Investigating strategies for addressing child and adolescent mental health following exposure to extreme weather events in low- and middle-income countries: A scoping review

Molly Kadota
KDTMOL001

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Supervisor: Professor Hanna-Andrea Rother
Co-supervisor: Dr Meryl Jagarnath

Institution:
Environmental Health Division
School of Public Health and Family Medicine
Health Sciences Faculty
University of Cape Town
South Africa

DECLARATION

I, **Molly Kadota (KDTMOL001)**, hereby declare that the work on which this thesis is based is my original work (except where acknowledgements indicate otherwise) and that neither the whole work nor any part of it has been, is being, or is to be submitted for another degree in this or any other university. I authorise the University to reproduce for the purpose of research either the whole or any portion of the contents in any manner whatsoever.

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ABSTRACT

The inevitability of an increase in extreme weather events (EWE) due to climate change will likely influence every determinant of human health and wellbeing. Children and adolescents, defined as anyone under the age of 19, are among the most susceptible because of their unique vulnerabilities (i.e. physiologically, developmentally, biologically, and behaviourally) and lifespans. The effects on physical health are generally well documented, and many climate change adaptation strategies have begun to include them in their considerations. However, the implications of EWE exposure on mental health are less understood, particularly within low- and middle-income countries (LMICs). Populations residing in LMICs are especially vulnerable because of pre-existing conditions like already extreme weather, lack of resources, poor economic conditions, weak health systems, high burden of disease, and poor governance. Therefore, children and adolescents in LMICs maintain a heightened vulnerability to experiencing adverse effects. In Part A, a preliminary literature review determined the breadth of information documenting child and adolescent mental health outcomes following exposure to EWE. Research, mainly from high-income countries (HICs) or international organisations, demonstrating an association between mental health impacts and climate change, focused primarily on adult populations, has increased substantially over the last few years. Experiencing an EWE in childhood or adolescence likely leads to direct (e.g. anxiety, post-traumatic stress disorder, depression, behavioural disorders, and suicidal ideations), indirect (e.g. displacement, loss of sense of place, violence, malnutrition, developmental delays, and disruption of education), and overarching (e.g. general climate anxiety about impending threats) mental health impacts, presenting in both the short- and long-term. The goals of adaptation and mitigation strategies were also presented in the protocol to determine the potential for specific mental health strategies. In Part B, then, a scoping review was conducted to provide a narrative of where adaptation, resilience, and mitigation strategies in LMICs address, and where they do not, child and adolescent mental health impacts following exposures to EWE. A search conducted in June-August 2021 of 12 online databases from the Pubmed, EBSCOhost, and Scopus platforms and grey literature sites like Google Scholar, Microsoft Academic, and NGO pages identified 5,073 relevant records. Search results were limited to documents written in English and filtered by a 2000-2021 date range. In the current LMICs climate change strategies, the review highlighted a general lack of consideration for child and adolescent mental health and resilience. Therefore, eight main themes recurring in the literature were identified as integral components for including child and adolescent mental health in future national strategies and policymaking discussions. The themes provide general guidance, but their addition necessitates country-specific conceptualisation to determine technical considerations (e.g. funding and responsibility) and relevance. This review, therefore, emphasised the necessity for LMICs to begin including child and adolescent mental health in climate change strategies, highlighted key recommendations that were applicable in the LMICs context, and illuminated still existing gaps in the literature and potential areas for future research.

Keywords: Climate change; extreme weather events; mental health; child; adolescent; low- and middle-income countries; adaptation strategies; resilience; social connection; strengthening national mental health systems; social determinants of health; community-based approaches; scoping review

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PART A: PROTOCOL

1. Introduction

The increase in extreme weather events (EWE) resulting from climate change is one of the most prominent issues of the 21st century and is likely to impact almost every determinant of human health [1]. The threat to physical health is well documented, and the impacts will be especially adverse for vulnerable groups such as children and adolescents [2]. Conversely, the documentation for mental health implications following exposure to EWE is significantly less and only beginning to consider the effects on children and adolescents [3]. Previous oversight is likely due to a general lack of consideration for mental health and wellbeing in society's overall definition and understanding of health [3,4]. In addition, predicting implications is difficult because there is a lack of specified tools to monitor and assess mental health, particularly in the long term [3, 4]. The literature that is emerging, mostly from high-income countries (HICs), demonstrates that the mental health impacts on children and adolescents following an EWE will be direct, indirect, and overarching and will have both short- and long-term effects [4,5]. There is a significant gap in similar studies from low- and middle-income countries (LMICs). However, based on the pre-existing social and environmental conditions (i.e. socioeconomic statuses, poor health systems, high burden of disease, demographics, poor governance, and the existence of already extreme environmental conditions), it is likely that children and adolescents in LMICs are more vulnerable to the impacts compared to children and adolescents in HICs [6,7]. The growing recognition of the existence and types of mental health outcomes associated with the exposure to EWE is significant because it provides a foundation for emphasising the importance of including mental health strategies in international, national, and local climate change adaptation and mitigation plans. When considering the implementation of strategies, it is imperative that child and adolescent mental health is explicitly considered as they are the group of people that are being disproportionally impacted by the burden of these events currently, and for many years in the future [4,5].

Broadly, international bodies like the World Health Organization (WHO), the Intergovernmental Panel on Climate Change (IPCC), and the United Nations Framework Convention on Climate Change (UNFCCC) all encourage the creation of mitigation and adaptation strategies in both national and local governments to minimise, prevent, and prepare for the inevitable impacts [8,9,10]. Many HICs have the resources to create task forces and protective policies and have progressed adaptation measures, while many LMICs, most impacted by the effects of climate change, lack similar resources and infrastructure to respond [9]. In 2007 the IPCC indicated that, in Europe, adaptation policies were published across all levels of government whereas, in Africa, most countries were only beginning to initiate early adaptation measures [1]. The newest publication by the IPCC (2014) recognises the vast differences in regional adaptation and implementation procedures but also states that all regions have shown significant progress since 2007 [11]. Comparatively, in regions like Europe and Australia, there has been significant investment and advancement in adaptation and implementation research, which is imperative for creating robust

strategies [11]. While in Africa, there is little investment and most of the research is being completed by international non-governmental organisations (NGOs), often lacking the local viewpoint [11]. Many LMICs indicate that climate change is only one of the factors affecting society, and therefore investing in other issues is seen as more necessary [11].

Looking more specifically at children and adolescent health, the 2019 Lancet Countdown on health and climate change identifies them as one of the most vulnerable groups requiring special attention in climate strategies [12]. Even with the recognised need, the United Nations Children's Fund (UNICEF) states that many strategies are not adequately addressing or mentioning children and adolescents [7,13]. Furthermore, the delineation of children and adolescent vulnerability is mainly focused on the physical health impacts of climate change (e.g. increased heat stress, decreased air quality, mortality, and injury), and there is minimal consideration for mental health and wellbeing [12]. Thus, it is the focus of this scoping review to identify adaptation and mitigation measures that LMICs have implemented or can implement to protect and promote positive mental health statuses in children and adolescents while also preventing negative outcomes. This scoping review will determine where the strategy gaps are in LMICs and make recommendations for future research with potential policy and implementation implications.

1.2 Defining low- and middle-income countries (LMICs) and their mental health resources:

According to the World Bank, there are three ways of classifying economies, or countries, including by geographic region, income, or operational lending groups [14]. This scoping review will utilise the income group classification, which is delineated based on a country's gross national income (GNI) per capita in U.S. dollars [14]. Therefore, low- and middle-income countries in this scoping review will be any country that has a GNI less than $12,535 or any country that falls into the low-, lower-middle-, or upper-middle-income categories [14, 15]. World Bank data will be referenced to determine how a country is classified.

The inequalities existing between HICs and LMICs, like disease burdens and the availability of healthcare resources, will be intensified by the experience of EWE. Currently, mental illness and substance abuse in LMICs account for 9% and 17% of the total disease burden [16, 17, 18]. It is also predicted that by 2030 depression will be one of the leading causes of disease [18, 19]. For children and adolescents in LMICs there is minimal evidence demonstrating the burden of mental health difficulties [20]. Given these statistics, access to mental healthcare should be a priority. However, across LMICs, a mental health treatment gap of 90% exists, indicating that the disparity between resource availability and need for treatment is significant [21, 22]. To account for this gap other practices like task-sharing, less specialised workers are trained in diagnosis, treatment, and prevention, become common [23]. This review will be inherently influenced by the current structure of mental health resources in LMICs which dictate their capacity to respond to EWE.

Additionally, there is a global absence of child and adolescent mental health policy. In 2017 only 46% of the 78 WHO reporting countries had developed child and adolescent mental health policies [24, 25]. LMICs not only lack policies but also face implementation difficulties, further increasing the child and adolescent treatment gap. Given the current state of mental health resources in LMICs there is an opportunity for general investment in child and adolescent mental health while promoting future co-benefits for climate change and EWE resilience.

1.3 Extreme weather events in LMICs:

EWE are increasing in frequency and severity worldwide, and most are due to the global warming patterns [26]. They are defined as any climate event that varies from the average and presents in irregular or repetitive patterns [26]. The most common types affecting LMICs include; extreme heat events, drought, flooding, cyclones, wildfires, landslides, and storms [27]. EWE may also be compounded, with two or more events coinciding, thus combining the risk of impacts [26]. An example of a compounded incidence is a wildfire occurring during a drought. The occurrence of other geophysical events in LMICs such as earthquakes, tsunamis, and volcanic eruptions are not directly linked to the changing climate and thus are not classified as EWE. The experience of these events within LMICs, however, still has the potential to provide preparedness, response, and recovery insights for EWE strategies. For the purposes of this review, literature considering child and adolescent mental health following exposure to any natural disaster that also outlines broad implications and recommendations applicable to EWE will be included.

Compared to populations of children and adolescents residing in HICs those that are in LMICs are likely to experience these events with higher frequency and severity due to; their demographics, proximity to the equator, the presence of already extreme weather conditions, and a minimised adaptive capacity because of socioeconomic constraints [6]. Within LMICs, children and adolescents comprise over half the population, increasing the likelihood that, nationally, they will be most impacted by EWE [6,7]. Internationally, their vulnerability is furthered because 85% of the world's population of children and adolescents live in LMICs [6,7]. Based on the justification of demographics alone, they are an important population to consider and protect in climate change policy.

EWE are usually destructive, causing the fabric of the community to be at least somewhat altered, thus affecting day-to-day life and health. The potential impacts consist of damage to infrastructure, loss of livelihoods, destruction of crops, decreased access to food, lack of access to or contamination of clean water, an increase in vector-borne disease, and community displacement [16]. The ensuing physical health effects associated with the impacts are wide-ranging including injury, premature death, diarrheal disease, increase in water-borne diseases, malnutrition, heat stress, heatstroke, cardiovascular, and respiratory diseases [26]. As EWE occur more frequently and severely, the vulnerabilities within LMICs increase because of a decreased capacity to recover between events, ultimately exacerbating impacts and the ensuing health effects [10,26,28].

