climate

MDPI

Article

Addressing Climate Resilience in the African Region: Prioritizing Mental Health and Psychosocial Well-Being in Disaster Preparedness and Response Planning for Mainstream Communities and Migrants

Belayneh Fentahun Shibesh [1,2,3] and Nidhi Nagabhatla [3,4,5,*]

[1] Faculty of Medicine and Health Sciences, University of Oviedo, C. San Francisco, 3, 33003 Oviedo, Spain
[2] Medical School of the University of Nicosia, Nicosia 2417, Cyprus
[3] United Nations University Institute on Comparative Regional Integration Studies, Potterierei 72, 8000 Brugge, Belgium
[4] School of Geography and Earth Science, McMaster University, Hamilton, ON L8S 4L8, Canada
[5] Faculty of Economics and Business, University of Ghent, 9000 Gent, Belgium
* Correspondence: nnagabhatla@cris.unu.edu

Abstract

Climate change represents a complex and multifaceted challenge for health systems, particularly in the African region, where the research has predominantly focused on physical health impacts while overlooking critical mental health dimensions. Our central hypothesis is that integrating culturally adapted mental health and psychosocial support (MHPSS) into climate resilience frameworks and disaster response planning will significantly reduce psychological distress (e.g., anxiety, depression, and trauma) and enhance adaptive capacities among both mainstream and migrant communities in disaster-prone African regions. This rapid review methodology systematically explores the intricate relationships between climate change, mental health, and migration by examining the existing literature and identifying significant information gaps. The key findings underscore the urgent need for targeted research and strategic interventions that specifically address mental health vulnerabilities in the context of climate change. This review highlights how extreme weather events, environmental disruptions, and forced migration create profound psychological stressors that extend beyond immediate physical health concerns. This research emphasizes the importance of developing comprehensive adaptation strategies integrating mental health considerations into broader climate response frameworks. Recommendations emerging from this assessment call for immediate and focused attention on developing specialized research, policies, and interventions that recognize the unique mental health challenges posed by climate change in African contexts. We also note the current limitations in the existing national adaptation plans, which frequently overlook mental health dimensions, thereby underscoring the necessity of a more holistic and nuanced approach to understanding climate change's psychological impacts. In this exploratory study, we intended to provide a crucial preliminary assessment of the complex intersections between climate change, mental health, and migration, offering valuable insights for policymakers, researchers, and healthcare professionals seeking to develop more comprehensive and responsive strategies in an increasingly challenging environmental landscape.

Keywords: climate change; mental health; migration; preparedness; response; Africa; internally displaced people

Academic Editor: Nir Y. Krakauer

Received: 21 February 2025
Revised: 10 June 2025
Accepted: 12 June 2025
Published: 3 July 2025

Citation: Shibesh, B.F.; Nagabhatla, N. Addressing Climate Resilience in the African Region: Prioritizing Mental Health and Psychosocial Well-Being in Disaster Preparedness and Response Planning for Mainstream Communities and Migrants. *Climate* **2025**, *13*, 139. https://doi.org/10.3390/cli13070139

1. Introduction

1.1. Context and Background

1.1.1. Climate Change and Mental Health Nexus

Climate change is noted as the most significant global health threat of the 21st century, impacting health through both direct and indirect effects [1–3]. One of the health components significantly affected by climate change is mental health [4].

The World Health Organization (WHO) defines mental health as 'the state of well-being that enables people to cope with stress, learn well, work productively, and contribute to their community. It is a basic human right and a crucial component of personal, community, and socio-economic development' [5]. Mental health is a global issue that affects individuals and communities across every continent. Even without considering the growing impacts of climate change, mental health challenges—including anxiety, depression, and stress-related disorders—are already widespread and place a significant burden on healthcare systems worldwide.

(United Nations health agency (World Health Organization) report on mental health, alongside the information from the Institute for Health Metrics and Evaluation (IHME), indicates that approximately 970 million people around the world are living with mental disorders. Of this population, females are disproportionately affected than males, with a prevalence of 52.4%. Roughly 800,000 people die from suicide annually, related to mental health disorders [6].

In the European region, over 100 million people are living with mental conditions, and across the European Union and the United Kingdom, close to 85% are affected [7]. Over the past three decades, the global burden of mental disorders in terms of disability-adjusted life years (DALYs) has significantly increased. The number of DALYs due to mental disorders rose from 80.8 million in 1990 to an estimated 172.9 million in 2019, accounting for 4.9% of the total global DALYs (Figure 1). Age-standardized DALY rates for mental disorders are gendered: they are higher among females than males, with the highest rates observed in Australia, Tropical Latin America, and high-income states in North America. Mental health is often neglected despite its prevalence and drivers originating from various sources, including but not limited to the climate crises [8,9].

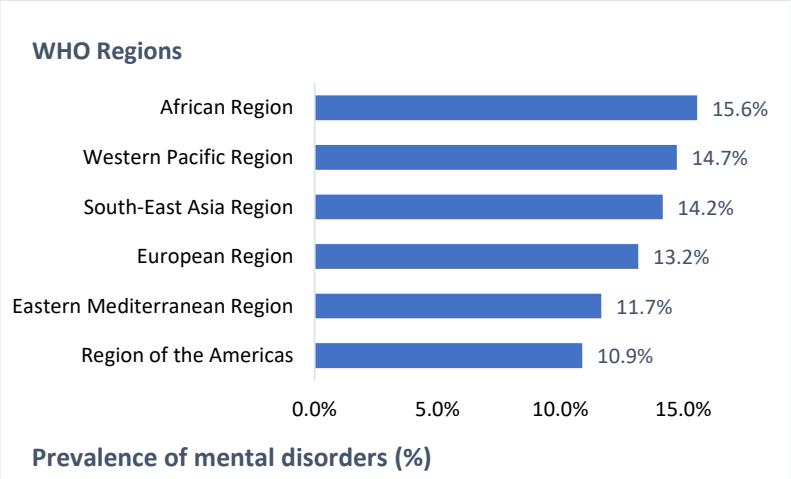

Figure 1. Overview of the prevalence of mental health disorders by WHO regions (2019) [5]: source, drawn by authors based on the data from IHME [10].

Climate change has far-reaching implications for mental health, stemming from damage to physical and social infrastructure, adverse effects on physical health, food and water shortages, conflicts, and displacement or an inability to migrate due to limited resources

and support systems, like social networks [11,12]. It also impacts nutritional well-being, with potential cognitive development issues and mental health diagnoses, particularly in children, due to changes in plant nutrient absorption and a decrease in the global food supply [13].Particulate air pollution, primarily from fossil fuel use, is linked to brain cell damage and various mental health issues, including autism, Attention-Deficit/Hyperactivity Disorder (ADHD), depression, and suicide [14–17]. The long-term economic and societal repercussions of climate change, such as crop destruction from drought in Sub-Saharan Africa, deforestation in the Amazon, and desertification in regions like the Sahel, result in significant food and income losses. Beckline et al. (2016) argue that environmental challenges and conflicts frequently trigger a cascade of interconnected problems, including restricted living and working spaces, intensified conflict, displacement, and the emergence of new human mobility pathways. These dynamics illustrate how environmental stressors can compound existing vulnerabilities, leading to broader social and humanitarian impacts.

1.1.2. Climate Change–Mental Health–Migration Nexus

The interconnectedness of water, migration, conflict, and climate change significantly affects regional governance strategies, particularly in cross-border water management, governance operations, and water sharing. Climate change exacerbates water scarcity, leading to conflicts over limited resources. For example, reduced rainfall and droughts in regions like the Middle East and North Africa have heightened tensions over water access, leading to conflicts that force people to migrate for more stable living conditions [18,19]. This migration, often driven by conflict over water resources, significantly affects mental health directly or indirectly. For instance, migrants and refugees face not only the trauma of displacement, but also the stress of uncertain futures and the psychological impact of leaving their homes. Recently, studies have shown that climate change is contributing to an increase in asylum-seeking behavior due to conflict, as reduced rainfall leads to more conflict and the subsequent outflow of asylum seekers [20,21].

Also, drought scenarios present various challenges, including food and water scarcity, compromised water quality, conflicts with wildlife, and population migration, all of which can contribute to adverse mental health outcomes. Moreover, communities grappling with inadequate access to essential social and health services, especially in maternal and childcare, face additional stressors that can exacerbate mental health issues. This, in turn, often leads to an uptick in alcohol and substance abuse, as noted by [22]. Experiencing floods and the sudden loss of shelter, coupled with struggles to meet basic needs, can significantly impact mental health. Despite the prevalence of stress disorders and depression in such situations, these mental health issues often remain undiagnosed and untreated. Climate change-induced migration further compounds these challenges, particularly affecting women and girls, leading to notable deterioration in their mental, sexual, and reproductive health in insecure environments [23]. Flooding exacerbates or triggers severe psychosocial distress due to significant socio-economic losses, leading to a spectrum of mental health disorders, such as PTSD, depression, and anxiety, with some even contemplating suicide. Emotional responses often center around profound feelings of grief and loss, contributing to increased substance abuse and a reliance on psychotropic medications in affected populations [24].

Overall, the impact of climate change on mental health for all communities, including migrants, is profound and multifaceted. Direct consequences from extreme weather events, such as the devastating floods in Pakistan in 2022 and the wildfires in Australia in 2020, have led to high rates of PTSD. Post-Traumatic Stress Disorder (PTSD) is a mental health condition that can develop after experiencing or witnessing a traumatic event involving actual or threatened death, serious injury, or violence that includes accidents, assaults,

serious health problems, or repeated exposure to distressing events. Symptoms include intrusion symptoms (viz., flashbacks and nightmares) and avoidance of reminders of the trauma, also negative changes in thoughts and mood (including guilt, isolation, or negative beliefs), alterations in alertness and reactivity (irritability, or difficulty sleeping), depression, and addiction among affected populations. Vulnerable groups, including women, children, and those in poverty, are often the most severely impacted. For example, in the aftermath of Hurricane Maria in 2017, Puerto Rican communities faced significant mental health challenges, particularly among those already struggling with poverty. Indirect consequences arise from observing and anticipating the effects of climate change, which can foster 'eco-anxiety' or 'climate anxiety' and contribute to concerns about the future, especially among younger generations [25].

The American Psychiatric Association observes how disasters amplify stress, sleep disturbances, high-risk coping behavior, such as increased alcohol consumption, and mental health disorders, such as depression, anxiety, and post-traumatic stress. Rising global temperatures are clearly linked to a set of disaster events, and long-term effects from repeated events impact well-being, economic stability, and infrastructure. This leads to cumulative stress, increased poverty, domestic violence, substance abuse, and forced migration in some regions. Children face significant challenges, coping with trauma symptoms resulting from disrupted routines, caregiver separation during evacuations, and parental stress [26].

In 2022, the number of people who were internally displaced persons (IDPs) around the world was 70.5 million, of which 9 million were attributed to natural disasters. Africa contributed significantly to this figure, with close to 7.5 million (7,441,680) IDPs. Among the African countries, Nigeria accounted for the highest percentage (32.8) of disaster-induced internal displacements, while Somalia and Ethiopia contributed 15.49% and 11.73%, respectively (Figure 2) [27].

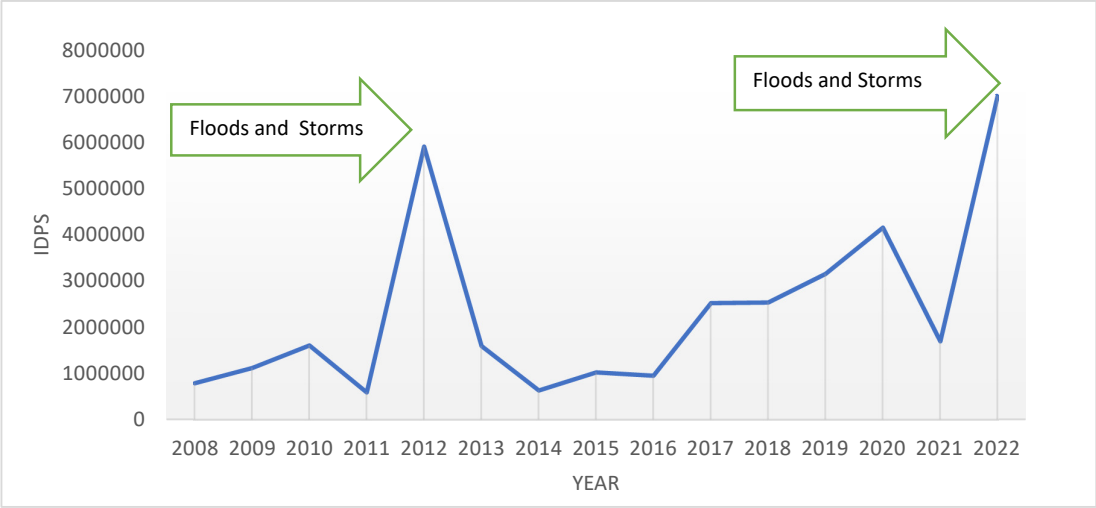

Figure 2. Overview of disaster-related internally displaced persons (IDPs) in Africa from 2008–2022; source: the Internal Displacement Monitoring Centre (IDMC) database, which monitors and reports on situations where people are forced to flee their homes but remain within their own country due to conflict, violence, disasters, or human rights violations.

