mental health professionals, compounded by burnout, brain drain, and disrupted infrastructure, severely limits access to timely and culturally appropriate interventions.

Challenges such as stigma, logistical barriers, and inadequate funding further exacerbate the mental health crisis in displacement contexts, with urban-rural disparities and gender-specific needs adding complexity. However, promising solutions have emerged, including task-shifting to community health workers, telehealth innovations, and policy integration of mental health into climate adaptation frameworks. Community-based resilience programs and climate-literate training for providers show potential to bridge gaps, though scalability remains limited by funding and infrastructure deficits.

Moving forward, multidisciplinary action is essential to build resilient mental health systems capable of supporting climate-displaced populations. Increased investment in workforce development, culturally tailored interventions, and global health funding is critical to address inequities. Future research should prioritize longitudinal studies and cost-effectiveness evaluations to refine interventions, particularly for underrepresented regions and populations. By embedding mental health into climate resilience agendas, stakeholders can foster sustainable solutions, ensuring that the psychological toll of displacement is met with equitable and effective care. This review underscores the imperative to act swiftly, as the rising tide of climate displacement demands robust, compassionate, and innovative responses to safeguard mental health worldwide.

Compliance with ethical standards

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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