1.4 Defining children and understanding their unique vulnerability:

This scoping review defines children and adolescents based on conventional terms and the WHO definition of child and adolescent health [29,30]. Children constitute those under the age of 10 years old; while adolescence is the period between childhood and adulthood, including anyone aged 10-19 years old [29,30]. The age range for adolescence demarcates a move from total dependence on support networks to independence and self-responsibility [30]. It is also a period of significant development where individuals change cognitively, psychosocially, and physically ultimately affecting how they view and interact with the world around them [30]. This period is essential for development, and disruptions can impact current and future health outcomes.

Climate change impacts are particularly pertinent during these life stages as the child and adolescent specific vulnerabilities are unique, and as such, they should not be considered "little adults" [4,7,13,31]. They are different biologically, physiologically, and behaviourally from adults [31]. Physiologically, they breathe more air, have a higher skin to body ratio, eat more food per unit of body weight, and drink more water [31]. Biologically all their systems, including cognitive and neurological, are still developing [31]. Behaviourally, they engage in more hand to mouth activity, risk activities, and are closer to the ground [31]. Additionally, they have a longer expected life span in which latent diseases have more time to present [32]. As far as mental health considerations are concerned, most mental health and developmental triggers occur in childhood and adolescence but only appear in adulthood [5,20]. As the future leaders, innovators, and members of society, the coming generations depend on affirmative mental health states [4]. Considering the minimisation of exposure to and the effects of EWE during this life stage is thus beneficial individually and for the community.

A few studies have also indicated a difference in climate change implications based on the gender of the child or adolescent. In most cases, female children experience more impacts because of their own status in society and social determinants like social roles, norms, less access to information, and lower socioeconomic statuses contributing to a minimised freedom of choice or mobility [33]. During an EWE, or other humanitarian crisis (e.g. war or armed conflict, epidemics, and other major emergencies), these already existing gender determinants are exacerbated leading to higher female morbidity and mortality rates, decreased school attendance, increased rates of child marriage at younger ages, and intensification of existing gender-based violence [33]. To protect the most at risk within an already vulnerable group, it is important to consider the intertwined relationship between impacts and social determinants like gender.

The experience of EWE also amplifies existing social and environmental inequalities, thus disproportionately affecting already marginalised populations. These populations include indigenous peoples, racial minorities, immigrants, and people with low socioeconomic status, low education, and pre-existing health conditions [34,35]. Considering the current social disparities that heighten child and adolescent vulnerability during and after an EWE it is critical to include social and environmental justice factors in climate change policies.

1.5 Mental health and impacts on children and adolescents:

Mental health, just like physical health, is representative of all states of wellness and incorporates not only the absence of mental illness but also affirmative and positive outcomes. It is defined as a state of well-being or an individual's ability to recognise their own intellectual and emotional potential, contribute to their community, work productively, and cope with normal daily life stresses [36]. Psychological well-being is consequently highly dependent on social factors and the context in which a person exists [5, 37]. Considering the social context of children and adolescents the impact of an EWE includes alteration to family structure, community, school, and the physical space they live in through loss of life, income insecurity, food and water insecurity, displacement, and conflict [3,5]. These factors impact a child or adolescent's mental health directly, indirectly, and overarchingly or through the overall awareness and recognition of climate change and EWE threat [5].

Direct impacts relate to the immediate experience of an EWE, considered a traumatic event. The mental health effects associated with an EWE are like those that persist after experiencing any other traumatic event in childhood or adolescence [5]. They include an increased risk for developing Post-Traumatic Stress Disorder (PTSD), depression, anxiety disorders, phobias and panic, attachment disorders, sleep disorders, suicidal ideations, and substance abuse [3,4,5]. These mental health outcomes are mainly attributed to a loss of family members, helplessness, low levels of social support, relationship strain, displacement, and loss of sense of place [3,5, 28]. Additionally, other psychological effects associated with the direct experience of an EWE are a decreased ability to regulate emotions, disruption to cognitive and language development, adjustment problems, behavioural problems, and decreased academic performance [5]. The more frequent, intense, and stressful the events, the more likely children and adolescents are to experience the effects and have a predisposition to mental health impacts in the future [5, 10].

The direct experience of an EWE can then be compounded by other affected mechanisms within the social and environmental determinants of health. In other words, the direct impacts of an EWE can be experienced by children and adolescents that may or may not be present during the event and the effects can be heightened based on pre-existing social and environmental determinants [3,5]. The first compounded impact is prenatal exposure to EWE and the experience of associated stressors in the womb, increasing a child or adolescent's vulnerability to poor mental health outcomes [3,5]. Prenatal exposures to EWE have also been shown to interrupt foetus development because of a mother's stress which makes children more prone to developing behavioural and motor problems, reduces their IQ, and increases the risk of children developing schizophrenia and/or autism [5]. The increase in vector borne diseases following an EWE has also been found to compound effects on mental health (e.g. through neurological and cognitive delays and increased susceptibility to mental disorders) both if exposed prenatally and if infected during childhood or adolescence [39]. There are also other stressors that children and adolescents experience during and following an EWE which affect school attendance and are associated with developmental delays. These stressors include an increased risk of asthma, diarrheal disease, and malnourishment [3,4,5].

Mental health can be made worse when children and adolescents exist in stressful social and environmental conditions that are more likely to exist in LMICs compared to HICs. For example, they may be more prone to losing support networks faster (i.e. if the child has only one parental figure to begin with); lack adequate access to basic necessities like food, shelter, and water (i.e. if the child or adolescent is already experiencing homelessness); have missed school days prior to the EWE and maintain a low socioeconomic status to begin with [4,7,10].

The indirect impacts on child and adolescent mental health are the result of EWE affecting the context in which children exist by threatening the social, economic, and environmental determinants of health [3,4,5]. These indirect effects include poor sleep quality, experiencing more violence because of increased family stress, living in displacement areas where violence or sexual assault on females is common, losing family support, economic hardships, and/or the alteration of their built and natural environments [3,4,5,40,41,42]. These are all the product of changing community and family contexts and can contribute or worsen PTSD, anxiety disorders, depression disorders, suicidal ideations, substance abuse, phobias and panic, attachment disorders, sleep disorders, and contribute to developmental delays [3,4,5].

The overarching awareness of climate change and the related risk of imminent EWE threat also impacts child and adolescent mental health. To describe this phenomenon, generalised climate anxiety, Albrecht (2011) coined the expression "pyschoterratic syndromes" [43]. This umbrella term is defined as the psychological responses associated with, and the perceptions of, a changing earth including syndromes like eco-anxiety, eco-paralysis, and eco-nostalgia [43]. These refer to the dread associated with the recognition of negative environmental impacts, hopelessness surrounding an inability to fix or act on the environmental challenges, and a longing for past and "better" ecosystems, respectively [43]. In many cases children and adolescents nowadays have heard and are taught about the effects of climate change from early on, thus instilling worry, fear, and uncertainty in their future [3,5,44]. These perceptions and ideologies ultimately increase children and adolescent's anxiety, depression, and distress which are furthered heightened by a recognition of their own reduced agency to participate in change [3,5]. Typically, as a group, they are excluded in political decisions and are not consulted in climate conversation because they are viewed as being too naïve or lacking the life experience to contribute [45,46]. Culminating in the combination of their perception of eventual environmental risk and lack of agency further increasing their feelings of helplessness and anger [45,46]. In indigenous populations, specifically, an increase in depression and suicidality have also been reported due to a loss of sense of place and the destruction of their close ties with the environment [3,45,46]. It is, therefore, important to consider how to include overarching threats in mental health strategies by encouraging child or adolescent participation, education, and an understanding of their unique perspective.

An important consideration for mental health is promoting the potential affirmative or positive states in children and adolescents following an EWE. Emotional resilience is defined as "the ability of an individual to recover from a setback, adapt well in the face of trauma, and survive and thrive despite significant adversity and stress" [47, pg. 3]. Promoting emotional resilience prior to and following an EWE has the potential to minimise the negative mental health outcomes while also creating positive ones. When children and adolescents are prepared, they experience less

overarching anxiety, depression, and distress and are less prone to poor future mental health outcomes [38]. Preparedness also increases resiliency during the event and makes it more likely that children and adolescents will positively cope throughout the EWE and during recovery [38, 48]. In a study of children that experienced disaster in Iran, researchers found that following the event, many displayed positive characteristics like self-care, high self-esteem, increase in self-confidence, and a lack of attention to previous concerns [48]. Developing these qualities at a young age is likely to bring about more effective leadership in the future [48]. Other studies have shown that, following an EWE, communities experience a rise in compassion, altruism, and post-traumatic growth [35]. These are likely due to an increase in community spirit to assess, salvage, rebuild, and console individuals for what was lost or damaged during an EWE. With an overall recognition that each person likely experienced some sort of loss or destruction as the effects impact the whole community [3, 46]. Although these traits have mostly been associated and studied among adults, children are likely to be involved in rebuilding, observing, and mirroring these behaviours [41]. Capitalising on and considering these positive effects of climate change are important for including resilience and resilience-enablers in adaptation and mitigation plans.

1.6 Climate change response through mitigation, adaptation, and resilience:

To effectively respond to climate change, recognition from global, national, and local entities is required with participation and collaboration from diverse stakeholders such as all facets of government, healthcare facilities, schools, communities, private and public sectors, and families [28]. Internationally the WHO, UNFCCC, and IPCC have all created documents that outline broad recommendations, but ultimately each country needs to consider their own contextual exposures and vulnerabilities to establish strategies that emphasise their specific needs [1,11,49,50]. During the UNFCCC's 23rd Conference of Parties (2018), three pillars of climate change response were identified, including mitigation, adaptation, and resilience [51]. While there is some connectivity that exists between the pillars, it is important to define each and recognise their varying goals to determine how strategies can ultimately protect and promote children and adolescent's mental health [51,52].

The intention of this section is to provide broad definitions, considerations, and EWE response examples to frame the actual review. As each LMIC should consider their own context when creating strategies, there will likely be a multitude of different approaches to address mental health within each country and pillar. A generalised understanding of mitigation, adaptation, and resilience will guide the specific investigation into themes and case studies within the proposed review. It will, therefore, only be possible after the scoping literature search is completed to provide more in-depth examples of strategies addressing children and adolescent's mental health in LMICs, and more particularly in Africa.

1.6.1 Climate change mitigation definition and strategies:

Mitigation strategies, by definition, aim to limit or prevent the emission of greenhouse gases (GHG) ultimately addressing the direct cause of climate change [53]. For this review, considering mitigation is important because limiting GHG output in all countries, sooner rather than later, is imperative to reduce the intensity and frequency of EWE and thus their impact on health and mental health now and in the future [51,54]. As children and adolescents are the group of people most likely to experience and live with these impacts for the longest, mitigation is especially pertinent. These strategies are also a means to address the intergenerational inequity of climate change [54]. The inequity focus is relevant because children and adolescents, and especially those in LMICs, are a group of people least responsible for the output of GHG but will, however, be the ones living with the climate effects for the longest [54]. Creating strategies to limit or prevent GHG emissions depends on the engagement across all sectors including energy, transport, industry, waste management, forestry, agriculture, and buildings [55]. There are various ways to reduce emissions, but the main strategies are; switching to renewable energies, updating or converting to newer technologies to make equipment more energy efficient, changing management practices in corporations, altering consumer behaviour, and increasing forest sizes and green spaces in urban areas [53,55].