Experts and recent studies have commented that the convergence of climate crises, poverty, and forced migration highlights the urgent need for comprehensive strategies that include a thorough assessment of health outcomes. Climate change not only directly affects physical health, but also has significant immediate and long-term mental health consequences, particularly for populations already vulnerable due to poverty and displace-

ment. Forced migration, whether driven by extreme weather events, resource scarcity, or environmental degradation, often leads to increased psychological distress, trauma, and the disruption of social support systems. Therefore, it is essential to identify the gaps and address the unmet needs in both physical and mental healthcare for affected communities. By prioritizing these issues, we can more effectively mitigate the complex and far-reaching impacts of climate crises on global mental well-being, with special attention to the unique challenges faced by migrants and displaced populations [28–34].

Migration represents a significant and complex life transition, with certain refugee and migrant groups experiencing negative impacts on their mental health and overall well-being [35]. With the increasing frequency and intensity of climatic events around the globe, climate change is expected to have a profound impact on population migration [36]. Defining migration in the context of climate change is indeed challenging, particularly when addressing the complex and evolving landscape of human mobility driven by environmental transformations. We recognize migration as a multifaceted phenomenon that goes beyond traditional understanding.

We adopted a strategic and nuanced perspective on climate migration, recognizing it as the movement of individuals or groups primarily driven by environmental and climatic changes. This migration can be voluntary or involuntary, temporary or permanent, and may occur within or across national borders. Rather than imposing rigid classifications, our approach acknowledges that mobility experiences are deeply personal and shaped by specific local contexts [37,38]

The complexity of climate migration arises from its diverse triggers, which range from sudden-onset disasters, such as hurricanes and floods, to slow-onset processes, like desertification and sea level rise. Recognizing migration as both a reactive response and a proactive adaptation strategy, we highlight the resilience and agency of affected communities. Notably, most climate-related migration is internal, with individuals and families relocating within their countries—often through anticipatory or planned measures.

Our framework for understanding human mobility is intentionally flexible, allowing us to capture the full spectrum of experiences and realities faced by those affected by environmental and climate disruptions. We emphasize that climate migrants are not a homogeneous group; they possess varied socio-economic backgrounds, personal capacities, and community ties. This strategic approach facilitates a more comprehensive and empathetic understanding of climate migration, ensuring that policy responses are tailored, inclusive, and responsive to the complex challenges posed by environmental change and disasters.

Regional Focus: Climate Change–Mental Health–Migration Nexus

Africa is the second-largest continent, comprised of 54 countries with diverse cultures, languages, and traditions. Many parts of the continent have been plagued by political unrest, civil wars, and other forms of conflict, in addition to climate change [29]. Acknowledgment of mental health is becoming increasingly important in Africa, as demographic changes are notable, such as a population growth of 49.0% between 2000 and 2015. The study by Sankoh, Sevalie, and Weston (2018) [39], complemented by the assessment by Africa Centres for Disease Control and Prevention (Africa CDC is the regional health agency of the African Union established to support public health initiatives of Member States and strengthen the capacity of their public health institutions to detect, prevent, control, and respond quickly and effectively to disease threats), notes that the number of years lost to disability because of mental and substance use disorders has risen by 52.0%. And mental health issues led to 17.9 million lost years, nearly equivalent to the impact of infectious and parasitic diseases, which caused 18.5 million lost years [40]. More than 116 million

people in the African region live with mental health conditions. Access to quality mental healthcare is limited despite the crucial role mental health plays in overall health and well-being agendas [41]. The climate crisis will most likely worsen these statistics and circumstances as mental health is impacted in unprecedented ways, posing direct and indirect threats to the physical and psychological well-being of individuals, leading to increased depression, anxiety, exposure to violence, substance abuse, trauma, and feelings of grief and hopelessness. Furthermore, this exacerbates health inequities for specific vulnerable groups, children, older adults, and people experiencing poverty [42].

The region is experiencing a rise in healthcare demands as climate change-induced migration and displacement continue to increase [23]. Climate-induced rural-to-urban migration among pastoralists in Tanzania and Kenya, driven primarily by drought, has led to adverse mental health outcomes for migrants. When migrating to cities, they often experience loneliness, isolation, homesickness, and anxiety, negatively impacting their well-being [43].

Noting the need for more empirical evidence and support for evidence-based policy decision-making, our study aims to fill this knowledge gap by conducting a rapid assessment of the available information on mental health issues linked to climate change in the African context. This is particularly important given the growing recognition that climate change is intensifying mental health challenges, such as eco-anxiety, depression, and post-traumatic stress disorder, across vulnerable groups in Africa, yet the systematic research and surveillance data remain limited. In addition, our narrative also aligns with two main political science concepts to extend the explanation of the climate change mental health nexus for migrants. Our hypothesis that if climate change-induced impacts, including migration and displacement, continue to rise in Africa, then the incidence and severity of mental health conditions—such as depression, anxiety, and substance use disorders—will increase disproportionately among affected and vulnerable populations, compared to those not experiencing such stress scenarios.

Objectives

The first objective is to deliver a rapid, evidence-based overview of climate change's impact on mental health in Africa.

- Synthesize and summarize the current evidence on how climate change—through extreme weather events, resource insecurity, displacement, and chronic environmental stressors—affects mental health outcomes across diverse African populations, with a focus on vulnerable groups.

The second objective is to systematically Assess Preparedness and Response Plans Addressing the Climate Change–mental health nexus in Africa.

- Review and evaluate the extent to which the existing national and regional preparedness and response frameworks in Africa recognize, integrate, and address mental health risks and needs arising from climate change, highlighting the best practices and identifying significant gaps.

The third objective is to evaluate and recommend strategies to strengthen mental health and psychosocial well-being in climate-related disasters.

- Analyze the effectiveness of the current plans and interventions aimed at supporting mental health and psychosocial well-being during climate-related disasters at both the regional and sub-regional levels. Develop actionable recommendations to enhance these frameworks, ensuring they address the needs of both mainstream and migrant populations, and promote resilience, equity, and accessibility in mental healthcare.

Our approach to this rapid assessment takes note of peer-reviewed publications and policy documents, utilizing the systematic literature review methodologies to synthesize the current evidence, identify gaps, and inform actionable recommendations for policymakers and practitioners in Africa.

2. Methodology and Framework

A rapid assessment was deemed appropriate if the research question had a broad scope and aimed to map the existing literature, identify gaps, and provide comprehensive recommendations. We conducted the assessment following the framework proposed by the JBI or Joanna Briggs Institute framework, also known as the JBI Model of Evidence-based Healthcare, which is a model for evidence-based decision-making that considers the feasibility, appropriateness, meaningfulness, and effectiveness (FAME) of healthcare practices. And we took note of three key scenarios as highlighted in Figure 3. The methodology employs a structured approach to reviewing the available research, prioritizing vulnerable populations, such as women, children, marginalized communities, and migrants disproportionately affected by climate-related disruptions. By meticulously analyzing the existing studies, the review revealed substantial gaps in understanding how climate change triggers mental health challenges, including increased stress, trauma, anxiety, and depression among affected populations. The framework shows the assessment process has six stages: (1) formulating the rapid assessment questions, (2) identifying the relevant literature, (3) selecting appropriate studies, (4) organizing collected data, (5) summarizing and reporting the findings, and (6) involving knowledge users through a consultation process [44–47].

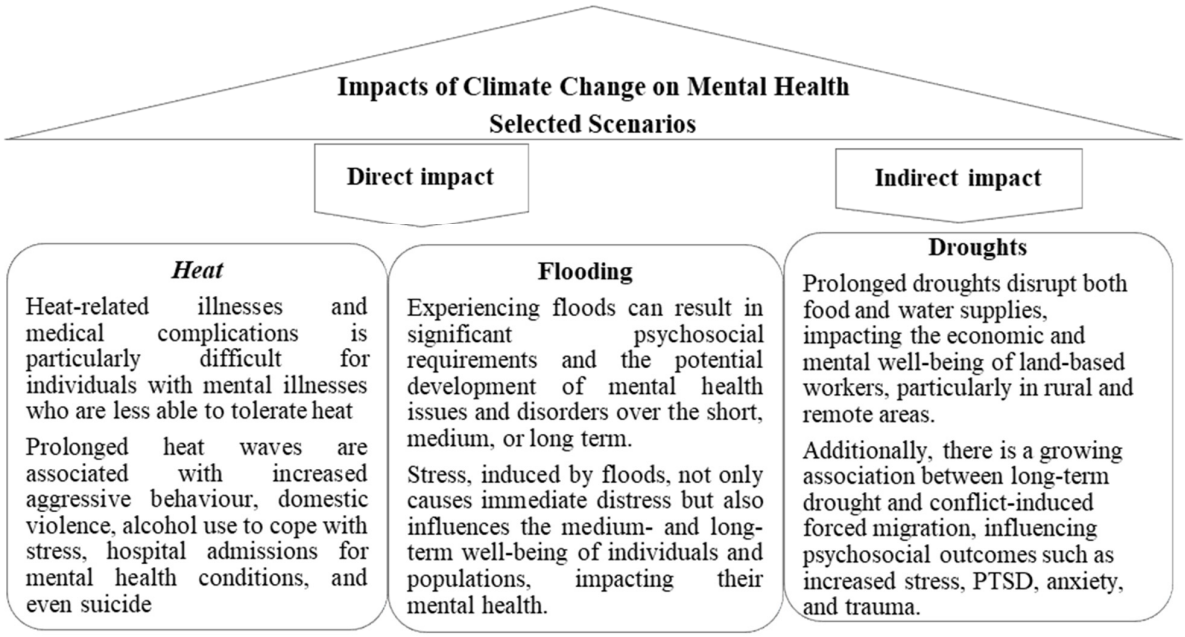

Figure 3. Selected scenarios of climate change's direct and indirect impacts on mental health aggregated from various available sources; for this study, focusing on the regional scale in Africa, we identified three key scenarios.

2.1. Elements of the Adopted Methodology

2.1.1. Inclusion and Exclusion Criteria

The scoping rapid assessment followed the Population, Concept, and Context (PCC) framework for its inclusion criteria. It includes studies of any design type that focus on individuals or groups affected by the intersection of climate change and mental health (Population). This rapid assessment exclusively considered studies that examined the

integration and prioritization of mental health and psychosocial well-being within disaster preparedness and response planning (Concept) in the context of climate change disaster scenarios in the African region (Context). Additionally, the rapid assessment included a national adaptation plan for selected African countries concerning the inclusion criteria. The studies that did not pertain to the specified geographical context of Africa or lacked a focus on mental health and psychosocial well-being were excluded. Furthermore, studies that primarily addressed other aspects of climate change or disaster management without a clear connection to mental health were also excluded. Studies that were not available in English were also excluded. Search Strategy and Information Source detailed in Appendix A.

Boolean operators ('AND' and 'OR') were used to enhance our search strategy to merge synonymous terms and free-text words with MeSH terms, and the search was restricted to English-language articles within Africa and encompassed technical and project reports from government and non-profit organizations from the past thirteen years. The search was performed in December 2023. After searching, all the relevant studies were imported into Endnote Desktop version 20 for ease of reference management and citation generation. Publications not directly related to the research question and any duplicate sources were removed. The full text of selected articles was assessed against the inclusion criteria. The scoping rapid assessment ensured transparency by documenting and reporting the reasons for excluding full-text sources that did not meet the inclusion criteria. The search result and the study inclusion process were reported in the final scoping rapid assessment and presented in a Preferred Reporting Items for Systematic Rapid Assessments and Meta-Analyses (PRISMA) flow diagram (as noted in Figure 4), following the guidelines [48,49].

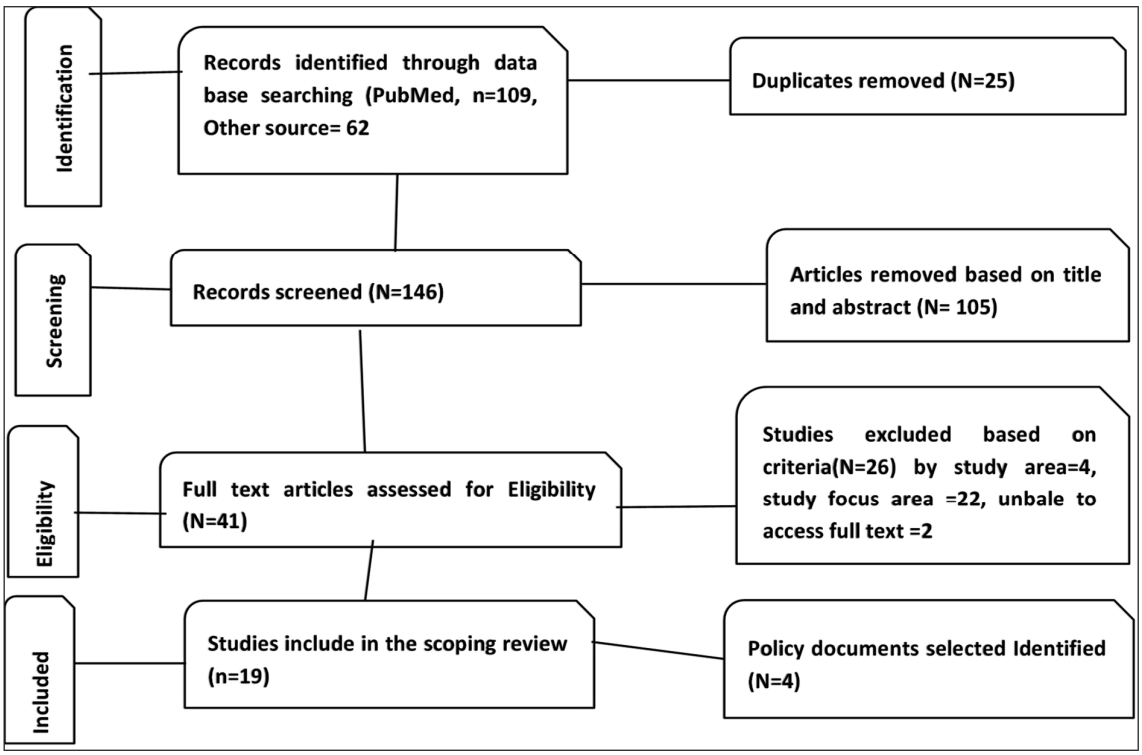

Figure 4. Flow diagram of the approach applied for the rapid assessment (PRISMA-ScR).

Climate change and mental health outcomes were assessed using definitions provided by authoritative organizations. Mental health was defined according to the WHO [5], and climate change was defined according to the United Nations Framework Convention on Climate Change [50]. Disaster preparedness was evaluated based on the definition provided by the United Nations Office for Disaster Risk Reduction [51].

2.1.2. Data Extraction and Analysis

As part of the rapid assessment process, a data extraction form was utilized to systematically gather information from the screened articles (Appendix A). This form included elements such as author information, publication date, study period, study setting, study method and design, study purpose, and key findings relevant to the rapid assessment question. For this assessment, a descriptive approach was employed to map both the published and unpublished literature and policies on mental health and climate change preparedness and response plans in Africa. Key details, such as author information, location, publication type, publication year, and alignment with the rapid assessment questions, were meticulously recorded. The extracted data are visually presented using tables to reflect on the outlined questions that align with the assessment objectives. In addition to these visual representations, a narrative summary was derived from resources and information outside the range of selected papers. This summary describes how the findings address the assessment's objectives and research questions. The assessment's overarching aim is to identify patterns and gaps, providing a thematic framework for a comprehensive overview of the African region's preparedness and response plans for climate change and mental health. The adopted approach is anticipated to support an enhanced understanding of the current knowledge on this complex nexus and how it intersects with related migration challenges.

3. Results and Key Observations

The data search and rapid assessment yielded 170 articles, of which 109 were sourced from the PubMed database and 62 from other search sources, such as Google Scholar, Google, and Reference List. During the initial phase, 105 articles were excluded based on titles and abstracts, and additionally, 25 articles were removed due to duplication. In the screening process, an additional 25 articles were excluded due to non-alignment with the desired eligibility criteria, such as variations in the study settings and differences in the focus of this study. Subsequently, the full text of the remaining 19 articles, including policy documents, was accessed to determine eligibility and included in the analysis (Figure 3).

Altogether, 19 studies and climate adaptation policy documents for the selected countries were assessed. Most studies were sourced from South Africa. Out of the 19 articles that were accessed, 4 were related to the national adaptation plan of randomly selected countries. All articles, except one [52], were published between 2016 and 2023. The assessment includes seven primary studies, five rapid assessments, one conference paper, and two reports. The primary studies were conducted using various methods, such as two case-based studies, one cross-sectional, one qualitative, one mixed, and one national survey (Table 1).

3.1. Climate Change and Mental Health Nexus in the African Region and Their Differentiated Impacts

Climate change impacts mental health differentially across African populations, with certain groups experiencing more pronounced vulnerabilities due to intersecting social, economic, and environmental factors. Women, for instance, face disproportionate mental health risks stemming from overwhelming caregiving responsibilities, higher exposure to violence during extreme weather events, and increased psychological burdens during environmental disruptions due to various socio-economic and sociocultural factors. Their mobility and access to resources are often constrained in the wake of climate-related crises, further exacerbating their mental health challenges. Of the referred literature sources evaluated, only eight attempted to address the mental health vulnerabilities resulting from extreme weather conditions. The research indicates that exposure to disasters renders certain population groups to be more susceptible to mental health outcomes. Specifi-

cally, women, Black Africans, and individuals with lower educational or income levels are particularly vulnerable to developing heightened symptoms of depression [53]. It makes it clear that marginalized populations, including those with lower educational or income levels, also experience heightened mental health issues characterized by limited adaptive capacity and reduced access to mental health resources. These individuals are more exposed to environmental shocks and face compounded psychological stress from economic instability.

Migrant populations present a unique case of vulnerability, as climate-induced migration disrupts family structures and increases childhood psychological trauma. The uncertainty about future prospects, along with reduced access to social support systems, contributes to higher interpersonal stress levels among these groups. Additionally, youth and children are particularly affected by climate change; they often exhibit increased awareness of climate-related issues, which correlates with heightened distress and a greater risk of depression. This demographic is also vulnerable to food and water insecurity impacts, compounded by a limited understanding of climate change mechanisms.

Migrant families also face increased strain, leading to unsupervised children and a shift in primary caregiver responsibilities. Weather-related challenges contribute to significant school absenteeism, intensifying educational hurdles for migrant children. Moreover, the impact of climate change-related disasters increases the likelihood of interpersonal violence. Migrant children and women are at a higher risk due to the stress caused by their temporary presence, uncertainty about their immediate and long-term future, and lack of clarity on accessing support systems, such as social services and healthcare facilities. This heightened susceptibility results in trauma and contributes to the spread of distress [54].

In contexts marked by insecurity and geopolitical volatility in some regions in Africa, women and girls face heightened risks, witnessing substantial declines in mental, sexual, and reproductive well-being [23,55]. The intersection of climate change and mental health amplifies vulnerability, disproportionately affecting specific groups: women, fishing communities, rural subsistence farmers, and residents in informal settlements [56]. This impact also extends to populations already burdened by factors such as age, disability, and pre-existing mental health conditions, rendering them more prone to mental health disorders in the aftermath of flooding. The psychological strain posed by flooding, a formidable challenge for these groups, compounds the complexity of coping with stressful events [17]. Also, children and migrants confront elevated risks compounded by pre-existing adversities, like poverty, inequality, crime, and conflicts/war [57,58] (Appendix B).

We highlight that mental health impacts are not uniform across populations; rather, the intersectionality of various factors plays a crucial role in determining psychological vulnerability. However, a significant gap exists in the research on African-specific experiences related to climate change and mental health. This underscores the urgent need for targeted, context-specific interventions that address climate change's nuanced and differentiated impacts on diverse populations in Africa, including migrants.

Table 1. Characteristics and methodological information to facilitate rapid assessment.

Study Site	Climate Change and Mental Health	Preparedness/Responseand Adaptation	Gap/Recommendation	The Method Adopted in the Study and Document Type (Formal and Informal Publications)
Africa	The climate crisis in Africa is damaging several health determinants, leading to poor health outcomes. Environmental shocks affect mental health directly or indirectly through social impact.	Early warning and adaption	Not mentioned.	Conference paper [59]
South Africa	Climate change can worsen existing social stressors, compounding their impacts on mental health. This is due to the amplification of pre-existing vulnerabilities, such as socio-economic conditions, access to healthcare, and other environmental stressors.	Not mentioned	Conducted in-depth analysis of the impact of climate change on mental health, with a particular emphasis on the vulnerable population.	Peer-reviewed paper [56]
Africa	The impact of climate change on social connections can lead to emotional disorders. This is because the loss of social capital resulting from climate change can have a negative effect on people's mental health.	Preserve social capital	Communities highly exposed to climate change require action to preserve their social capital.	Qualitative [42]
South Africa	Trauma, loss of property and loved ones, and displacement can lead to anxiety, post-traumatic stress disorder, depression, and even suicide.	Not mentioned	Constant surveillance of climate-related health and associated risks needed.	Peer-reviewed paper [52]
Ghana	Can lead to the loss of livestock for farmers, resulting in mental health problems.	Provide veterinary support; treat animal diseases		Mixed method [60]
Africa	Extreme weather results in depression and suicide, especially among farmers. Can also cause chronic distress and solastalgia.	Not mentioned, only explained that adaptation strategies at the sub-national level are often limited.	Adopt a 'health and climate change in all policies' approach for better adaptation and mitigation strategies. Sub-national governments often face limitations in implementing adaptation strategies.	Case-based study [54]
Tanzania	Leads to anxiety and other poor mental health outcomes.	Not mentioned	Further research is needed to inform policies and interventions that will mitigate the impacts.	Case study [42,61]
Tanzania	Climate change can impact the mental health of young people through various channels, resulting in depression.	Not mentioned		Cross-sectional [55]
Kenya	Exposes the community to various stressors, resulting in mental health challenges and a rise in alcohol and substance abuse.	Not mentioned		Report [22]

Table 1. *Cont.*

Study Site	Climate Change and Mental Health	Preparedness/Responseand Adaptation	Gap/Recommendation	The Method Adopted in the Study and Document Type (Formal and Informal Publications)
South Africa	Depression.	Not mentioned	The study did not consider or conduct research considering children.	Survey [53]
Zimbabwe and Sudan	Stress disorders and depression are prevalent.	Not mentioned		Literature [23]
Selected African countries	Affect children physically, mentally, and emotionally.	Indigenous knowledge can help individuals cope with climate change by using animal behavior to forecast weather, diversify crops, manage cattle stress, and divide labor during droughts.	More research and surveillance data on mental health effects of climate change in Africa.	[58]
Africa	Stress, PTSD, and mental health problems.	Not mentioned		Peer-reviewed paper [62]
S. Africa	Increased aggression, violent behavior, and homicides.	Not mentioned	A call for action to change is made to mitigate these effects at the individual and policy levels.	Narrative report [57]
Nigeria	Flooding can trigger psychosocial distress due to socio-economic losses, such as property damage and displacement, experienced by affected individuals.	Provision of daily basic needs	It needs to include mental health policies and funding allocation for its implementation.	[24]

At the regional level, serval studies from Africa highlight the climate change–mental health nexus, for example, the study by [59] reiterates that the cascading crises of ecosystem collapse, species extinction, and more frequent climate hazards, like heatwaves and floods, lead to both physical and mental health issues, escalating morbidity and mortality rates and causing severe harm to mental well-being. Ref. [56] examined the potential connection between the drought and increased suicide rates among farmers because of extreme temperatures from climate change, leading to droughts, floods, and fires, contributing to a rise in psychiatric disorders, such as mood, anxiety, sleep, trauma, and stress-related conditions. Ref. [57] indicates that high temperatures are linked to increased aggression, violent behavior, and homicides, potentially rising by 18.0% when temperatures exceed 30 °C.