Implementing these tactics not only limits GHG, but also directly co-benefits child and adolescent mental health through numerous pathways. For example, and most directly, air pollutants like carbon monoxide, nitrogen dioxide, ozone, sulphur dioxide, and particulate matter 10 and 2.5 have been associated, in various studies, with mental illnesses and developmental delays [55,56]. Consequently, limiting the output of these pollutants directly reduces the amount of toxins inhaled and the chance of developing poor mental health outcomes. The switch to renewable energies can also be beneficial in providing reliable energy to places that may be off the power grid [52]. Having access to reliable energy in communities improves school lighting and school meal preparation, thus contributing to a more productive learning environment [52]. The benefits of education are innately intertwined with mental health and development. Next, promoting alternative forms of transportation such as walking or biking increases, not only wellbeing, but also respiratory and heart health [56]. Finally, increased green space in the living environment, less noise pollution, and improved housing conditions are also associated with an enhanced general wellbeing and realises a child's or adolescent's specific right to a safe home and environment [55, 56, 57].

1.6.2 Climate change adaptation definition:

Adaptation strategies directly aim to address the actual or expected effects associated with climate change and EWE through systemic and societal adjustments ecologically, socially, and/or economically [58]. Within the lifetime of most children and adolescents the likelihood of experiencing an EWE and the direct and indirect effects of climate change is high. Recognising this, the implementation of adaptation strategies ultimately aims to reduce climate impacts and challenges to making living with the risks more manageable [4,59]. For children and adolescents, this means identifying their unique vulnerabilities and exposures to create targeted strategies through EWE risk reduction and risk or crisis-management [54,58].

Adaptation, in comparison to mitigation, is more inclusive of the processes, practices, and structures within daily life [58]. For adaptation to be successful, systems need to be considered from both a national and local level and be inclusive of diverse stakeholders, not just government [58]. As adaptation strategies are more dependent on the context of the community where they are introduced, "there is no 'one-size-fits-all solution'" [55,58]. According to the UNFCCC (2014), to ensure inclusivity and thoroughness, the process of development and implementation of national and local strategies should be iterative, cycling through the following four steps with continuous financial and technical support [58]:

- *assessing impacts, vulnerability, and risks;*
- *planning for adaptation;*
- *implementing adaptation measures; and*
- *monitoring and evaluating adaptation strategies.*

Adaptation strategies are more fluid than mitigation strategies because it is likely that as time progresses the impacts will vary or change. The iterative nature requires a constant reassessment of vulnerabilities, exposures, and inclusion of the new and best available science [55,58]. Vulnerability is defined as the "propensity or predisposition to be adversely affected" [10, pg. 32]. As mentioned, children and adolescents have unique vulnerabilities, biologically and physiologically. Depending on the context of their community, a child or adolescent's vulnerability could be heightened by exposure to EWE based on other aspects like their role socially, culturally, economically, institutionally, politically, historically, and within the environment [10]. The exposure risk, therefore, is how the location that they inhabit, infrastructure, economic, resources, social, or cultural assets could be affected by an EWE either through harm, loss, or damage [10]. Examining and combining both exposure and the vulnerability of children and adolescents determines their disaster risk [10]. This is defined as the likelihood that an EWE will interact with societal structures to disrupt the functioning of a community, ultimately impacting the experience of day-to-day life [10]. A preliminary child and adolescent specific risk assessment that considers vulnerability, exposure, and disaster risk is an important mapping tool the provides the framework for adaptation responses before, during, and after an EWE. Considering specific mental health indicators for children and adolescents within a risk assessment is thus the first step towards explicit and necessary inclusion in adaptation strategies [3]. By outlining these details prior to an EWE, impacts will be more predictable and response more targeted and efficient.

1.6.3 Climate change resilience and resilience-enabling mechanisms definition:

The third pillar of climate change and EWE response is resilience, both structural and human. Resilience theory can be applied to any dynamic system such as communities, ecosystems, economy, or organisations [59]. While structural resilience supports children and adolescent's mental health through the creation of resilient schools and homes that can withstand or recover more quickly from EWE, it is not the focus of this review. Rather, human resilience is innately intertwined with children and adolescent's mental health and mechanisms to promote resilient qualities are imperative for effective climate change response [51,54].

Children and adolescent's resiliency is, like the qualities of adaptation, dependent on the interaction and consideration of multiple systems including ecological, social, biological, and psychological [60,61]. Resilience, however, unlike adaptation, considers more than just the risks of EWE. It strives to protect and promote factors and processes in children and adolescents that increases their likelihood of recovering and maintaining more positive mental health outcomes [4,62,63]. Resilience recognises the potential of children and adolescents to not only survive an event, but also continue living their lives and developing normally despite the risks [4,62]. More formally, resilience is defined by Masten (2014) as "the capacity of a dynamic system to adapt successfully to disturbances that threaten the systems function, viability, or development" [59 pg. 10]. In many studies which investigate child and adolescent climate change resilience, researchers navigate the concept from a social-ecological perspective [4,61,62,64,65]. This perspective recognises resilience as an intertwined process between a child or adolescent and their existence in physical and social environments [61]. For the purposes of this review defining resilience from a social-ecological perspective will be assumed as well. Climate change is inherently enmeshed with humans existing in their environments.

Resilience can be promoted through various mechanisms in both the internal and external factors of a child or adolescent's life. The internal factors of a child or adolescent (i.e. neurological, biological, cognitive, individual personality characteristics, and stress response) within the context of the external factors (i.e. relational, social, economic, political, and environmental) contribute to their personal resilience, or ability to respond adversity like EWE [60, 61]. Both types of factors are important and interact on a multisystemic level, but there is an indication in some studies that external factors tend to have a higher influence on resilience, indicating the importance of the social-ecological perspective [60]. When considering resilience-enablers in climate change it is imperative that they are socially inclusive, context specific, and adequately consider locally valued outcomes [66]. Thereby acknowledging that even within the same community children and adolescents will have different experiences of EWE based on their own unique existence [66].

The first type of resilience-enablers are mechanisms that promote personal resilience in children and adolescents or qualities and characteristics that make it instinctive and easier to act on their own during crisis [60,61]. The first of these mechanisms is allowing children and adolescents to have their own agency by providing them with a space where they can play a meaningful role in action and goals while expressing their own needs and views (individually and as a group) [60, 61]. The next personal resilience-enabler is adaptive meaning making or promoting skills to inspire hopefulness and opportunities rather than only focusing on challenges and resignation [60, 61]. Promoting a commitment to education and instilling a belief of its importance for future employment and well-being is another important personal resilience-enabler [60,61]. Finally, certain dispositional qualities like self-regulation skills, high self-esteem, altruism, empathy, and maturity along with physical characteristics (being in good health, male, and/or physical strength) increase personal resilience [60,61]. While all of these allow for a better response to EWE, promotion will also benefit future societies and their adulthood, thus advantages of consideration are twofold.

Externally, and some studies report most importantly, the attachments and relationships with others are a key resilience-enabling mechanism within a child or adolescent's life [61]. Constructive relationships are not only associated with more positive mental health outcomes, but also coincide with resilience through support in both resources and a feeling of acceptance [60, 61]. Relationships also foster opportunities for growth through communication, sharing, fun, play, and ultimately assisting them with their identity development [60, 61]. Other external enablers include structural resilience so that schools, community spaces and facilities, and both school and community systems function at a high level and are safe for children and adolescents [61]. The last consideration is enablers through cultural and spiritual identities [62,63]. Some studies have found that children and adolescents that are connected to and feel a part of a religious or cultural experience will, in turn, be more resilient [64, 65]. For climate change specifically, considering a child or adolescent's connection with the land because of, or through, their culture is essential. This is especially true for indigenous populations and should be explicitly considered in all strategies [64,65]. For community-based strategies to be effective, they should not only recognise individual children and adolescents, but also how they interact within broader social networks.

1.6.4 Adaptation strategies and resilience-enabling mechanisms that address child and adolescent mental health:

The adaptation measures and strategies are delivered in two stages. First is the risk-reduction phase where preparedness measures are introduced to anticipate and minimise the risks [67]. Secondly, crisis-management or risk-management consists of strategies that are delivered during and after an impact [67]. In the preparedness phase, particularly, there are resilience-enabling mechanisms that can be considered to promote positive or protective mental health states so that when an EWE occurs children and adolescents are more resilient. Examining response and recovery from a resilience perspective can then contribute to the iterative process of addressing and increasing the resilience-enabling mechanisms within the community to prepare for future events.

<u>Preparedness measures in risk-reduction techniques:</u>

The risk reduction measures for climate change include steps taken to prevent, mitigate, and prepare for EWE. They are the strategies, or interventions, that are delivered pre-impact and aim to reduce existing vulnerabilities, exposures, and hazards [67]. Preparedness is one of the most important forms of risk reduction measures. It not only contributes to adaptation, but also to many resilience-enabling mechanisms. Preparedness is defined as "activities and measures taken in advance to ensure effective response to the impact of hazards" [67, pg. 511]. Planning for the impacts of EWE, comprises of creating strategies that initiate and improve risk communication, update, and build resistant infrastructure, and design emergency response plans in schools, hospitals, local, state, and federal governments [4,10,68]. The preparedness measures therefore contribute to personal and relational resilience mechanisms through the creation of emergency plans within social support networks and increasing child and adolescent knowledge and interpretation of EWE to ensure they can act prior to and during an event [61]. Preparedness in mechanisms to promote structural resilience include, reducing risks in schools, creating plans for access to community services and facilities during and after an event, and outlining how children

and adolescents will be cared for [67]. Investing in a range of preparation mechanisms like these increases the likelihood for positive mental health outcomes during and following the event.

Creating risk communication strategies for communities consists of early monitoring and warning systems for common EWE [67]. Promoting early warning and thus early action is important to minimise risk, allowing families and communities to initiate emergency response protocol more quickly. Which is indicative of the next strategy, creating emergency response plans specifically through school interventions. During these education sessions children and adolescents can be provided with the tools to understand EWE, create evacuation plans, practice emergency response through drills, and talk about ways they can include and create plans with their families at home [4,6,13]. Educating children and adolescents and including them in response plans allows them to have a sense of agency and understanding of what their role is during and after an EWE [69,70]. This therefore increases their resilience as they feel more prepared and able to resolve problems when they arise [69]. In studies from HICs and LMICs, specifically Zimbabwe, it was found that children and adolescents that are aware of EWE impacts and emergency response protocols were more likely to teach their parents [38, 44]. The resilience-enabler of educating family and support networks is two-fold as it allows children and adolescents to feel like agents of change, making an active difference within their network, and ensures that the important people in their lives are all aware of the same safety and emergency protocols, likely leading to more rapid reunification [53,61,69]. Understanding and preparing for EWE allows children and adolescents to also have an increased adaptive meaning, they interpret their challenges to be less when they have a deeper understanding of EWE and are prepared to engage in emergency protocols when they do occur [53,69]. More broadly, the overarching understandings and preparedness for EWE increases children and adolescent's capacity to cope with the overwhelming fear of climate change [5].