At the national level, a study conducted in South Africa utilized the National Household Panel Survey to investigate the impact of various disasters, including those related to climate change, on mental well-being. The results showed a significant association between disaster exposure and the manifestation of major depressive symptoms [53]. Three studies reflect that social capital is an intermediary variable between climate change and mental health in climate change-induced migrants, whilst climate-induced migration often leads to a lack of social support and homesickness, which can result in anxiety and other mental health issues, and extreme weather events increase the risk of death, injury, trauma, loss of property, and loved ones. These events can trigger anxiety, post-traumatic stress disorder, depression, and even suicide. Preserving social capital can help reduce the impact of the CCMH nexus on communities [42]. The underlying mechanisms involve the disruption of social networks, loss of stability, and the emotional impact of sudden and severe environmental changes, which collectively strain mental health [43,52].

The rise in adverse weather patterns attributed to climate change has resulted in significant livestock losses for farmers, adversely affecting their productivity and means

of livelihood. Moreover, these consequences are also linked to mental health repercussions, as highlighted by [60]. Prolonged droughts, floods, and extreme temperatures have been observed to heighten the risk of depression and suicide, particularly within farming communities. Additionally, climate change can induce chronic distress and evoke feelings of solastalgia, described as a profound sense of loss stemming from environmental transformations, as noted by [54].

Furthermore, elevated temperatures in work environments have been associated with increased incidents of aggression, mental stress, and mental health disorders, along with a rise in occupational injuries and risks to pregnant women. Direct injuries stemming from extreme weather events and resource scarcity, such as limited access to water, can further exacerbate tensions and lead to conflicts. The trauma resulting from such events can manifest as post-traumatic stress and other mental health challenges, as noted by [62].

According to [52], climate change is anticipated to exacerbate and introduce new health issues. Mental health emerges as a significant issue susceptible to adverse impacts from climate change. Extreme weather events heighten the likelihood of fatalities, injuries, and population displacement. Resulting trauma, grief, and displacement can trigger anxiety, post-traumatic stress disorder (PTSD), depression, and potentially suicidal tendencies. Moreover, relocation and prolonged exposure to extreme environmental stressors may elevate the risk of substance abuse and misuse within affected communities.

We note the multifaceted threat climate change poses to the mental well-being of young people, impacting them through various avenues. The concerning reality of young individuals experiencing severe water and food insecurity due to climate change is acknowledged in the region. Deprivation of necessities can escalate stress levels, foster a sense of powerlessness, incite conflicts, and detrimentally affect physical health, all of which can profoundly affect mental health. The research indicates a notable correlation between food and water insecurity and heightened prevalence of depression among youth, with a staggering 30.0% exhibiting symptoms [55].

Another related aspect to this discourse is how climate change impacts in the regional context exert adverse effects on cultural heritage, extending its impact to customary norms and local and traditional practices, such as fishing practices that face threats from extreme weather events, like heatwaves and heavy rainfall, while pastoralist communities in the Congo basin and countries like Kenya, Somalia, and Tanzania are compelled to migrate due to these disruptions, resulting in the loss of livelihoods and community cohesion. It worsens water stress and leads to the displacement of millions in vulnerable regions (Filho et al., 2020) [63]. The displacement experienced by these communities' triggers feelings of hopelessness and homesickness, leading to mental health issues and increased substance misuse. Studies show that children are subjected to physical, cognitive, and emotional risks, compounded by trauma, malnutrition, and disease, exacerbated by the limited availability of mental health services. Consequently, displacement negatively impacts emotional development and contributes to school absenteeism [20,23].

3.2. Climate Change, Mental Health, and Migration Nexus in the African Region

Recent regional studies highlight a growing trend of climate-related events triggering population migration. This migration manifests in various forms, including circular migration, temporary or permanent relocations of individuals or families, and planned resettlements occurring both within and between countries. Notably, climate-induced migration in Africa primarily involves internal migration, as noted by [36]. The increase in climate change-induced migration across Africa intensifies healthcare demands, straining essential resources, like food, water, and housing, and impacting both physical and

mental health. Mental health issues exacerbated by climate change often remain untreated, compounding existing health vulnerabilities among communities and populations [23].

Refugee and migrant groups have an increased risk of mental health conditions, such as depression, anxiety, and psychosis. These conditions can lead to premature death, physical ill health, and the loss of economic productivity. Additionally, people with mental health conditions may face stigma, discrimination, and denial of their human rights, and are more likely to experience physical and sexual abuse [35]. During the process of migration, people may lose their possessions, community ties, and sense of belonging, fostering feelings of despair and powerlessness, commonly associated with mental health challenges. Consequently, many individuals turn to alcohol or substance use as a coping mechanism. Studies in South Africa have highlighted increased substance misuse rates among those displaced and exposed to severe climate stressors [52,58], underscoring the mental health implications of climate-induced migration.

Ref. [64] notes how South Africa is witnessing a decline in rainfall, heightening the risk of drought, while rising sea levels pose a looming threat to its coastal cities. These urban areas are experiencing a surge in population density due to migration spurred by the degradation of rural livelihoods, further complicating the situation. In addition, East Africa is facing higher risks of flooding, drought, and heat, which pose health hazards and infrastructure damage due to substantial climate impacts, driving migration for stability and safety. Conversely, West Africa anticipates reduced oceanic productivity, posing risks to food production, food security, and migration, thereby negatively impacting human health [64,65]. Extreme weather can displace people, causing anxiety, PTSD, depression, and suicide. It also increases substance abuse risk [52]. These regional variations underscore the multifaceted challenges climate change poses on health and migration dynamics.

3.3. Assessment of the Existing Adaption, Preparedness, and Response Plans Using Case Studies

Integrated approaches are crucial to strengthening coping mechanisms, offering comprehensive protection against the diverse impacts of climate-related vulnerabilities. Stakeholders aiming to assess climate change impacts on mental health should comprehensively explore various pathways and conduct inclusive research that incorporates perspectives from vulnerable populations [55]. To this need, we identified three key points after assessing the region's existing adaptation, preparedness, and response plans.

African communities traditionally acknowledge the indigenous knowledge to navigate the challenges posed by climate change and utilize various traditional practices, such as interpreting animal behavior, for weather forecasting, diversifying crops, managing cattle stress, and organizing labor divisions to adapt to drought conditions. The communities in the region are also adopting scientific methods to navigate climate challenges, including using GIS for weather forecasting and early warnings, etc. [66]. Additionally, implementing climate-smart agroecological techniques, such as cultivating drought-tolerant crops, enhances food security, promotes sustainable land management, and reduces water usage. Despite their proven effectiveness, these adaptive measures are predominantly small scale and often need more consistent research support. Acknowledging and promoting these local strategies can enhance resilience and facilitate a sustainable adaptation to environmental pressures within African communities [58].

Second, based on this existing traditional system approach, establishing community mental health centers can play a crucial role in providing long-term follow-up care for the disaster-affected population via community-led and agency (government-supported) response and recovery measures. These centers can help in the early identification of mental illnesses triggered by the flood that may not be immediately apparent. By providing access to specialized care, vulnerable individuals can better cope with the psychological impact

of the disaster and early intervention can prevent the development of more severe mental health problems in the long term [24].

Third, adaptation, preparedness, and response plans can be designed and deployed by leveraging the region's customary norms and cultural practices; for example, to provide effective psychosocial support, it is vital to involve religious institutions, community-driven initiatives, and traditional educational programs. To bolster resilience, interventions should be directed toward households, focusing on enhancing infrastructure, promoting climate-resilient income-generating activities, and implementing gender-specific measures. National emissions reduction strategies and localized initiatives are imperative for mitigating susceptibility and supporting mental health [55]. In addition to the published articles, our assessment also examined specific African countries' national adaptation plans (NAPs). We applied a random starfield approach to sampling, noting that we had representative points across the region. This technique aims to create an unbiased distribution of references that mimics natural randomness and helps minimize potential biases through randomization. The selection was also influenced by information availability and accessibility.

Many African nations are in the process of developing and implementing these NAPs to mitigate the impacts of climate change. Typically, these plans outline strategies and actions for resilience building, managing vulnerability, and adapting to the shifting climate conditions. It is important to recognize that NAPs are tailored to address each country's unique climate challenges, socio-economic factors, and environmental considerations. Moreover, these plans are dynamic documents that may be revised as circumstances evolve. This assessment primarily evaluates the incorporation of mental health considerations into existing adaptation responses and preparedness plans for climate change in the selected African countries.

For the case study selection, we used a nuanced process driven by strategic considerations that balance the research objectives, data availability, and narrative potential, and after carefully evaluating potential cases based on their ability to provide comprehensive insights while managing practical constraints, like resource limitations. The primary criteria for case selection involve assessing the quality and accessibility of available data. Cases are chosen when they offer rich, in-depth information that can illuminate complex research questions and represent the broader framework adopted in this study. This means prioritizing sources with robust documentation, potential for analysis, and the capacity to generate meaningful insights into the research hypothesis. Narrative explanatory power is another critical factor. We chose cases that can effectively communicate the research's core arguments and helped us translate complex phenomena into comprehensible narratives. In addition, taking note of word limits, submission guidelines, and research resources necessitated a strategic approach to case selection, limiting them to the ones presented below.

Case Study 1: Ethiopia

Ethiopia, located in East Africa, is one of the countries that is highly vulnerable to the impacts of climate change and variability. The country's limited livelihood options for much of the population, inadequate disaster resilience, and exposure to biophysical shocks further exacerbate its vulnerability. To address these issues, Ethiopia has developed a comprehensive and up-to-date strategy called Ethiopia's Climate Resilient Green Economy—National Adaptation Plan (NAPETH) 2019 [67]. The strategy reflects on integrating climate change adaptation into national, regional, and local policies toward a long-term timeframe, combining adaptation and development action. It identified five strategic priorities to achieve its objectives, as noted in Figure 5.

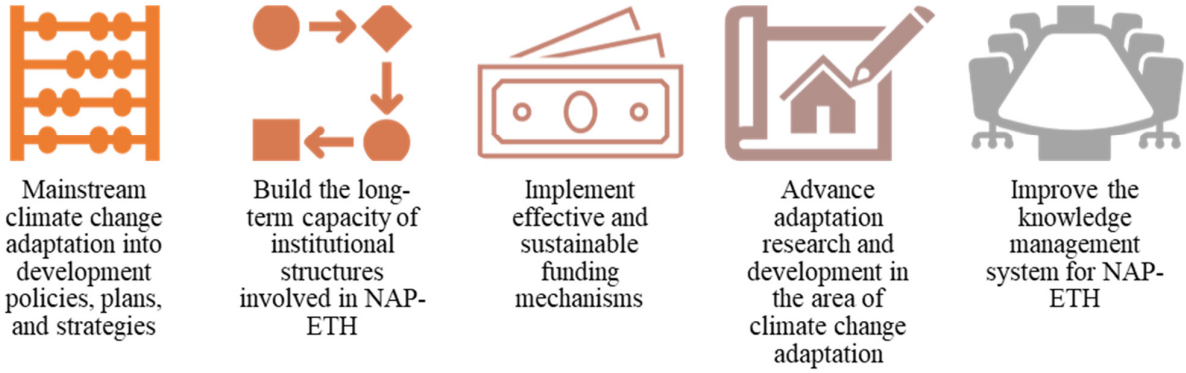

Figure 5. Overview of Ethiopia's Climate Resilient Green Economy—National Adaptation Plan strategic priorities (visual drawn by the authors).

The plan outlines 18 significant adaptation options to be implemented nationwide and across various development sectors to address the major challenges exacerbated by the impacts of climate change in the country. One of the adaptation options proposed for the health sector is to enhance human health systems by adopting an integrated health and environmental surveillance protocol. This involves implementing evidence-based policy decisions based on disease surveillance, focusing on climate-sensitive disease prevention and management, improving emergency medical services, managing indoor air pollution, and enhancing basic health services, including the health extension system. The plan also identifies eight vulnerable sectors to climate change and its impacts. One of the sectors identified in the plan is the health sector, which is affected differently across different regions; overall, it mentions the word 'health' about 45 times (Table 3), and words like malaria, malnutrition, increased infectious diseases, water-borne diseases, and decreased productive human power are most frequently mentioned as health impacts.

The term 'migration' appears 16 times in a document discussing the effects of climate change on vulnerable sectors, such as agriculture and pastoralism. These sectors experience decreased food production, loss of cultivable land, and livelihood distribution due to migration caused by flood, drought, and human and livestock diseases. The other adaptation options mentioned in the document are creating social protection and livelihood options for vulnerable people, focusing on women, children, and impoverished communities. This option includes safety net schemes, supporting asset creation, improving access to credit, promoting livelihood diversification, and arranging voluntary resettlement/migration.

Case Study 2: Kenya

Kenya faces climate variability and change risks, particularly droughts, floods, and rising sea levels. Drought is the most recurrent natural disaster in the country. In contrast, excessive flooding occurs relatively frequently, linked to El Niño or La Niña episodes that can lead to extreme weather in the country and region. To address these climate change challenges, the Kenyan government developed the NAP 2015–2030 [68] to enhance climate resilience toward attaining Vision 2030 and beyond. This initiative focuses on achieving strong economic growth, resilient ecosystems, and sustainable livelihoods for Kenyans. This leads to reduced climate-induced loss and damage, disaster risk reduction approaches, and improved knowledge and learning for adaptation.

The national adaptation plan aims to integrate climate change adaptation into national and county-level development planning and budgeting processes; enhance the resilience of public and private sector investments in the national transformation, economic and social pillars of Vision 2030 to climate shocks; enhance synergies between adaptation and mitigation actions; and enhance the resilience of vulnerable populations to climate shocks through adaptation and disaster risk reduction strategies. Stakeholders have identified

adaptation actions for various sectors, including the health sector. The plan proposes strengthening climate change adaptation in the health sector, given that Kenya's recent advancements in malaria control, water-borne diseases, infant mortality, and malnutrition are at risk of setbacks due to climate change. There are concerns about water quality, water resources, changes in habitat, increased exposure of vulnerable groups, sanitation and drainage, vector-borne diseases, and other potential impacts. The need for continued investment and focus on climate-sensitive health issues, as well as the full integration of climate change into Kenya's existing health programs and policies, is noted. The health sector has proposed sub-actions under different timeframes. Short-term sub-actions include conducting a climate vulnerability and risk assessment of the impacts of climate change on human health and increasing public awareness and social mobilization on climate change and its impacts on health. Medium-term sub-actions include designing appropriate climate change-related interventions for the health sector and measures for the surveillance and monitoring of climate change-related diseases to enhance early warning systems. Long-term sub-actions include scaling up pilot projects for climate change adaptation in the health sector (Table 2). In the context of the climate–health nexus intersecting with migration outcomes, drivers like rising sea levels, groundwater salinization, land degradation, and loss of productivity are labeled. Furthermore, the document reflects that climate change can directly influence migration pathways as it can alter the balance of environments, creating new conditions or increasing variability that can affect the land's economic value, cultural use, or physical conditions, rendering livelihood and income generation activities limited, diminished, or perished. Such insecurity can hinder economic development by discouraging household investment and triggering internal migration.

Case Study 3: South Africa

The country has observed substantial warming trends, particularly in specific regions, and acknowledges climate change as a measurable reality, necessitating a comprehensive adaptation strategy. Recognizing the disproportionate impact on impoverished people, the country emphasizes enhancing social and economic resilience to climate change. The National Climate Change Adaptation Strategy (NCCAS) 2020–2030 [69] outlines South Africa's adaptation and mitigation efforts framework, aiming to address climate change impacts and responsibly contribute to global emission reduction goals. The NCCAS presents an opportunity for the country to transform its health and economy, strengthen its social and spatial fabric, and become more competitive in the global marketplace while adapting to the impacts of climate change with its four strategic objectives (see Figure 6). NCCAS also identifies 9 strategic interventions and 12 strategic outcomes, of which strategic outcomes involve a sub-action directly addressing health issues, such as equipping and capacitating healthcare facilities to manage climate change-related health effects and climate-sensitive diseases. Other sub-actions indirectly address health issues, such as equipping and capacitating emergency response departments to prepare for and manage climate-related disasters. Despite mentioning 'health' approximately 40 times, mental health remains notably absent as a distinct focus area in the strategy. Overall, the NCCAS does not sufficiently address migration despite mentioning it only once around developing a research roadmap for climate change adaptation (see more in Table 2).

Table 2. Summary of the current plan for adaptation, preparedness, and response concerning mental health in selected countries, as outlined in their National Adaptation Plan developed between 2015 and 2020.

Country	Extreme Event Risks, Health	Adaptation Options	Potential Impacts on Health	Mental Health	Migration
Ethiopia	Increase in temperature and drought frequency, and extreme events, including heat waves and storms	Improving human health systems by implementing integrated health and environmental surveillance protocols https://www4.unfccc.int/sites/NAPC/Documents/Parties/Final%20Ethiopia-national-adaptation-plan%20(1).pdf (accessed on 14 November 2024)	Increase vector-borne diseases, increase water-borne diseases, severe malnutrition, and increase flood incidence displacement	Not mentioned explicitly	Climate change poses significant risks, including more frequent droughts and floods, which in turn are leading to an increase in the migration of rural residents to urban areas. Term 'migration' is mentioned 16 times.
Kenya	Not specified for the health sector alone. The word 'health' is mentioned about 19 times	Strengthen the integration of climate change adaptation measures in the health sector https://countytoolkit.devolution.go.ke/sites/default/files/resources/Kenya_NAP_Final.pdf (acessed on 14 November 2024)	Impacts on water quality, water resources, changes in habitat, increasing exposure of vulnerable groups, sanitation and drainage, and vector-borne diseases are all areas for concern	Not mentioned explicitly	Strengthen vulnerable groups' adaptive capacity and promote livelihood diversification for vulnerable groups to reduce rural–urban migration. Term 'migration' is mentioned 3 times.
South Africa	Changing climate can have a myriad of impacts on the health sector	Ensure that healthcare facilities are equipped and capable of managing the health effects of climate change and diseases sensitive to climate https://unfccc.int/sites/default/files/resource/South-Africa_NAP.pdf (acessed on 14 November 2024)	Quadruple disease burden; poor housing, infrastructure, and service delivery; changes in the distribution of diseases; and catastrophic events may affect the population's health	Not mentioned explicitly	Migration is addressed only by the term mentioned once. The relationship between climate change and rural–urban migration is a potential area for research.
Ghana	Not mentioned	Not mentioned https://faolex.fao.org/docs/pdf/gha189992.pdf (acessed on 14 November 2024)	(Not mentioned)	Not mentioned explicitly	The term 'migration' is mentioned 4 times.

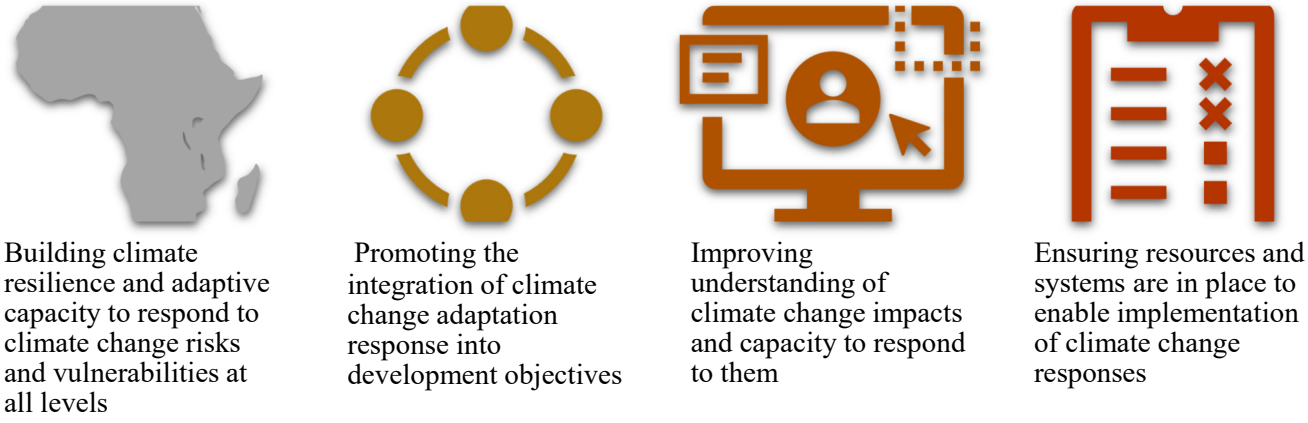

Figure 6. Key strategic objectives of South Africa's NCCAS (source: NCCAS of South Africa); visual drawn by the authors.

Case Study 4: Ghana

This state recognizes its vulnerability to climate change impacts and emphasizes the need for conscious planning to address current and future challenges. Ghana has developed its National Adaptation Plan (NAP) Framework in 2018 [70] to guide a coordinated and coherent approach to address the country's medium- and long-term adaptation needs and to achieve long-term benefits, such as savings, improved societal security and health, reduced disaster damage, new job and business opportunities, and enhanced investment security. This national document outlines the country's vision, adaptation objectives, and principles, providing a reference point for stakeholder engagement and aligning the NAP process with existing sectoral policies.

The framework underscores the importance of aligning national, regional, and global climate policies, ensuring meaningful participation from diverse stakeholders, and addressing capacity gaps for successful implementation. Key aspects include identifying adaptation options, creating an enabling institutional environment, mobilizing funds effectively, engaging the private sector innovatively, and implementing a robust monitoring and evaluation scheme. However, despite the word 'health' appearing 19 times in the NAP, there are no specific statements addressing health, and mental health is not mentioned at all. Furthermore, even though migration is highlighted as a focus area, the NAP must address it more adequately.

4. Discussion

In this assessment, we present a set of points to reiterate that climate-induced disaster risks in Africa, including flooding, drought, heatwaves, food insecurity, and labor productivity loss, impacting physical and mental well-being and increasing morbidity and mortality and extreme temperatures due to climate change, are linked to a higher risk of psychiatric disorders [53,57]. We also stress the critical need to recognize mental health as an integral component of climate change impacts, which is vital for developing comprehensive strategies to protect vulnerable populations and improve overall resilience in the face of climate-related challenges.

We did not delve deep into how the climate change–mental health nexus can be dealt with as a regional phenomenon or how regional integration can serve as an approach to address this nexus by promoting collaborative efforts from countries within a specific geographic region to combat environmental challenges and safeguard the well-being of its citizens and populations. We acknowledge that addressing climate crises and disaster management via collective approaches at the regional scale can help facilitate the develop-

ment of coordinated climate action plans, resilience strategies, and initiatives tailored to the region's unique needs [71,72].

While evaluating the existing climate action-related plans in the region, the assessment also identifies preparedness and response plans are not clearly reflective of the interconnections between the climate change–health nexus and, more so, the aspects of mental health outcomes. During the assessment, for example, only screening titles and abstracts and removing duplicates, only 19 articles and policy documents focused on mental health and climate change adaptation in Africa were considered. The existing literature reveals crucial gaps. Most of the analyzed work predominantly linked climate change to mental health within the context of physical health, lacking a distinct separation between the two domains. Only six articles exclusively explore the impact of climate change on mental health, highlighting the lack of a comprehensive understanding needed for effective mental health interventions. Only seven papers documented mental health vulnerabilities resulting from climate-induced extreme weather events, particularly affecting vulnerable demographics. These populations, already burdened by poverty, inequality, crime, and political instability, confront challenges exacerbated by climate change [42,53–58].

As per the current knowledge, a noticeable lack of literature explicitly addressing preparedness and responses to mental health problems resulting from climate change-related disasters is evident. However, in the articles that focus on health and climate change, there is an emphasis on indigenous knowledge in African communities. This includes practices like animal behavior-based weather forecasting, crop diversification, and cattle stress management, which are employed as adaptation, preparedness, and response strategies. Adopting climate-smart agroecological practices is highlighted, contributing to food security, sustainable land management, and reduced water use. These adaptive measures are predominantly small scale and need more consistent research and support. These findings suggest a need for comprehensive approaches that address physical adaptation and prioritize mental health preparedness and response in climate change policies and interventions.

Several African countries have developed national adaptation plans (NAPs) to tackle climate change issues. A rapid assessment process was conducted to assess the integration of mental health in Ethiopia, Kenya, South Africa, and Ghana. However, we found that these countries' NAPs needed more provisions to address the health sector despite their attempts to integrate it. The findings also reveal that no countries differentiated between physical and mental health in their integration efforts. Additionally, mental health was not mentioned in any of the NAPs, and there was a noticeable absence of preparedness and response strategies for mental health adaptation. This gap indicates a critical oversight in these countries' adaptation strategies, as mental health is a significant aspect of public health and well-being. It suggests a need for these countries to revisit and enhance their NAPs to incorporate comprehensive measures that specifically address mental health concerns in the context of climate change.