Adaptation strategy recommendations should also include creating EWE resistant infrastructure that can withstand impacts, aligning with sustainable development procedures. This includes supplying hospitals and schools with power generators, providing buildings with air conditioning to utilise during extreme heat waves, and updating housing to be more efficient and effective during an EWE [4,10,67]. Resilient infrastructure will allow for children and adolescent's mental health to be protected as it ensures that they will be returned to their studies and a pre-EWE life more rapidly and, ideally, there will be less to rebuild [61]. Having these spaces that children and adolescents can rely on before, during, and after a crisis also increases their resilience [61]. The benefits of focusing energy on resilient infrastructure thus renders it an important adaptation strategy and sustainable development goal.

The last broad strategy to consider during risk-reduction is creating hospital, local, state, and federal emergency plans, and protocols [10,67]. Hospitals should create plans for mass care following an EWE and anticipate the likelihood of different injuries and poor health statuses, explicitly including children and adolescent's mental health [10,67]. Considering the LMIC context, where poor health systems and infrastructure are prevalent, pre-disaster planning is especially important. A study conducted by Koka et. al. (2018) investigated a regional hospital's disaster preparedness and response capacity in Tanzania, which could be applicable to other LMICs [71]. The following obstacles were identified for hindering adequate response; staffing issues, a lack of

resources and diagnostic tools, an inability to support surge capacity, minimal triage training, and poor communication technology [71]. To address these barriers, action items were suggested by researchers, such as calling in stand-by or off duty staff, cancelling elective surgeries, discharging stable patients, and opening alternate care areas [71]. It was, however, argued that the main opportunity is in encouraging providers to create pre-disaster teams that are responsible for assessing resources, training employees in triage procedures, and coordinating responses nationally [71]. Additionally, the creation of local teams that engage nationally allows hospitals to have specialised response plans utilising the resources that they do have available while also being guided by the actions of other hospitals in the country.

To prepare for the direct mental health impacts developed response protocols and pre-disaster teams should include mental health training for healthcare professionals responding to EWE. The trained psychological professionals should be able to explicitly recognise socially inclusive mental health indicators and demonstrate an understanding of the specific and unique vulnerabilities of children and adolescents within their community [60,66,72]. Local, state, and federal governments should likewise create plans for providing access to clean water, sanitation, food, and shelter directly following and during an event [10,67]. Equitable access to basic necessities is important for maintaining everyone's health and mental health [5,67]. As, overall, it minimises the stress surrounding the acquisition of resources and increases resiliency by providing the community more time to rebuild and care for what was lost or damaged [5,67]. In LMICs where challenges like food and water insecurity already exist, they will be heightened during and after an EWE. Consequently, innovation for resilient agricultural techniques and methods to conserve and treat water within these countries should also be considered not only for EWE response, but for sustainability purposes [55]. Therefore, there are a multitude of different steps that stakeholders can take to prepare for the inevitable impact that also co-benefit children and adolescent's mental health.

Crisis-Management Measures:

During, and immediately following an EWE, crisis-management measures contribute to the adaptation of the population by creating rapid and effective response and recovery [67]. To support child and adolescent mental health both national and local response strategies need to prioritise immediate treatment of injury or poor health outcomes, rapid reunification with support networks, provision of necessities (i.e. food, clean water, and shelter), inclusion in the recovery process, and return to school as quickly and efficiently as possible [5,13,67].

Risk-reduction through preparedness is therefore instrumental for response and recovery action plans. If proper strategies are not considered prior to an EWE, then the crisis-management strategies can be costly, likely requiring national and international intervention, and ultimately are not sustainable [67].

In the first phase of crisis-management, that is the response, the onset of the event is typically clear and the necessity to respond is apparent [67]. There are, however, some EWE like droughts that may be pervasive over a long period and as such determining when to respond may prove to be more difficult [15,67]. The second phase in crisis-management, recovery, occurs directly following an event and is the process of rebuilding society [67]. Rapid response should consist of, treating

injuries or poor health outcomes, reunification with social support networks, quickly providing access to shelter, food, clean water, sanitation, proper provision of personal protective equipment for clean up, and control of vector outbreaks [67]. Following an EWE, the most imperative goals for preventing poor mental health outcomes in children and adolescents are rapid reunification with support networks, returning them to school as quickly as possible, providing them with equitable resources (food, water, and shelter) as the community rebuilds and during the poor economic conditions that follow, and ensuring continued access to healthcare resources [5,13,67]. These measures ultimately aim to return children and adolescents to the routine of their life pre-EWE and limit the disruptions.

The most proactive mental health response and recovery, directly addressing impacts, is providing children and adolescents with immediate and continued counselling. There are different methods for doing this either in school interventions, in group or individual sessions, and/or other offered opportunities within the community (e.g. family counselling) [69,72]. Health practitioners that respond to an EWE, and are tasked with addressing mental health, should, again, be trained to recognise the specific stressors of an EWE and understand how impacts influence mental health in both the short-and long-term [69,72]. Following an EWE children and adolescents should be treated as equitably as possible and their right to learn, to play, and to be safe should be a community priority to maintain mental health [73]. To do this, it may be necessary to provide safeguards in recovery plans like free childcare and nutrition for families impacted [67,74]. Reducing family stresses as much as possible after an EWE is essential as poor mental health and high levels of stress in parents or caretakers is associated with children and adolescents mirroring the same [41].

Conversely, the resilience of children and adolescents during response and recovery is depicted through their absorptive capacity, or their ability to cope with and absorb the impacts of climate extremes and variability [66]. It is within these situations where resilience is tested and their ability to overcome obstacles is noticeable. In some studies, one conducted in the upper-middle-income country of Iran and others in HICs, children and adolescents have demonstrated more resilience responding to traumatic events than their adult counterparts [44,48] Specifically highlighting that they can be strong leaders within their communities possessing unique and creative viewpoints while also demonstrating their own self-sufficiency to protect their health and recover from an EWE [44,48]. Recognising that children and adolescents are a part of the community and can assist in the recovery and rebuilding process is important for empowering them in the present, while also providing them with tools like higher self-esteem and self-sufficiency for future events and challenges [44,48,65,69].

Including children and adolescents as agents of change:

As emphasised one of the most relevant and important ways to promote resiliency in children and adolescents is recognising that they are capable agents of change that can play a key role in climate mitigation, preparedness, and response at a local, national, and international level. With movements like Greta Thunberg's "Fridays for the Future" school strikes, it is apparent that children and adolescents are concerned about the imminent effects of climate change and are demonstrating emerging participation in the advocating sphere [54]. A similar Afrocentric movement in South

Africa included the creation of a youth-led climate advocacy group called the African Climate Alliance [75]. Considering these trends, UNICEF recognises that is it of the utmost importance to make children the centre of climate change strategies and responses [54]. As a group it is their fundamental right to be included and in various studies focused on disaster risk reduction in HICs and LMICs, they have demonstrated that they can lead by example in their communities, promote sustainable lifestyles to limit GHGs, and portray important risk and emergency information [54,73]. One study, conducted in Zimbabwe, stressed that children and adolescents wanted to learn, to express their climate concerns, and contribute to climate response in their community [38]. However, the biggest barrier to their participation were adults doubting their capacity to do so because of a lack of life experiences [38]. Thus, genuinely engaging and listening to children and adolescents in policy discussions safeguards their interests as the future generation and leaders and, more individually, promotes positive mental health outcomes and resilience [54,64,69,70]. Acknowledging inclusion as both a right and a resilience-enabler will be especially relevant for considering positive mental health outcomes and is an objective of this review.

Including children and adolescents in the policy process can take on creative and unique approaches. For example, in a study conducted by researchers in the Philippines children and adolescents voluntarily formed groups where they were asked to make a video documenting their views on climate change [69]. Their prompt from researchers was, specifically, to portray how the experience of frequent floods affected them and their communities [69]. After the completion of the documentary videos in September 2009 they were premiered in a multi-scale approach the first within the community, the second for municipal government officials, and the third for provincial government officials [69]. Although there was some adult assistance, with production, many people within the community and government recognised the uninfluenced, honest, and pure view that the children and adolescents were able to portray and deemed it important [69]. For many adults, watching the video was eye opening and inspiring to create change as well as educational [69]. For the children and adolescents that participated they not only learned more about flood risks, but their confidence increased, they felt more comfortable questioning decision-makers, and displayed a higher engagement in climate change response after participation [69]. Thus, utilising their capacity to be change agents is not only important for explicitly considering them in policies but is also highly beneficial for both the collective resilience and individual mental health.

To address the gender gap in the climate change impacts, it is also important to include and consider girls education and participation in climate change responses. Advancing climate change response through the specific consultation of girls allows insight into one of the most vulnerable populations and provides a unique viewpoint [74]. According to Chiwanda (2016), girls can be highly effective in critical thinking, problem solving, and leadership promoting creative and inclusive adaptation and mitigation responses [74]. Increasing their involvement in school and climate change response also benefits other social determinants like women and girl's socio-economic statuses, skill, social capital and networks, and communication thus contributing to a more productive society in the long term [74].

1.7 Gaps in the literature:

Over the past several years there has been a significant increase in literature that recognises the mental health implications of climate change and EWE. However, many of the studies demonstrating associations between EWE and mental health impacts are from HICs, and mostly focused on adults, although there is a growing body of literature on children and adolescent's mental health [4]. Based on a preliminary literature search it appears that the increasing amount of evidence about mental health implications is leading to a growing number of adaptation and mitigation strategies subsequently including it. Nevertheless, many of them do not appear to explicitly include mental health strategies for children and adolescents. Further, in most cases, these measures and studies lack the LMICs context (i.e. already extreme weather conditions, lack of monetary capacity to rebuild and recover, malnutrition, poor health systems, conflict, and unstable governments). Looking more specifically at mental health in LMICs there is a general lack of research. This could be the result of stigma from religious and cultural beliefs limiting people from seeking help and talking about it [18]. It should be noted, however, that mental illnesses are currently very prevalent in LMICs, and many health facilities do not possess the resources or capacity to address them [18]. Additionally, people seeking help are hindered by barriers like poverty and travel time [18]. The gaps in both child and adolescent inclusion in climate change response strategies and the general lack of mental health consideration in the LMICs context are both the key drivers of this review.

As attention to climate change is growing in LMICs and resources are being allotted to an increasing number of adaptation and mitigation strategies it is important to understand the scope of what is being considered to address children and adolescent's mental health. Thus, it is the aim of this scoping review to investigate the literature that outlines climate policy and response or that make recommendations for adaptation, resilience, and mitigation strategies in LMICs. This scoping review will attempt to address the gap in understanding how children and adolescent's mental health and resilience is being addressed in LMICs, provide examples, and indicate areas for improving EWE mental health response.

1.8 Aims and objectives of this review:

The aim of this scoping review is to provide a narrative of where adaptation, resilience, and mitigation strategies in LMICs address, and where they do not, the mental health impacts following exposures to EWE on children and adolescents.

The following objectives for this review will be used to address the aim:

1 To document how LMICs are considering children and adolescent's mental health in climate change adaptation and mitigation strategies and identify gaps where it could be included
2 To identify the inclusion of resilience in strategies to promote positive and protective mental health outcomes in children and adolescents while identifying gaps where resilience-enabling mechanisms could be included
3 To describe how children and adolescents in LMICs have the capacity to be actively and explicitly included in adaptation and mitigation strategies

2. Methods

Scoping reviews aim to provide an overview or map of the evidence that is available on, mostly, an emerging topic [78]. Unlike systematic reviews they do not evaluate the quality of literature but gather information on the scope and breadth to understand what information is available about a topic [78,79]. Typically, scoping reviews aim to identify types of evidence, clarify key concepts, examine how and where research is being conducted, and identify and analyse knowledge gaps [78].