We also reflect on the climate change–migration nexus, primarily discussing how health impacts both physical and mental health outcomes manifest in such scenarios. Recognizing the profound value and intersections of migration and health, the WHO developed the 'Rabat Declaration' in June 2023 [73] to enhance the health services for refugees and migrants. The initiative seeks to integrate refugees and migrants into national health systems, aligning with the global movement for universal health coverage and bolstering resilience and sustainability in health emergency prevention, preparedness, and response capacities. The WHO's proactive approach draws attention to the complex nature of the problem, garnering global attention to address the implications effectively. Special provisions include improving mental health services, integrating trauma-informed

care practices, delivering culturally appropriate mental health support, and ensuring access to psychosocial services for refugees and migrants. By prioritizing mental health within the framework of the Rabat Declaration, the WHO aims to strengthen resilience and sustainability in health emergency prevention, preparedness, and response capacities, effectively addressing the complex challenges faced by displaced populations worldwide.

Limitations

This assessment has several limitations. Predominantly, we relied on two electronic databases (PubMed and Google Scholar), which may introduce selection bias. Our reference to information sources, like books, gray literature, and various governmental documents, was limited due to time constraints. Future research should incorporate a broader range of databases and additional sources to achieve a more comprehensive analysis, incorporating diverse knowledge sources and performing document analyses country-by-country to better understand mental health considerations in disaster preparedness throughout the African region. Additionally, our search was limited to English-language publications, which may result in publication bias. This limitation could exclude the relevant studies published in other languages or those not yet published, potentially affecting the generalizability of our findings. To comprehensively address the multifaceted challenges of climate change on health, in particular mental health outcomes, future research should focus on the targeted mental health impacts of climate change in specific regions and groups, develop specific adaptation strategies accordingly, and integrate them into broader (national/regional) climate change policies for expanding financing options.

To the gaps highlighted in this section, in the concluding section, we provide recommendations for enhancing mental health and psychosocial well-being in climate crises and disaster events. The context of mental health and psychosocial well-being is currently under-reflected in climate action planning, and the climate change strategies at the national and regional levels need to include these aspects as they are being revised and reframed. We also highlight the need for targeted interventions and policies tailored to address the mental health concerns of these vulnerable groups, like youth, women, disabled people, etc., as only a holistic approach can better support vulnerable communities in coping with the multifaceted challenges of climate change.

5. Concluding Notes and Way Forward

This rapid assessment highlights a significant gap in integrating mental health considerations within the African region's (selected countries) existing climate adaptation and disaster preparedness strategies. We note that the health burden from climate change is given limited attention, and an oversight of the climate change–mental health nexus underscores the urgent need to recognize and address this nexus as a distinct and critical component of health outcomes steered by climate change for the mainstream population and migrants. Policymakers and stakeholders must prioritize incorporating mental health services and support frameworks in their climate adaptation plans. Particular attention should be paid to vulnerable populations disproportionately affected by climate-related challenges, including but not limited to migrants. Such an approach will enhance the comprehensiveness of adaptation strategies and ensure a more effective response to the multifaceted health challenges posed by climate change. To this end, we recommend the following actions:

First, the national adaptation plans (NAPs) should explicitly include mental health and psychosocial support strategies. This integration should be supported by adequate funding and resources to implement effective mental health interventions.

Second, to develop and expand training programs for healthcare providers and emergency responders to recognize and treat mental health issues associated with climate-related stress and trauma.

Third, conduct and support the targeted research to better understand climate change's specific mental health impacts in African settings. This should include the development of robust methodologies to assess mental health outcomes and the effectiveness of adaptation interventions.

Fourth, engage local communities in designing and implementing mental health programs to ensure that interventions are culturally sensitive and appropriately address local needs. We also highlight that regional-level approaches (states, cities, and regional agencies, like the African Union) hold the potential to lead the climate change and health challenges agenda in a coordinated manner and present a promising pathway (via multilevel governance conceptual frameworks) toward developing more effective and coordinated responses. By embracing collective approaches within regions, global agencies, like the International Organization for Migration and regional agencies, along with stakeholders, can tailor climate action plans and resilience strategies to meet the specific needs of their communities. Furthermore, fostering global cooperation and encouraging a broader dialog and partnership across regions will help enhance the capacity to address the intertwined issues of climate change and health, including mental health.

The key findings from the assessments highlight the need to integrate climate change and mental health considerations into policy and action frameworks across Africa. The points synthesized for the African context, as in Figure 7 and Table 3, point to the increasing acknowledgment across Africa that climate change exacerbates mental health challenges, particularly among vulnerable groups, such as youth, women, Indigenous communities, and persons with disabilities. Despite this, mental health remains underprioritized in climate adaptation and disaster preparedness policies. We can conclude that integrating mental health support services in adaptation and disaster preparedness at national and regional levels, and developing regional frameworks and national adaptation plans that explicitly address mental health impacts, can provide psychosocial support as a disaster response.

In conclusion, we suggest that collaborative efforts focus on establishing interregional partnerships that facilitate sharing best practices, joint research initiatives, and the development of cross-regional policies to address the climate–health nexus at all levels and for all population groups. Such strategies will help improve the effectiveness of climate adaptation and disaster preparedness, and ensure that mental health considerations are consistently integrated into climate responses and migration management strategies. We also reiterate that by uniting the strengths and resources of diverse regions, a comprehensive and inclusive approach is needed to combat the dual challenges of climate change and mental health, ultimately leading to more resilient societies in the African region.

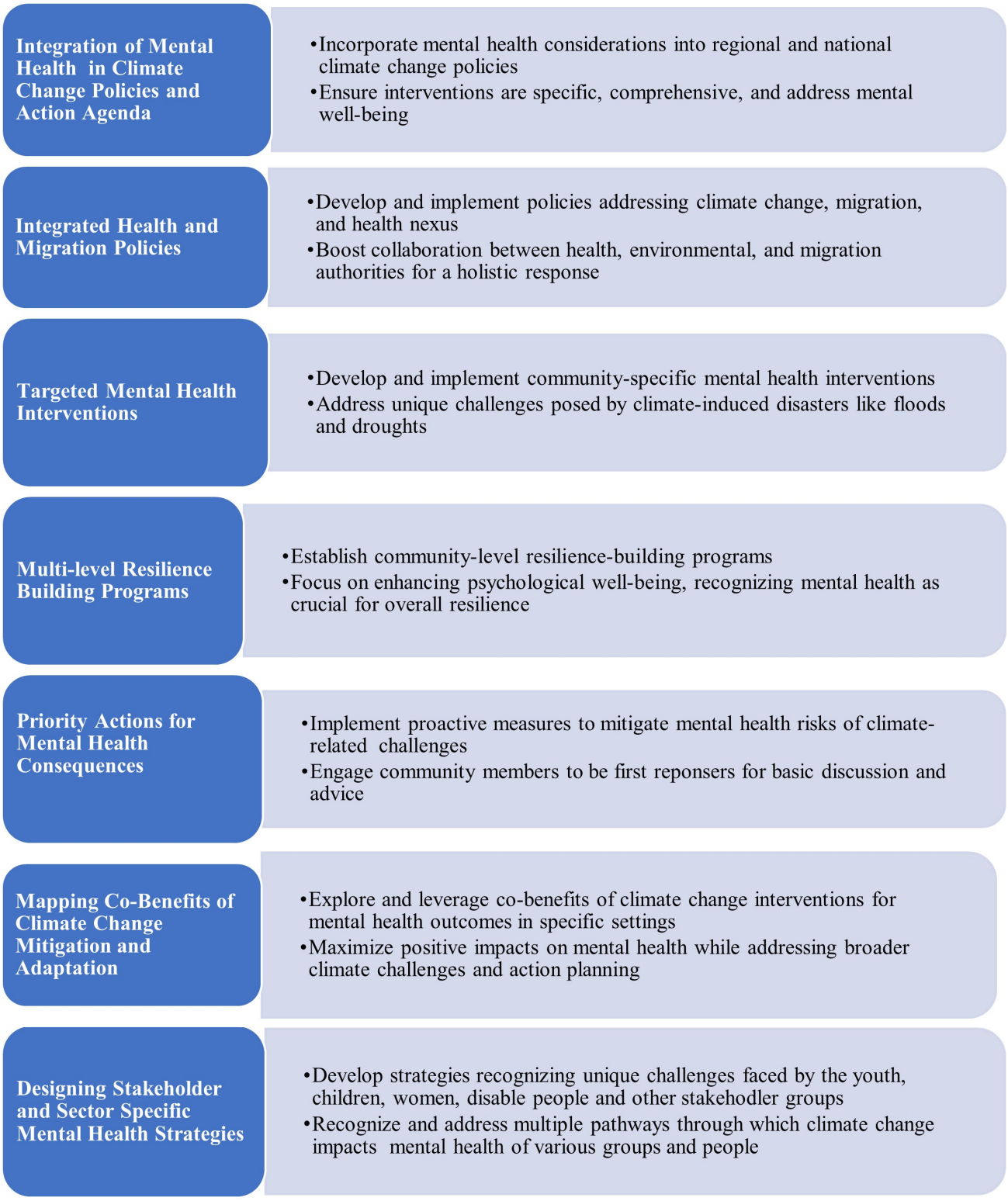

Figure 7. Key points from this assessment toward boosting CCMH-focused policies and actions.

Table 3. Suggestions for selected relevant stakeholders in the African region to improve the effectiveness of adaptation and disaster preparedness in addressing mental health challenges induced by climate change.

Government and Policymakers and Related Stakeholders	Researchers/Academia/Think Tanks	International, Regional Agencies, and Development Financing Institutions
➢ Support integration of mental health considerations within national health policies and frameworks, particularly climate change, and boost advocacy for this correlation among all concerned stakeholders. ➢ Develop clear guidelines and protocols for healthcare professionals to address mental health concerns arising from climate-induced disasters. ➢ Revise existing NAPs to explicitly include provisions for addressing mental health and distinguishing between mental and physical health. ➢ Prioritize mental health initiatives as integral components of climate change adaptation and mitigation strategies, with a specific focus on vulnerable populations, such as migrants and IDPs at the sub-national to regional levels; regional integration to support mental health challenges. ➢ Develop and implement targeted interventions and policies to address the mental health concerns of vulnerable groups (women, children, disabled people, etc.) tailored to their specific needs.	➢ Conduct targeted studies on mental health vulnerabilities, coping mechanisms, and adaptation strategies, particularly in areas prone to climate change and climate-induced migration. ➢ Map with evidence of climate change's distinct mental and physical health impacts, particularly for vulnerable groups (women, children, disabled people, etc.). ➢ Prioritize and support the research endeavors focusing on climate change's impact on mental health in the African region. ➢ Create learning content for community-scale outreach, schools, and other sector-specific stakeholders.	➢ Prioritize the research and funding to address mental health implications of climate disasters in the region and boost efforts to create this nexus-specific funding in financial agreements, like the Loss and Damage Fund ➢ Collaborate with local stakeholders, sub-national government actors, and agencies mandated with the climate action agenda and health-focused targets to develop comprehensive and integrated strategies and action plans. ➢ Emphasize investments in climate-focused health outcomes, specifically mental health services, and drive infrastructure and capacity-building programs to mitigate and respond to mental health challenges from climate-induced disasters and extreme events (expand response and recovery mandate of DRM).

Author Contributions: Conceptualization, B.F.S. and N.N.; methodology, B.F.S. and N.N.; software, B.F.S.; validation, B.F.S.; formal analysis, B.F.S.; investigation, B.F.S.; resources, B.F.S. and N.N.; data curation, B.F.S.; writing—original draft preparation, B.F.S.; writing—review and editing, N.N.; visualization, B.F.S. and N.N.; supervision, N.N.; project administration, N.N.; funding acquisition, B.F.S. All authors have read and agreed to the published version of the manuscript.

Funding: External funding was not obtained for this study. The main author secured funding for a research internship at UNU CRIS via the EU ERASMUS channel.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Acknowledgments: The first author thanks the University of Oviedo for allowing them to participate in the internship program at UNU CRIS, Belgium. We want to acknowledge Rafael Castro and the entire staff of UNU CRIS for their collaboration and efforts in making all the necessary arrangements for this experience. Special appreciation goes to Philippe De Lombaerde for offering and facilitating this internship, and overseeing and providing ongoing support throughout the project's development. We want to extend our sincere gratitude to Alisha Parikh and Olivia Toles (interns at UNU CRIS while writing this document) for their significant contribution in the form of comments and language edits. The COST Action "Climate change impacts on mental health in Europe" (CliMent) CA23113 project in discussion related to the topic that helped to refine the conceptual framing. Also, this paper contributes to UNU CRIS's commitment to WASAG—The Global Framework on Water Scarcity in Agriculture, an initiative of the United Nations Food and Agriculture Organisation (FAO) working group on Water and Migration. We also attempted to situate this work within the thematic scope of TRI-AGENCY INSTITUTIONAL PROGRAMS SECRETARIAT (TIPS), Award #: NFRFI-2023-00669 at McMaster University, Investigator: Krantzberg, Gail, and Co-Investigator: Nidhi Nagabhatla.

Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations/Acronyms

DALYs = disability-adjusted life years, IHME = Health Metrics and Evaluation, IDPs = internally displaced persons, NAPs = national adaptation plans, NCCAS = National Climate Change Adaptation Strategy, PTSD = post-traumatic stress disorder, and WHO= World Health Organization.

Appendix A. Additional Information Relevant to This Rapid Assessment

To better understand climate adaptation, disaster preparedness, and response planning in the African region—particularly as they relate to mental health and psychosocial well-being among both mainstream and migrant communities—our rapid assessment took note of guiding questions. We examined how existing preparedness and response plans address climate change and mental health for all communities, drawing on the peer-reviewed rapid assessment literature to identify the impact of climate change on mental health across Africa, with special attention being paid to regional variations. We also reviewed current plans at the regional and sub-regional levels that focus on mental health and psychosocial well-being in the context of climate change, aiming to develop recommendations to enhance their effectiveness. The following are key questions that were considered when evaluating interoperability.How does the existing preparedness and response plan address CCMH in the African region for all communities?

- What insights do the existing peer-reviewed assessments and literature offer regarding the impact of climate change on mental health in Africa, particularly considering regional variations?
- What are the existing plans related to mental health and psychosocial well-being in the face of climate change at the regional and sub-regional levels in Africa, and what recommendations can be made to enhance their effectiveness?

For data extraction, we employed an instrument that captured the Study Identification Number (ID), types of evidence source (such as databases), and full citation details (including author, date, title, journal, volume, issue, and pages). We also recorded the study setting, country, or context; the purpose of each study; article type (qualitative, quantitative, systematic, rapid assessment, or other specified design); and the data collection method used. Key findings were systematically extracted, focusing on the relationship between climate change and mental health, identification of specific vulnerable groups, preparedness, response and adaptation measures, as well as the gaps, needs, and recommendations highlighted in the literature. The data extraction search terms are noted below.

"Mental Health" [MeSH Terms] AND "Climate Change" [Mesh] OR Hurricanes [tw] OR flood OR wildfire* [tw] OR drought [tw] OR "sea level rise" [tw] OR coastal[tw] erosion[tw] OR heatwave*[tw].
"Disaster Planning" [Mesh] OR prevention[tw] OR recovery[tw] OR coping strategies OR Preparedness[tw] OR response[tw] OR plan*[tw] OR intervention[tw].
"Africa"[Mesh] OR Algeria[tw] OR Angola[tw] OR Benin[tw] OR Botswana[tw] OR "Burkina Faso"[tw] OR Burundi[tw] OR "Cabo Verde"[tw] OR Cameroon[tw] OR "Central African Republic"[tw] OR Chad[tw] OR Comoros[tw] OR Congo[tw] OR "Democratic Republic of the Congo"[tw] OR "Cote d'Ivoire"[tw] OR Djibouti[tw] OR Egypt[tw] OR "Equatorial Guinea"[tw] OR Eritrea[tw] OR Eswatini[tw] OR Ethiopia[tw] OR Gabon[tw] OR Gambia[tw] OR Ghana[tw] OR Guinea[tw] OR Guinea-Bissau[tw] OR Kenya[tw] OR Lesotho[tw] OR Liberia[tw] OR Libya[tw] OR Madagascar[tw] OR Malawi[tw] OR Mali[tw] OR Mauritania[tw] OR Mauritius[tw] OR Morocco[tw] OR Mozambique[tw] OR Namibia[tw] OR Niger[tw] OR Nigeria[tw] OR Rwanda[tw] OR "Sao Tome and Principe"[tw] OR Senegal[tw] OR Seychelles[tw] OR "Sierra Leone"[tw] OR Somalia[tw] OR "South Africa"[tw] OR "South Sudan"[tw] OR Sudan[tw] OR Tanzania[tw] OR Togo[tw] OR Tunisia[tw] OR Uganda[tw] OR Zambia[tw] OR Zimbabwe[tw].

Original research papers and gray literature related to our topic using electronic databases, such as Google, Google Scholar, and PubMed, were searched. The search strategy focused on four main areas: Mental Health, Climate Change, Preparedness, and Africa. The search terms included "Mental health," "Mental health effect," "climate change adaption," "climate change," "hurricanes", "flood", "wildfires," "droughts," "heatwaves," "sea-level rise," "coastal erosion," "services," "interventions," "response," "preparedness," "Nigeria," "Ethiopia," "Egypt," "DR Congo," "Tanzania," "South Africa," "Kenya," "Uganda," "Sudan," "Algeria," OR "Morocco," "Angola," "Ghana," "Mozambique," "Madagascar," "Côte d'Ivoire," "Cameroon," "Niger," "Mali," "Burkina Faso," "Malawi," "Zambia," "Chad," "Somalia," "Senegal," "Zimbabwe," "Guinea," "Rwanda," "Benin," "Burundi," "Tunisia," "South Sudan," "Togo," "Sierra Leone," "Libya," "Congo," "Central African Republic," "Liberia," "Mauritania," "Eritrea," "Gambia," "Botswana" "Namibia," "Gabon," "Lesotho," "Guinea-Bissau," "Equatorial Guinea," "Mauritius," "Eswatini," OR "Djibouti," "Comoros," "Cabo Verde," "Sao Tome & Principe," "Seychelles", and "Africa.

Appendix B. Overview of Vulnerable Groups to Climate Change-Induced Mental Health Nexus as Reflected (or Not) in the Existing Studies from the Region

References	Vulnerability Groups/Factors mentioned or reflected in the study
Atwoli, L. et al. 2022 [56,57]	Not mentioned
Chersich et al., 2018 [54]	Reflects on women, fishing communities, rural subsistence farmers, and those living in informal settlements
Di Giorgi et al., 2020 [58]	Not mentioned
Myers, J. et al., 2011 [50]	Not mentioned
Nuvey et al., 2020 [59]	Not mentioned
Godsmark et al., 2019 [59]	Children and women
Heaney et al., 2016 [42]	Not mentioned
Prencipe, L. et al., 2023 [53]	Largely focused on Young people
Sheriff et al., 2022 [21]	Not mentioned
Tomita et al., 2022 [51]	Reflects Women, Black Africans, and individuals with lower educational qualifications or income
Trummer et al., 2023 [22]	Children and women
Atwoli et al., 2022 [56,57]	Children, migrants
Lokotola et al., 2023 [60]	Not mentioned
Chetty, I. et al., 2022 [55]	Focuses on existing challenges of poverty, inequality, crime, and political turmoil
Oluka EM et al., 2022 [23]	Refelcts on children, older adults, persons with disabilities, and people with mental health conditions

References

1. United Nations. Climate Action. 2023. Available online: https://www.un.org/en/climatechange/what-is-climate-change (accessed on 23 November 2024).
2. World Health Organization. Climate Change. 2023. Available online: https://www.who.int/health-topics/climate-change#tab=tab_1 (accessed on 23 November 2024).
3. Pan American Health Organization, World Health Orgnization. Climate Change and Health. 2023. Available online: https://www.paho.org/en/topics/climate-change-and-health (accessed on 23 November 2024).
4. Padhy, S.K.; Sarkar, S.; Panigrahi, M.; Paul, S. Mental health effects of climate change. *Indian J. Occup. Environ. Med.* **2015**, *19*, 3–7. [CrossRef] [PubMed]
5. World Health Organisation. Mental Health. 2023. Available online: https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response (accessed on 27 November 2024).
6. United Nations Health Agency (World Health Organization). 2019. Available online: https://news.un.org/en/story/2019/10/1048931 (accessed on 27 November 2024).
7. European Commission. *Tracking Framework for the Implementation of the Commission Communication on a Comprehensive Approach to Mental Health*; Directorate-General for Health and Food Safety: Brussels, Belgium, 2024.
8. European Climate and Public Health Observatory. Climate Change Impacts on Mental Health in Europe an Overview of Evidence March 2022. Available online: https://www.infocop.es/wp-content/uploads/2025/03/European_Climate_Health_Observatory_mental-health_evidence_review_2022.pdf (accessed on 21 January 2025).
9. World Health Organization. *World Mental Health Report: Transforming Mental Health for All*; World Health Organization: Geneva, Switzerland, 2022.
10. Institute for Health Metrics and Evaluation (IHME). *GBD Results*; IHME, University of Washington: Seattle, WA, USA, 2020; Available online: https://vizhub.healthdata.org/gbd-results/ (accessed on 12 January 2024).
11. Hayes, K.; Blashki, G.; Wiseman, J.; Burke, S.; Reifels, L. Climate change and mental health: Risks, impacts and priority actions. *Int. J. Ment. Health Syst.* **2018**, *12*, 28. [CrossRef] [PubMed] [PubMed Central]
12. Cianconi, P.; Betrò, S.; Janiri, L. The Impact of Climate Change on Mental Health: A Systematic Descriptive Review. *Front. Psychiatry* **2020**, *11*, 74. [CrossRef] [PubMed] [PubMed Central]
13. Sugden, S.G.; Merlo, G. What do Climate Change, Nutrition, and the Environment Have to do With Mental Health? *Am. J. Lifestyle Med.* **2024**. [CrossRef]
14. American Psychatric Association. Extreme Heat Can Take a Toll on Mental Health. Available online: https://www.psychiatry.org/news-room/apa-blogs/extreme-heat-can-take-a-toll-on-mental-health (accessed on 14 January 2024).
15. White, B.P.; Breakey, S.; Brown, M.J.; Smith, J.R.; Tarbet, A.; Nicholas, P.K.; Ros, A.M.V. Mental Health Impacts of Climate Change Among Vulnerable Populations Globally: An Integrative Review. *Ann. Glob. Health* **2023**, *89*, 66. [CrossRef]
16. Clayton, S.; Manning, C.M.; Krygsman, K.; Speiser, M. *Mental Health and Our Changing Climate: Impacts, Implications, and Guidance*; American Psychological Association, and ecoAmerica: Washington, DC, USA, 2017.
17. Nagabhatla, N.; Cassidy-Neumiller, M.; Francine, N.N.; Maatta, N. Water, conflicts and migration and the role of regional diplomacy: Lake Chad, Congo Basin, and the Mbororo pastoralist. *Environ. Sci. Policy* **2021**, *122*, 35–48. [CrossRef]
18. Tanarhte, M.; De Vries, A.J.; Zittis, G.; Chfadi, T. Severe droughts in North Africa: A review of drivers, impacts and management. *Earth-Sci. Rev.* **2024**, *250*, 104701. [CrossRef]
19. Jedd, T.; Fragaszy, S.R.; Knutson, C.; Hayes, M.J.; Fraj, M.B.; Wall, N.; Svoboda, M.; McDonnell, R. Drought Management Norms: Is the Middle East and North Africa Region Managing Risks or Crises? *J. Environ. Dev.* **2021**, *30*, 3–40. [CrossRef]
20. Abel, G.J.; Brottrager, M.; Crespo Cuaresma, J.; Muttarak, R. Climate, conflict and forced migration. *Glob. Environ. Change* **2019**, *54*, 239–249. [CrossRef]
21. Sheriff, M.; Mash, R. Climate change and primary health care in Chakama, Kilifi County, Kenya. *Afr. J. Prim. Health Care Fam. Med.* **2022**, *14*, e1–e3. [CrossRef]
22. Trummer, U.; Ali, T.; Mosca, D.; Mukuruva, B.; Mwenyango, H.; Novak-Zezula, S. Climate change aggravating migration and health issues in the African context: The views and direct experiences of a community of interest in the field. *J. Migr. Health* **2023**, *7*, 100151. [CrossRef] [PubMed]
23. Oluka, E.M.; Dossen, S.B.; Ebuenyi, I.D. Flooding in Nigeria, towards prioritizing mental health and psychosocial support. *Pan Afr. Med. J.* **2022**, *43*, 199. [CrossRef] [PubMed]
24. American Psychatric Associaition. How Extreme Weather Events Affect Mental Health. Last Modified May 2023. Available online: https://www.psychiatry.org/patients-families/climate-change-and-mental-health-connections/affects-on-mental-health (accessed on 13 January 2025).
25. Hickman, C.; Marks, E.; Pihkala, P.; Clayton, S.; Lewandowski, R.E.; Mayall, E.E.; Wray, B.; Mellor, C.; van Susteren, L. Climate anxiety in children and young people and their beliefs about government responses to climate change: A global survey. *Lancet Planet Health* **2021**, *5*, e863–e873. [CrossRef] [PubMed]

26. Internal Displacements Monitoring Center. Internally Displaced People (IDPs). 2024. Available online: https://www.internal-displacement.org/database/displacement-data/ (accessed on 9 February 2025).
27. Mental Helath Foundation. Mental Health and Climate Change-COP26. 2021. Available online: https://www.mentalhealth.org.uk/our-work/policy-and-advocacy/climate-change (accessed on 30 November 2024).
28. Ingle, H.E.; Mikulewicz, M. Mental health and climate change: Tackling invisible injustice. *Lancet Planet Health* **2020**, *4*, e128–e130. [CrossRef]
29. Black Dog Institute. The Nexus Between Climate Change and Mental Health Briefing Prepared by Black Dog Institute for COP26. Sydney, Australia 2023. Available online: https://www.blackdoginstitute.org.au/news/the-implications-of-climate-change-on-mental-health/ (accessed on 30 November 2024).
30. Adaawen, S.; Rademacher-Schulz, C.; Schraven, B.; Segadlo, N. Chapter 2—Drought, migration, and conflict in sub-Saharan Africa: What are the links and policy options? In *Current Directions in Water Scarcity Research*; Mapedza, E., Tsegai, D., Bruntrup, M., McLeman, R., Eds.; Elsevier: Amsterdam, The Netherlands, 2019; Volume 2, pp. 15–31.
31. Alto, M.E.; Nicasio, A.V.; Stewart, R.; Rodríguez-Sanfiorenzo, T.D.; González-Elías, G.; Orengo-Aguayo, R. Provision of mental health services immediately following a natural disaster: Experiences after Hurricane Maria in Puerto Rico. *J. Emerg. Manag.* **2021**, *19*, 167–175. [CrossRef]
32. Yousuf, J.; Mehmood, H.; Aquil, S.; Rija, A.; Syyeda Rahmat, Z.; Malikzai, A. Effects of floods on the mental health of Pakistanis: A commentary. *Ann. Med. Surg.* **2023**, *85*, 2253–2255. [CrossRef]
33. Rodney, R.M.; Swaminathan, A.; Calear, A.L.; Christensen, B.K.; Lal, A.; Lane, J.; Leviston, Z.; Reynolds, J.; Trevenar, S.; Vardoulakis, S.; et al. Physical and Mental Health Effects of Bushfire and Smoke in the Australian Capital Territory 2019–2020. *Front. Public Health* **2021**, *9*, 682402. [CrossRef]
34. World Health Organization. *Mental Health of Refugees and Migrants: Risk and Protective Factors and Access to Care*; Global Evidence Review on Health and Migration (GEHM) Series; World Health Organization: Geneva, Switzerland, 2023.
35. Torres, J.M.; Casey, J.A. The centrality of social ties to climate migration and mental health. *BMC Public Health* **2017**, *17*, 600. [CrossRef]
36. Okasha, A. Mental health in Africa: The role of the WPA. *World Psychiatry* **2002**, *1*, 32–35.
37. IOM. *Migration, Environment and Climate Change: Assessing the Evidence*; IOM: Geneva, Switzerland, 2009; 448p, ISBN 978-92-9068-454-1. Available online: http://publications.iom.int/system/files/pdf/migration_and_environment.pdf (accessed on 1 December 2024).
38. IOM. *IOM Outlook on Migration, Environment and Climate Change*; IOM: Geneva, Switzerland, 2014.
39. Sankoh, O.; Sevalie, S.; Weston, M. Mental health in Africa. *Lancet Glob. Health* **2018**, *6*, e954–e955. [CrossRef] [PubMed]
40. Africa CDC. Mental Health, A Universal Human Right for Africans. 2023. Available online: https://africacdc.org/news-item/mental-health-a-universal-human-right-for-africans/ (accessed on 28 November 2024).
41. Camh. Climate Change and Mental Health. 2023. Available online: https://www.camh.ca/en/professionals/professionals--projects/climate-change-and-mental-health (accessed on 28 November 2024).
42. Heaney, A.K.; Winter, S.J. Climate-driven migration: An exploratory case study of Maasai health perceptions and help-seeking behaviors. *Int. J. Public Health* **2016**, *61*, 641–649. [CrossRef] [PubMed]
43. Peters, M.D.; Marnie, C.; Tricco, A.C.; Pollock, D.; Munn, Z.; Alexander, L.; McInerney, P.; Godfrey, C.M.; Khalil, H. Updated methodological guidance for the conduct of scoping reviews. *JBI Evid. Synth.* **2020**, *18*, 2119–2126. [CrossRef] [PubMed]
44. Arksey, H.; O'Malley, L. Scoping studies: Towards a methodological framework. *Int. J. Soc. Res. Methodol.* **2005**, *8*, 19–32. [CrossRef]
45. Levac, D.; Colquhoun, H.; O'Brien, K.K. Scoping studies: Advancing the methodology. *Implement. Sci.* **2010**, *5*, 1–9. [CrossRef]
46. Liberati, A.; Altman, D.G.; Tetzlaff, J.; Mulrow, C.; Gøtzsche, P.C.; Ioannidis, J.P.; Clarke, M.; Devereaux, P.J.; Kleijnen, J.; Moher, D. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: Explanation and elaboration. *BMJ* **2009**, *339*, b2700. [CrossRef]
47. Health Sciences Library. Scoping Reviews: Step 4: Manage Citations. 2023. Available online: https://guides.lib.unc.edu/scoping-reviews/manage-citations (accessed on 5 November 2024).
48. UNFCCC. United Nations Framework Convention on Climate Change. 2024. Available online: https://unfccc.int/resource/ccsites/zimbab/conven/text/art01.htm (accessed on 19 June 2024).
49. UNDRR. Preparedness | United Nations Office for Disaster Risk Reduction. 2024. Available online: https://www.undrr.org/terminology/disaster (accessed on 19 June 2024).
50. Myers, J.; Tucker, T.; Young, T.; Galloway, M.; Manyike, P. A public health approach to the impact of climate change on health in southern Africa-identifying priority modifiable risks. *S. Afr. Med. J.* **2011**, *101*, 817–822.
51. Tomita, A.; Ncama, B.P.; Moodley, Y.; Davids, R.; Burns, J.K.; Mabhaudhi, T.; Modi, A.T.; Slotow, R. Community disaster exposure and first onset of depression: A panel analysis of nationally representative South African data, 2008–2017. *PLoS Clim.* **2022**, *1*, 0000024. [CrossRef]

52. Godsmark, C.N.; Irlam, J.; van der Merwe, F.; New, M.; Rother, H.A. Priority focus areas for a sub-national response to climate change and health: A South African provincial case study. *Environ. Int.* **2019**, *122*, 31–51. [CrossRef]
53. Prencipe, L.; Houweling, T.A.J.; van Lenthe, F.J.; Kajula, L.; Palermo, T. Climate distress, climate-sensitive risk factors, and mental health among Tanzanian youth: A cross-sectional study. *Lancet Planet Health* **2023**, *7*, e877–e887. [CrossRef]
54. Chersich, M.F.; Wright, C.Y.; Venter, F.; Rees, H.; Scorgie, F.; Erasmus, B. Impacts of Climate Change on Health and Wellbeing in South Africa. *Int. J. Environ. Res. Public Health* **2018**, *15*, 1884. [CrossRef]
55. Chetty, I.; Nayager, T.; Morar, T.; Iyaloo, S.; Subramaney, U. Climate Change and Mental Health implications in South Africa. *Wits J. Clin. Med.* **2022**, *4*, 151–156. [CrossRef]
56. Atwoli, L.; Merali, Z.; Muhia, J. Mental health and climate change in Africa. *BJPsych Int.* **2022**, *19*, 86–89. [CrossRef]
57. Atwoli, L.; Erhabor, G.E.; Gbakima, A.A.; Haileamlak, A.; Ntumba, J.K.; Kigera, J.; Laybourn-Langton, L.; Mash, B.; Muhia, J.; Mulaudzi, F.M.; et al. COP27 Climate Change Conference: Urgent action needed for Africa and the world. *East Mediterr. Health J.* **2022**, *28*, 785–787. [CrossRef] [PubMed]
58. Di Giorgi, E.; Michielin, P.; Michielin, D. Perception of climate change, loss of social capital and mental health in two groups of migrants from African countries. *Ann. Ist. Super. Sanita* **2020**, *56*, 150–156. [CrossRef]
59. Nuvey, F.S.; Kreppel, K.; Nortey, P.A.; Addo-Lartey, A.; Sarfo, B.; Fokou, G.; Ameme, D.K.; Kenu, E.; Sackey, S.; Addo, K.K.; et al. Poor mental health of livestock farmers in Africa: A mixed methods case study from Ghana. *BMC Public Health* **2020**, *20*, 825. [CrossRef]
60. Lokotola, C.L.; Mash, R.; Naidoo, K.; Mubangizi, V.; Mofolo, N.; Schwerdtle, P.N. Climate change and primary health care in Africa: A scoping review. *J. Clim. Change Health* **2023**, *11*, 100229. [CrossRef]
61. Serdeczny, O.; Adams, S.; Baarsch, F.; Coumou, D.; Robinson, A.; Hare, W.; Schaeffer, M.; Perrette, M.; Reinhardt, J. Climate change impacts in Sub-Saharan Africa: From physical changes to their social repercussions. *Reg. Environ. Change* **2017**, *17*, 1585–1600. [CrossRef]
62. Bahal'Okwibale, P.M. *Mainstreaming Climate-Related Disaster Risk Reduction in Agriculture and Food Sectors in Eastern Africa: Analytical Report*; FAO: Addis Ababa, Ethiopia, 2017.
63. Filho, W.L.; Ternova, L.; Fayyaz, M.M.; Abubakar, I.R.; Kovaleva, M.; Donkor, F.K.; Anuga, S.W.; Matamanda, A.R.; Djekic, I.; Umar, I.A.; et al. An analysis of climate change and health hazards: Results from an international study. *Int. J. Clim. Change Strateg. Manag.* **2022**, *14*, 375–398. [CrossRef]
64. Federal Democratic Republic of Ethiopia. *Ethiopia's Climate Resilient Green Economy-National Adaptation Plan*; Federal Democratic Republic of Ethiopia: Addis Ababa, Ethiopia, 2019.
65. Republic of Kenya. *Kenya National Adaptation Plan: 2015–2030*; Government of Kenya: Nairobi, Kenya, 2016.
66. Nwafor, C.; Ogundeji, A.; Nwafor, I.C. Review of agricultural extension and advisory services in sub-Saharan African countries. Progress with private sector involvement. *J. Agribus. Rural Dev.* **2021**, *3*, 271–282. [CrossRef]
67. Republic of South Africa. *Republic of South Africa National Climate Change Adaptation Strategy*; Republic of South Africa: Pretoria, South Africa, 2020.
68. Antwi-Agyei, P. Ghana's National Adaptation Plan Framework. 2018. Available online: https://napglobalnetwork.org/wp-content/uploads/2020/04/napgn-en-2018-ghana-nap-framework.pdf (accessed on 15 October 2024).
69. International Organization for Migration. *Migration, Climate Change and the Environment*; International Organization for Migration: Geneva, Switzerland, 2009.
70. Africa Union. African Union Climate Change and Resilient Development Strategy and Action Plan (2022–2032). Available online: https://au.int/sites/default/files/documents/41959-doc-CC_Strategy_and_Action_Plan_2022-2032_08_02_23_Single_Print_Ready.pdf (accessed on 15 October 2024).
71. World Health Organization. Rabat Declaration Adopted to Improve Refugee and Migrant Health. 2023. Available online: https://www.who.int/news/item/16-06-2023-rabat-declaration-adopted-to-improve-refugee-and-migrant-health (accessed on 27 November 2024).
72. Beckline, M.; Sun, Y.; Eric, Z.; John, A.B.; Tahle, M.; Lisette, N.; Bernard, L. Environmental Degradation in Conflict and Post-Conflict Regions. *Int. J. Environ. Prot. Policy* **2016**, *4*, 187–195. [CrossRef]
73. Leal, F.W.; Taddese, H.; Balehegn, M.; Nzengya, D.; Debela, N.; Abayineh, A.; Mworozi, E.; Osei, S.; Ayal, D.Y.; Nagy, G.J.; et al. Introducing experiences from African pastoralist communities to cope with climate change risks, hazards and extremes: Fostering poverty reduction. *Int. J. Disaster Risk Reduct.* **2020**, *50*, 101738. [CrossRef]