A scoping review was chosen for evaluating the adaptation and mitigation strategies addressing children and adolescent's mental health impacts following an EWE because it is an emerging and broad topic. The broadness of the topic renders conducting a systematic review difficult because of the required specificity and rigour of the chosen documents [78]. Scoping reviews have the potential to inform future systematic reviews as they gather and provide a narrative of the available evidence and key concepts about a topic that can be further defined based on what is identified. Since the literature regarding adaptation and mitigation strategies addressing children and adolescent's mental health in LMICs is, upon initial investigation, limited it is important that this review is inclusive of a broad range of studies and reports from grey literature, policy documents, NGO's reports, etc. Including these sources is also not within the scope of a systematic review. Finally, this review does not explicitly aim to evaluate the quality of the strategies but rather to determine the potential opportunities for including children and adolescent's mental health in LMICs adaptation and mitigation plans. The findings of this review have the potential to form the basis of a systematic review in the future to determine how effective the policies are, but this review only seeks to identify the available information and provide a broad overview.

This protocol follows the Arksey and O'Malley framework for a scoping review and similarly considers the Joanna Briggs Institute's (JBI) guide for creating a scoping review protocol [80,81]. As outlined in these two sources, this review will be organised by the five-stage model including:

1. *Identifying the research question*
2. *Identifying relevant studies*
3. *Study selection*
4. *Charting the data*
5. *Collating summarising and reporting the results*

2.1 Stage one- Identifying the research question:

To create a relevant research question to guide the review, the desired components were defined based on the JBI PCC mnemonic (population, concept, and context) [81]. That is:

Population:

Children and adolescents aged 0-19 years old as defined above. This population was chosen because of their unique vulnerabilities and the permanency of living with the impacts for the longest.

Concept:

The concept of interest includes adaptation, resilience, and mitigation strategies that specifically mention and consider children and adolescent's mental health following exposure to an EWE.

Context:

The primary goal is to identify what measures are currently in place in LMICs and highlight the potential strategies that may be effective based on identified research or successful implementation. As such the review will focus mainly on LMICs, but considering the broadness of a scoping review, it will also identify possible strategies that were implemented in HICs with promising success in the LMIC context or were recommended by an international body with consideration for a country's specific needs. Only articles written in English will be selected and it is a recognised limitation, but for this mini-dissertation English is the only feasible language. To interpret the most recent information, the timeframe will be limited to the last 21 years. This was chosen because in 1997 the UNFCCC adopted the Kyoto Protocol which aimed to emphasise the limitation and reduction of GHG emission in signing countries, marking the official beginning of mitigation strategies [82,83]. During the 1990's many climate scientists and policy makers were also creating a case for the necessity of adaptation alongside mitigation, prompting the addition of the Marrakesh Accords in 2001 [82-84]. Under the guidance of the UNFCCC and as an extension to the Kyoto Protocol, this declaration promoted the adoption of adaptation thinking [84]. Therefore, limiting articles to 2000-2021 should be sufficient in gathering information on both adaptation and mitigation strategies.

Research question:

Considering the PCC criteria, the following question was created to guide this review:

What adaptation and mitigation strategies are currently in place in LMICs to protect and promote resilience in children and adolescent's mental health following exposures to EWE?

2.2 Stage two- Identifying relevant studies:

2.2.1 Search Strategy:

According to Arksey and O'Malley, the second stage in the scoping review framework is identifying relevant studies [80]. A search strategy has been determined based on the search terms in Rother et. al.'s (2020) systematic review protocol and further defined based on terms related to adaptation, mitigation, and resiliency [4]. The proposed search strategy is available in appendices 1.1 and search terms will be modified depending on the databases being searched [81]. All the

identified literature from the databases will be exported to EndNote to document and organise citations. Reference lists of all relevant literature will be scanned to identify other pertinent papers, adopting a "snowballing" method [81]. Further, forward citation tracking will determine if other papers that have cited the identified literature would be useful to this review [81].

2.2.2 Databases:

The following databases identified in the systematic review protocol developed by Rother et. al. (2020), will be used for searching the relevant literature: MEDLINE (via PubMed), Agricultural and Environmental Science collection (via ProQuest), Africa-Wide, Academic Search Premier, ERIC (Education Resources Information Center), CINAHL (Cumulative Index of Nursing and Allied Halth Literature), PyscARTICLES, PsychINFO, Econlit, GreenFILE, General Science, GeoRef, Environment Collection (all via the EBSCOHost platform), and Scopus [4]. To identify grey literature the following databases and types of websites will be used: Google Scholar, Microsoft Academic, Google, Proquest Dissertations and Theses, International Institute for Environment and Development (IIED), Web pages of countries, and NGO pages. All databases will be limited to English and between 2000-2021.

2.2.3 Eligibility Criteria:

All inclusion criteria were considered and defined based on the JBI guidelines for a scoping review and the PCC mnemonic [81]. The types of documents and evidence that will be included were also considered [81]. Final inclusion and exclusion criteria are summarised in Table 1.

Types of evidence:

A preliminary search indicated that information about adaptation and mitigation strategies considering mental health and more specifically mental health in children and adolescents was limited and broad. To include all possible strategies this scoping review will not limit the type of evidence. The review will include qualitative, quantitative, and mixed method studies. Data will not be limited to published studies and will also include grey and peer-reviewed literature. Types of publication will not be limited either and will include original studies, policy documents, government strategies, systematic and scoping reviews, proceedings, dissertations, and theses.

Including literature from HICs:

It may be necessary to review some documents from HICs or international organisations that make more broad recommendations. To determine the feasibility of these types of strategies in the LMICs context, the following criteria will be considered: if they include local evidence, there is a strong partnership within country (i.e. with a local NGO, University, etc.), and if the strategies are or could be contextualised to consider the institutional capacities, technical capacity, political, economic, and cultural aspects of LMICs [76,77].

Inclusion Criteria	Exclusion Criteria
Population: • Focuses on children and adolescents aged 0-19 *Concept:* • Discusses adaptation, mitigation, and resilience strategies to protect and promote children and adolescent's mental health following an EWE *Context:* • Adaptation, mitigation, and resilience strategies for children and adolescent's mental health in LMIC • Adaptation, mitigation, and resilience strategies that have HIC influence, but may be applicable in LMIC context • Articles linked to any EWE in the past 21 years (2000-2021) • Articles written in English *Type of Evidence:* • Qualitative, quantitative, and mixed method studies • Peer-reviewed and grey literature • Original studies, policy documents, government strategies, systematic and scoping reviews, proceedings, dissertations, and theses	*Population:* • Do not include children or adolescent's mental health *Concept:* • Do not identify adaptation or mitigation or resilience strategies for mental health • Do not include strategies to cope with an increase in EWE • Only include mental health strategies tangentially

Table 1. summary of inclusion and exclusion criteria of articles and documents

2.3 Stage three- Study selection:

Once exported to EndNote the number of results from each database will be recorded. Then duplicate citations will be removed via the 'Find Duplicates' function. A manual check will be performed to ensure that none were missed [81]. As recommended by Levac et. al. two separate reviewers, Kadota and Jagarnath, will independently review the publications and meet at the beginning, midpoint, and final stages of the selection process to clarify uncertainties and ensure relevance [79]. The software Rayann will also be utilised between reviewers to allow for collaboration and quicker review time. In the preliminary scan, titles and abstracts will be reviewed and any papers that are obviously irrelevant to the topic will be removed [80,81]. After the first pass, a second pass will be conducted by Kadota and Jagarnath examining the full text of the remaining articles [80,81]. The two reviewers will separately determine eligibility based upon the defined criteria (Table 1). The reason for exclusion of full text articles will be documented. After the second pass the reviewers will collaborate and determine which publications will be included. If there is disagreement between the two reviewers, then a third reviewer, Rother, will be consulted to reach a consensus [79]. The screening process will be documented in a flowchart in accordance with PRISMA guidelines [81].

2.4 Stage four- Charting the data:

The next stage in the Arksey and O'Malley framework is charting the data in an Excel spreadsheet to create a descriptive summary for each publication [80]. Levac et al criticised the Arksey and O'Malley framework indicating that this stage should be an iterative process throughout the review [79]. Scoping reviews, by nature, are broad and tend to discuss complex concepts which can be difficult to summarise [78]. As the reviewers, Kadota and Jagarnath, engage in the charting process it may be necessary to add characteristics and review publications more than once [81]. After conducting preliminary research and consulting the JBI recommendations Table 2 includes the information for the proposed draft of the charting form [80]:

Information	Description of what will be included
Title	
Author (s)	
Year	The year of publication and, if applicable, the year(s) the study was conducted.
Country Geographic setting	The country of origin, where it was published, and, if different, the country of focus. Geographic characteristics of the area of focus (rural, urban, the characteristics of the surrounding natural environment) to determine which EWE the area may be most susceptible to.
Type of publication	Since there is no limit to the type of evidence this section will detail what type of publication the document is and if applicable the methodology of the study.
Aims/purpose of publication	What the publication was attempting to address.
Population	Age of the children and/or adolescents that were the focus of the study.
Type of EWE and effects	What type of EWE does the publication discuss and how do the effects of the EWE influence child and adolescent mental health?
Type of mental health outcomes discussed	What are the potential mental health outcomes (both positive and negative) discussed in the publication? Are they direct or indirect outcomes following an EWE?
Mitigation strategies	What are the recommended mitigation strategies in the publication that limit GHGs and consider children and adolescent's mental health? The logistics of the strategies: Are they long term or short-term strategies? What is the timeline for their introduction? What mental health outcomes do they address? Who is going to be funding them? Where are they going to be introduced? Who is responsible for overseeing them? Who are the stakeholders being tasked with or affected by the introduction of strategies? Will they be re-evaluated and re-introduced if they fail? Any other relevant information?
Adaptation strategies	What are the recommended adaptation strategies for addressing the effects of EWE on children and adolescent's mental health in the publication? The logistics of the strategies: Was a vulnerability risk assessment conducted? How does it consider vulnerability? Is it a risk-reduction or crisis-management strategy? Are they long-term or short-term strategies? What is the timeline for their introduction? What mental health outcomes do they address? Who is going to be funding them? Where are they going to be introduced? Who is responsible for overseeing them? Who are the stakeholders being tasked with or affected by the introduction of strategies? Will they be re-evaluated and reintroduced if they fail?
Resilience and resilience-enabling mechanisms	How is children and adolescent's resiliency being protected or promoted by the strategies? Are there specific resilience-enabling mechanisms being address?
Children and Adolescent inclusion in the policy process	Were identified strategies inclusive of children and adolescents during the policy process? What role, if any, did they play in the creation of strategies?
Gaps and/or further research	Identified in the study as a potential area of focus for the future

Table 2. A draft of the table that will be created in Excel to understand and chart the data.

2.5 Stage five- Collating, summarising, and reporting the results:

The data charted will be presented in an overview based on trends and themes in implemented strategies and the mental health outcomes they attempt to address. After highlighting the current strategies, a review of the provided recommendations will be synthesised. These data will illuminate potential future research areas and allow the researchers to make recommendations based on the strategies identified throughout the scoping review. The goal of this review is to synthesise a large amount of information spanning all LMICs to provide areas for more focused research.

2.6 Ethics:

This scoping review will not include collecting individual data and will not contain identifiable information. As such, this scoping review does not require ethical approval, but it will be registered with Open Science Framework to ensure transparency and rigour [81].

2.7 Risk of bias:

There is a risk of bias during the selection and reviewing process of literature. To limit this bias, two reviewers, Kadota and Jagarnath, will independently select and screen documents. If there are differing opinions, they will engage in a discussion and attempt to come to an understanding. If they are still unable to agree then a third reviewer, Rother, will be consulted for a consensus. Although this will reduce most of the bias, potential selection bias may still exist. It is likely that while conducting the review decisions will be made to determine how far the breadth goes and what to include, creating some selection bias, which is also a recognised limitation of the scoping review methodology [80]. Finally, as it is not the goal of a scoping review to determine the strength of a published piece it will be understood that bias may exist within the articles, but the goal is to understand adaptation and mitigation strategies and map potential gaps for future research.

2.8 Limitations of this review:

Scoping reviews aim to identify the breadth of information on a particular topic rather than the quality or depth of information [80]. This is a recognised limitation because there is a considerable amount of literature available, and it is possible that some may be missed based on the broadness of the topic. Another limitation associated with the methods of scoping review is that the review will not provide information regarding the effectiveness of adaptation and mitigation strategies, but rather a descriptive narrative [80]. The last limitation with the scoping review method is that it is inclusive of different types of literature thus making it difficult to systematically compare the quality, but that is not the aim of this review [80]. To address these limitations in the future it would be beneficial to do a more focused systematic review based on

the trends of literature identified. A future systematic review has the potential to address these limitations and gain further insights into the topic.

More particularly, as identified, one of the main limitations of this review is the exclusion of literature not published in English. Since English is the language shared and spoken by the reviewers and no other translation help is available it is sufficient for addressing the requirements for this mini dissertation. However, this limitation is especially pertinent because many LMICs are not English-speaking and thus there is a good chance that important publications in adaptation and mitigation strategies will be missed. It would be beneficial in the future to conduct another review with the capacity to include other languages. Finally, only databases and grey literature that are available through the University of Cape Town or are free to access will be included which could also lead to missing important literature.

2.9 Timeline:

In the current timeline, this review will be completed and submitted for examination by February 2022 for a December 2022 graduation from the University of Cape Town, MPH program. The following table indicates expected milestones:

Month	Milestones
March 2021	Register Thesis
April 2021	Final draft of proposal submitted to supervisor
May 2021	Proposal submitted to ethics
June 2021	Databases and grey literature searched
July 2021	First screen of identified records (titles and abstracts)
August 2021	Second screen of included records (full text documents)
September 2021	Data charted Data analysis and theme identification
October 2021	First and second drafts of journal article submitted and revised
November 2021	Third draft of journal article submitted
December 2021	Final draft of journal article submitted First submission of full thesis draft
January 2022	Intention to Submit Final Turnitin submission to supervisor
February 2022:	Submission of thesis to the Post Graduate office

Table 3. Proposed timeline and milestones to submit by February 2022.

3. Conclusion

The impacts of climate change and EWE are becoming more apparent as the years progress. Children and adolescents possess unique vulnerabilities exacerbated by the social and environmental factors in LMICs. In addition, the significant mental health treatment gap and lack of child and adolescent-specific mental health resources indicate a necessity to urgently act regardless of available research and evidence level for health co-benefits [86]. Implementing policies that address social inequities and consider child and adolescent mental health will only likely increase and promote resilience in the future. The intention of this review is to provide a narrative of adaptation, resilience, and mitigation strategies addressing children and adolescent's mental health in LMICs. The findings of this review could provide information relevant for LMICs responses to climate change and afford guidance for future strategies

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PART B: JOURNAL READY MANUSCRIPT

Title: Investigating strategies addressing child and adolescent mental health following exposure to extreme weather events in low- and middle-income countries: A scoping review

Target Journal: *International Journal of Environmental Research and Public Health*

The original template for the manuscript that includes the instructions for authors is included in Appendix 3.1.

International Journal of
Environmental Research and Public Health

MDPI

Review

Investigating strategies addressing child and adolescent mental health following exposure to extreme weather events in low- and middle-income countries: A scoping review

Molly Kadota [1], Meryl Jagarnath [1] and Hanna-Andrea Rother [1,*]

[1] Division of Environmental Health, School of Public Health and Family Medicine, University of Cape Town, Observatory, 7925 South Africa; mollykadota@gmail.com (M.K.); meryl.jagarnath@uct.ac.za (M.J.)
* Correspondence: andrea.rother@uct.ac.za (H-A.R.); Tel.: +27-21-4066721

Abstract: A growing amount of literature is beginning to outline the associations between exposures to extreme weather events (EWE) and mental health. The impacts are expected to be especially adverse for children and adolescents residing in low- and middle-income countries (LMICs). With the inevitability of EWE, it is imperative that climate change strategies explicitly minimise the potential for negative mental health outcomes while promoting positives ones. A scoping review was, therefore, conducted to provide a narrative of where adaptation, mitigation, and resilience strategies in LMICs address, and where they do not, child and adolescent mental health following exposures to EWE. Databases were searched from June-August 2021, providing a total of 5,073 records with 1,913 duplicates. After two screening phases, 48 full-text articles were included for data extraction. The identified documents illuminated a lack of child and adolescent mental health inclusion in current climate change strategies. Therefore, eight themes were identified as integral components for future inclusion in national strategies and resilience planning. The general guidance of the themes requires country-specific conceptualisation to determine further technical factors (e.g. funding and responsibility). This review provides a foundation of information available in LMICs regarding child and adolescent mental health after exposure to EWE.

Keywords: climate change; extreme weather events; mental health; adaptation strategies; resilience; children; adolescents; low- and middle-income countries

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1. Introduction

The latest publication from the United Nations Intergovernmental Panel on Climate Change (IPCC), the 2021 Sixth Assessment Report (AR6), starkly revealed that human influence has and will continue to irreversibly intensify the extreme weather conditions associated with climate change [1]. Notably, the experience of extreme weather events (EWE) and their impacts will be unevenly distributed across the globe and among populations. Investigating global EWE vulnerability requires considering a country's geographic location and natural environment along with the economic, political, and social conditions present [2]. With this information, Edmonds et al. [2] indicate that low- and middle-income countries (LMICs), specifically in Sub-Saharan Africa and South Asia, are likely to experience more frequent and severe EWE and their subsequent effects [2]. Children and adolescents will disproportionately bear adverse outcomes within these regions because of their unique vulnerabilities and lifespan [3, 4]. Experiencing EWE in childhood or adolescence, particularly within the LMICs context, likely affects their safety, health and wellbeing, development, social structures, and future, thus demarcating them as an urgent population of focus.

The new AR6 data continues to support the assertion by the Lancet Commission on Climate Change that climate change "is the biggest threat to global health of the 21st century" [5]. Since this declaration in 2009, the inclusion of physical health in mitigation

and adaptation plans has increased significantly in both high-income countries (HICs) and LMICs. In contrast, mental health indicators and interventions are widely underrepresented or missing altogether [6-8]. However, within the last few years, research addressing the association between mental health and EWE has expanded substantially, creating a growing evidence base for its inclusion. Furthermore, vulnerable groups like children and adolescents residing in LMICs are underrepresented or absent in many National Adaptation Plans (NAPs) [9]. Considering the lack of inclusion of both mental health outcomes associated with the exposure to EWE and child and adolescent populations in LMICs, it is imperative to outline the available research to inform future adaptation planning considerations.

From the expanding research, it is apparent that EWE have the potential to disrupt child and adolescent mental health via three pathways: directly (experiencing the EWE), indirectly (how it interacts with existing social, political, and economic conditions, and the natural and built environments), and overarchingly (child and adolescent awareness of the imminent threat of EWE and the effects on their future) [10, 11]. According to available research, child and adolescent exposure to EWE heightens the risk for developing mental health outcomes like post-traumatic stress disorder (PTSD), anxiety, depression, phobias and panic, attachment disorders, sleep disorders, and substance abuse [10, 12-15]. Experiencing any of these consequences in combination with an alteration to social, economic, or environmental conditions can also lead to developmental delays, behavioural issues, decreased academic performance, and social strain [16-18]. Further, the presentation of mental health or developmental delays in childhood or adolescence increases the likelihood of experiencing poor outcomes in adulthood [10]. However, children and adolescents also possess an increased capacity to display resilience during an event, leading to positive outcomes like post-traumatic growth (PTG), empathy, altruism, compassion, self-confidence, and self-care [6, 19, 20]. Previous reviews by Burke et al. (2018) [10] and Charlson et al. (2021) [11], though, recognised a significant gap in research from LMICs demonstrating similar associations between mental health and exposures to EWE. Contextual factors in LMICs like poor governance, lack of resources, weak health systems, minimal mental healthcare considerations, poor economic conditions, high burden of disease, and already extreme weather conditions are likely to influence the impacts of EWE differently [21, 22]. Even with the lack of research in LMICs, it can be assumed that experiencing an EWE will adversely impact children and adolescents, creating an immediate need for attention in climate change measures.

Considerations for mental health in adaptation and mitigation strategies have emerged in HICs, namely the United States of America (USA), Canada, Australia, and the European Union (EU). In 2019 and 2020 respectively, the American Public Health Association [23] and the American Academy of Nurses [24] published themes and guidelines for including mental health in adaptation strategies but did not explicitly consider child and adolescent mental health. A scoping review conducted in the EU specifically investigated climate change policies addressing child and adolescent mental health, but minimal data or policy planning considerations were discovered [25]. Clemens et al. (2020) [25] did, however, highlight the importance of supporting child active coping methods, participation in response and recovery efforts, accessibility to rapid treatment options post-EWE, and addressing social adversities. Finally, Canadian researchers Hayes and Poland (2018) [6] investigated the inclusion of mental health indicators in health and risk impact assessments but lacked explicit child and adolescent focus and considerations for LMICs contextual factors. Based on the current literature and its disparate inclusion of child and adolescent mental health in adaptation and mitigation plans in LMICs, it is evident that one of the most vulnerable populations to climate change remains susceptible to experiencing adverse outcomes.

This scoping review aims to provide a narrative of where adaptation, resilience, and mitigation strategies do or do not address mental health impacts on children and adolescents in LMICs following exposures to EWE. This review highlights the strategy gaps in LMICs and identifies eight integral themes to ensure child and adolescent mental health incorporation in future policy and national strategy considerations. The guiding research question focuses on what adaptation and mitigation strategies are in place at the time of this review in LMICs to protect and promote child and adolescent mental health and resilience following exposure to EWE.

2. Materials and Methods

The methodology for this review was created based on the Arksey and O'Malley [26] framework and the Joanna Briggs Institute (JBI) [27] guide for conducting a scoping review. A scoping review was chosen as child and adolescent mental health following exposure to EWE in LMICs is an emerging topic and the published literature is sparse. The review methods allowed for the inclusion of a range of documents and provided an opportunity to map the available information. For clarity, the JBI recommended defining essential components of the review based on the desired Population, Concept, and Context (PCC) mnemonic [27]. The population of focus was children and adolescents under the age of 19 years old. The age range was determined considering conventional terms and the WHO definition of child and adolescent health. Childhood includes anyone under the age of ten and adolescence is the period between childhood and adulthood (10-19 years old) [28, 29]. A preliminary literature review highlighted minimal differentiation between measures for children and adolescents. Therefore, in this review they were, mainly, considered one group. The concept was adaptation and mitigation strategies that addressed mental health and resilience following exposures to EWE. Finally, the context was LMICs or strategies that could be adopted by LMICs given their implementation constraints.

2.1 Search Criteria

To identify relevant literature, a search of the following online databases was conducted: MEDLINE (via PubMed), Agricultural and Environmental Science collection (via ProQuest), Africa-Wide, Academic Search Premier, ERIC (Education Resources Information Centre), CINAHL (Cumulative Index of Nursing and Allied Health Literature), PyscARTICLES, PsychINFO, Econlit, General Science, GeoRef, Environment Collection (all via the EBSCOHost platform), and Scopus. Sources like Google Scholar, IPCC, UNFCC NAP Central, WHO, and non-governmental organisations (NGOs) sites identified additional grey literature. The review was completed from June to August 2021. The search strategy was created building on the terms utilised in Rother and colleagues' [15] systematic review protocol. Additional search terms were then added to include adaptation and mitigation strategies. A filter was applied to ensure that the articles focused on LMICs and included search terms developed from the University of North Carolina, Chapel Hill LibGuides [30] and World Bank data [31]. These comprised of the names of LMICs, and key text words commonly used to describe them. Reflected in Appendix 2.1 is the utlised Pubmed search strategy. The results were limited to English, given language constraints, and only included literature published between the years 2000-2021. The date range was determined considering the introduction and growing emphasis on climate policies in the late 1990s and early 2000s to the present.

To understand the potential capacity of LMICs to address child and adolescent mental health, included literature considered documents that highlighted recommendations for child and adolescent mental health following exposures to natural disasters not directly linked to climate change. Additionally, the review considered documents published from HICs, or international organisation if they were contextually feasible or demonstrated ample considerations for LMICs context.

The articles were screened based on the following inclusion and exclusion criteria determined considering the PCC definitions:

Inclusion:

- Focused on children and adolescents aged 0-19
- Considered adaptation, mitigation, and resilience strategies or interventions that protect or promote mental health following EWE or natural disasters
- Research or documents focused on LMICs or were applicable in LMICs context
- Studies linked to any EWE or relevant natural disaster in the past 21 years
- Documents that were written in English

Exclusion:

- Did not explicitly mention child or adolescent mental health
- Documents that did not identify adaptation or mitigation or resilience strategies or interventions addressing mental health
- Only included mental health tangentially
- Full-text access was not available through the University of Cape Town
- Non-English documents

The search strategy retrieved a total of 5,073 records, of which 1,913 were removed for duplication. Abstracts of the remaining 3,160 records were screened independently by two reviewers (MK and MJ). In this stage 3,049 were excluded for irrelevancy. Finally, 111 records were sought for full-text retrieval and screened thoroughly by the two reviewers (MK and MJ) based on the identified criteria. Of these, a final 48 were included in this review. Figure 1 details the screening process and indicates the reasons for excluding 62 full-text articles.

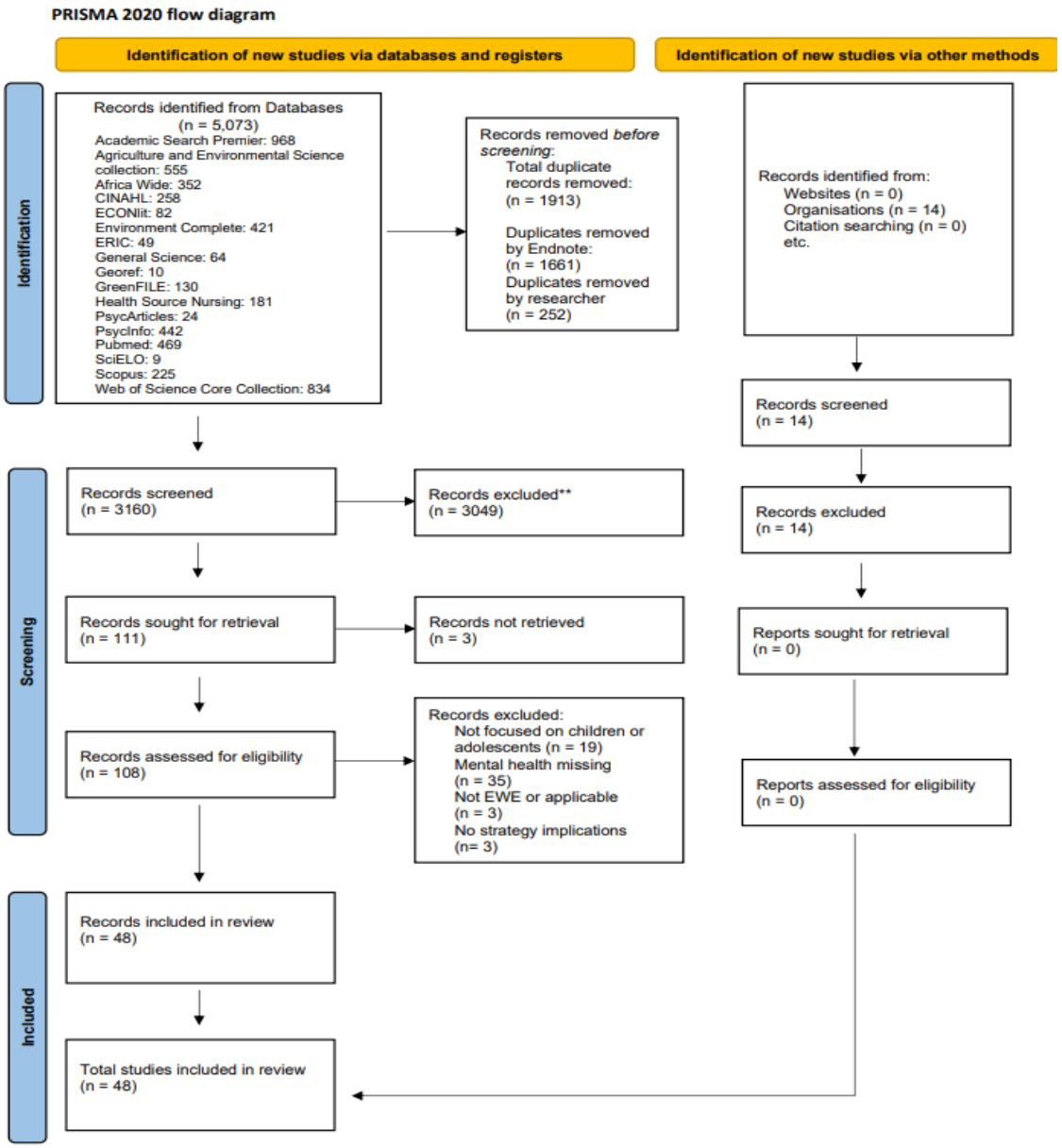

Figure 1. Prisma flow chart detailing the screening process with reasons for excluding full text articles. Adapted from Page and colleague's PRISMA 2020 guideline for reporting systematic reviews [32].

2.2 Data Extraction

Once the included articles were determined, data was extracted into an Excel spreadsheet (Appendices 2.2 and 2.3). To ensure readability in this document, the spreadsheet was split into two tables. Appendix 2.2 contains the following data charted for each study: Title, author, year of publication, location, type of publication, aim, population, type of EWE or disaster and the effects, type of mental health outcomes discussed, and whether the document explicitly mentioned climate change. When defining the location, literature was considered international if it documented research broadly with no specified country or if it included more than one World Bank defined region. Appendix 2.3 depicts the remaining charted data: mitigation strategy implications, adaptation strategy implications, resilience and resilience-enablers, child and adolescent participation, and gaps or recommended future research. Within the adaptation strategy implications, the following details were documented: if a vulnerability risk assessment

was conducted, vulnerabilities considered, strategy details, short or long term, timeline (preparedness, response, or recovery), mental health outcomes addressed, funding, stakeholders, responsibility, and other important notes. Following a narrative synthesis approach, one reviewer (MK) identified recurring themes from the collated information. The themes provided the framework for a textual analysis to summarise and draw conclusions from the included studies.

3. Results and Discussion

The following section incorporates both the results and discussion from this scoping review.

3.1. Description of studies

3.1.1 Geographic regions

Of the reviewed literature, 33% included data and insights from an international perspective (n = 16). Five of these articles focused explicitly on LMICs. Two mentioned the importance of considering LMICs or developing nations. The remaining nine did not mention LMICs but contained relevant research from multiple countries or an unspecified location. The 32 region-specific records represented 18 countries and seven regions (Appendix 2.2). The regions with the most publications were East Asia and the Pacific (n = 10) and South Asia (n = 9), while China (n = 6) and Sri Lanka (n = 4) were the two most represented countries. Conversely, the regions that were minimally represented in the reviewed literature were Sub-Saharan Africa, and Latin America and the Caribbean, which each constituted 8% of the records (n = 4).

Considering the two previously identified vulnerable regions to climate change, South Asia, and Sub-Saharan Africa, it was apparent that increased attention to child and adolescent mental health following exposure to disasters in Sub-Saharan Africa is needed. Rother and colleague's (2021) [17] systematic review focused explicitly on this region and determined consistent results. A few explanations for the apparent gap in literature in this region could be related to a stigma surrounding mental health and health seeking behaviours and the prioritisation of other urgent health issues. Additionally, there is a lack of funding in this region provided for mental health and climate change research which inhibits the availability of information. Finally, there could be an additional motivation to create and implement interventions in South Asia due to the nature of common natural disasters. These countries experienced previous sudden-onset natural disasters, like tsunamis and earthquakes, which cause visible and immediate destruction (Appendix 2.2). Whereas, in Sub-Saharan Africa, common natural disasters include droughts and heatwaves which are more long-term events and have impacts that are not immediately visible or destructive [33]. Thus, determining appropriate and timely response may be more complex and appear less urgent as impacts are not as visible.

3.1.2 Year of publication

With climate change and EWE becoming more of a reality, there is an apparent upward trend in publications addressing and considering the relationship between child and adolescent mental health and exposure to EWE and disasters. More than half, 52%, of the included literature were published in the last six years from 2016 to 2021 (n = 25). While 23% of the records were published from 2011-2015 and 2006-2010 respectively (n = 11) and the review only included one article from 2000-2005.

The consideration for children and adolescents in climate change response could be explained by an increase in youth-led movements, like the Greta Thunberg Fridays for Future strike. Such movements are vocalising their concerns for the future and pushing for inclusion in climate strategies [34]. While the youth involved in these movements have not directly mentioned mental health effects, their participation alone demonstrates an overarching awareness of, and anxiety about, climate change [35]. Increased attention to

mental health could be attributed to the World Health Organisation (WHO) mental health gap action programme aimed at providing more mental health resources and destigmatising mental health-seeking behaviours globally [36, 37]. The general move towards inclusion of mental health in the definition of health has also likely contributed to the increase in literature.

Similarly, there is an increasing recognition of the connection between climate change and disasters. A majority, ten out of fourteen, of the articles that explicitly mentioned climate change, were published 2016 and 2021. The earliest publication mentioning climate change was in 2007, followed by one article in 2008, 2013, and 2015 respectively. This indicates a general increase in the awareness of how EWE impacts global society and all facets of health, including mental health.

3.1.4 Mental Health Outcomes

The mental health outcomes discussed in the reviewed articles were consistent with previous child and adolescent mental health and EWE research [10, 12-15, 38]. The most identified were PTSD (n = 28), depression (n = 25), anxiety (n = 24), behavioural issues (n = 17), post-traumatic stress symptoms (PTSS) (n = 16), general emotional distress (n = 12), and phobias and panic (n = 12) (Appendix 2.2). A few articles suggested that they were highly prevalent because these outcomes were among the most recognisable and diagnosable [39-43]. Other identified outcomes in this review were substance abuse (n = 7), attachment disorders (n = 7), sleep disorders (n = 6), developmental delays (n = 5) suicidal ideations (n = 2), adjustment disorders (n = 2), and triggering an episode of a pre-existing mental health diagnoses (e.g. schizophrenia) (Appendix 2.2). Very few articles acknowledged positive outcomes presenting post-disaster like post-traumatic growth (n=1) and positive emotional expression (n=1) (Appendix 2.2). However, seven articles did associate resilience with increased positive mental health.

While the literature was consistent with previously identified outcomes, gaps still exist. First, the conceptualisation and diagnostic tools for the outcomes were mainly developed in HICs [15, 44-47]. As mental health is inherently context dependent and influenced by many pathways and life experiences, it is likely that there were missed symptoms and diagnoses [13]. Second, there is a need to recognise that mental health is more than just the absence of mental illness. Capitalising on child and adolescent resilience to encourage positive mental health outcomes is imperative for future climate change strategies.

3.2. Mitigation strategy implications for child and adolescent mental health

The included literature did not mention mitigation or insinuate implications for including child and adolescent mental health in mitigation strategies in LMICs. It is apparent that minimising the emissions of greenhouse gases (GHGs) influences child and adolescent mental health both directly (reducing the amount of exposure to GHGs and associated poor mental health outcomes) [48, 49] and indirectly (reducing the frequency and intensity of EWE). However, considering the global emission trends, it would be unfair to prioritise mitigation strategies in LMICs, as they are minimal contributors compared to HICs [50, 51]. Therefore, advocating for a reduction in GHGs emissions in HICs would be beneficial for child and adolescent mental health in LMICs. The potential negative social impacts in LMICs when implementing mitigation in HICs should be considered [51]. For example, an implemented policy that monitors the environmental standards of imported goods may limit the feasibility of exporting goods from small producers in LMICs [51]. Including children and adolescents from LMICs as active participants in global mitigation discussions should also be considered and viewed as an opportunity to promote positive mental health outcomes [52-55]. Generally, children and adolescents possess an enthusiasm, energy, and desire to contribute to promoting a green future [14]. Including children and adolescents that will disproportionately bear the impacts of global emissions will ensure their representation in considerations and

elucidate the impacts they are experiencing due to actions in other countries. Future research investigating the best methods to promote and amplify their voices in global mitigation discussions should be considered. Mitigation can also be taught in disaster and risk reduction education in LMICs to provide children and adolescents with ample information and appropriate methods for individual, community, and family-based mitigation techniques [56]. Children and adolescents felt empowered by education that they could implement and teach their families and communities, thus contributing to their overall resiliency during EWE [56]. Though mitigation is not well represented in this review, future acknowledgements in global strategies and literature of the mental health impacts on the child and adolescent populations in LMICs children would be beneficial.

3.3 Adaptation strategy implications for child and adolescent mental health

Recognising the inherent likelihood and vulnerability of experiencing EWE in LMICs, it is more productive to build capacity to respond to climate change through the creation of adaptation strategies than focus on mitigation [51]. Adaptation is also more community-centred and intertwined with the social determinants of health, and consequently better addresses child and adolescent mental health. As such, all the reviewed articles contributed to suggestions for including child and adolescent mental health in adaptation strategies, but few recognised the needed urgency [15, 53, 57-59]. The reviewed literature mainly identified implications for including mental health in general natural disaster preparedness, response, and recovery, which provided a framework to initiate conversations surrounding adaptation in LMICs. Adaptation strategies can be split into two categories: those that aim to reduce the risk of EWE through preparedness, and those that address and manage the crisis, EWE response and recovery. The literature presented recommendations for both risk reduction and crisis management strategies. Although, more articles focused on considering mental health in the crisis management phase (n = 43) than the risk reduction phase (n = 16). Tanaka et al. (2019) [60] specifically observed that many African governments lacked preparedness plans and tended to only react to disasters, implementing costly and unsustainable interventions. Increasing resources dedicated to enhancing preparedness strategies would be economically beneficial and create more long-lasting interventions. Risk reduction measures also heightened the capacity of children and adolescents, with their families and communities, to respond to EWE threats and increased resilience.

Eight main themes were consistently identified in the literature as integral components for addressing child and adolescent mental health in adaptation strategies. The themes themselves maintained a broad and overarching quality that, theoretically, rendered them applicable in many settings, including LMICs. The specific measures that contributed to each of the themes exemplified in the literature, required further conceptualisation depending on country-specific details (e.g. available funding, political will, social practices, location, and cultural traditions). The included documents lacked evaluation of the proposed strategies, and many were presented as theoretical. Generally, a cross-cutting aspect existed between the themes, where proposed measures addressed more than one theme. The most widely identified theme in the literature was fostering and bolstering connectedness with social support networks both prior to and after an EWE (n = 40). Social support among families, communities, and peers is an essential protective factor for child and adolescent mental health [13]. Measures to bolster connectedness were generally simple and interwoven with the success of measures presented in every theme. The causal pathways and contributing factors affecting child and adolescent mental health outcomes following exposures to EWE in LMICs require future research. The effectiveness of specific mental health interventions thus relies on determining these [13, 14]. However, there are still immediate opportunities to enhance child and adolescent resilience through the themes of improving the social determinants of health, strengthening the national mental health system, and generally aligning measures with the United Nations

Sustainable Development Goals (SDGs). Advocating for methods to address inequities while determining more specific EWE mental health interventions will minimise impacts in the future and should be an immediate, primary goal [14]. The themes are presented in Table 1, with the most overarching, systemic, and broad themes appearing first and working down to more specific EWE mental health considerations.

Table 1. Summary of the eight main themes, and actions identified in the reviewed articles that aimed to address them.

Recommendations for adaptation strategies considering the eight key themes identified	
Risk Reduction (preparedness)	**Crisis Management (response and recovery)**
STRENGTHENING NATIONAL MENTAL HEALTH SYSTEM	
• Child and adolescent mental health represented in national policy *(Health professionals working directly with children and adolescents are key informants)* • Embedding more local mental health professionals in communities • EWE mental health response training for nurses, paediatricians, and other relevant health professionals *(e.g. train members embedded in the community)* • Decentralise mental healthcare facilities to communities *(e.g. creation of more local clinics)* • Normalise and destigmatise mental health seeking behaviours	• Deploying national mobile mental health teams and creating temporary walk-in clinics *(Not a long-term solution)* • Promote within community response *(e.g. relying on local healthcare providers to initiate response)* • Use lessons learned during EWE to bolster the available resources *(e.g. temporary clinics become a permanent fixture in the community)*
IMPROVING GENERAL SOCIAL DETERMINANTS OF HEALTH	
• Improve non-disaster social safety nets • General improvements in the social determinants of health *(e.g. access to clean water, sanitation, food, shelter, childcare, healthcare and education. Monitoring growth and development)* • Consider existing vulnerabilities and create adaptation strategies surrounding them *(e.g. gender, socioeconomic status, race, and location.)*	• Consider secondary stressors of the event *(e.g. violence and abuse, child labour, child marriage, and dropping out of school)* • Continue to provide necessities and promote improvement of social determinants of health • Special attention given to the identified vulnerabilities contributing to the experience of EWE *(e.g. gender determining the presentation of PTSD symptoms or girls being more prone to violence and abuse after EWE)*

SUPPORTING A COMMUNITY-BASED, BOTTOM-UP APPROACH	
• Communities create EWE response guidelines and are supported by non-state parties, local, and national government • Form disaster management team in school that coordinates with local community efforts *(e.g. creates disaster plans, emergency response, and considers the provision of resources)*	• Implement response based on created emergency plans and guidelines *(e.g. ensure response is occurring in community and schools concurrently)*
• Children and adolescents consulted as stakeholders *(e.g. opinions sought during planning embedded into response)*	• Active, purposeful, and concrete participation *(e.g. help with cleanup, caring for children, rebuilding, and advising on building reconstruction)*
• Training community members to deliver basic psychological responses	• Community members deliver basic psychological response
• Train teachers in basic psychological techniques *(Capitalising on their trusted position in children and adolescents lives)*	• Teachers provide basic psychological support *(e.g. screen for presentation of potential symptoms and behavioural issues, implement basic therapy techniques, and share their own experience)*
• Ensure presence of school-based counsellor	• Support provided by school-based counsellor trained in more advanced psychological response • Consider the appropriateness and sustainability of nonlocal-NGOs and international aid. *(e.g. through local community approval and dependent on if they are based on local research, train local community members, and create a coalition between the organisation and the community)*
CONSIDERING CULTURAL AND CONTEXTUAL NUANCES	
• Validate the use of psychological screening and diagnostic tools in the community *(e.g. considers local dialogue surrounding mental health and contains culturally appropriate and inclusive diagnoses)*	• Rapidly employ validated psychological tools
• Validate appropriate therapy interventions *(e.g. consider resource and specialist availability in the community to determine if trauma-focused therapies are relevant and can be delivered sustainably)* • Ensure taught emergency procedures and education is based on appropriate cultural context *(e.g. consider religious explanations for the occurrence of EWE)*	• Appropriate and validated therapy is provided to those that need it • Using cultural coping mechanisms to express and normalise feelings *(e.g. breathing techniques and relaxation in Asian cultures and connection to Buddha)*
• Encourage connection to community through participation in cultural and religious traditions	• Re-establish connectedness to community through relevant traditions and ceremonies *(e.g. celebrations of the dead and 100 days of mourning in China)*

PROMOTING SAFETY	
• Disaster and risk reduction education *(e.g. teaching emergency procedures, evacuation drills, location specific EWE information, and providing children and adolescents with resources to share at home)*	• Provision of accurate and reliable information post-EWE *(e.g. information about continued threats and response and recovery efforts)*
• Risk communication and early warning systems in the community • Community plans to enhance the services delivered during EWE *(Child and adolescent impact assessments performed to ensure their explicit inclusion)*	• Accurate activation of warning systems and risk communication • Implement appropriate community plans to ensure a rapid intervention
• Evacuation kits at home and in schools *(e.g. kits contain important documents, food, water, and first aid for immediate use)*	• Use of evacuation kits *(immediate availability for children and adolescents)*
• Considering risks of school and healthcare infrastructure *(e.g. location, structural safety, and evacuation routes)*	• Coordinated and immediate restoration of school infrastructure, housing, and healthcare facilities *(prioritising child and adolescent safety in rebuilding efforts)*
RAPID INTERVENTIONS	
• Relies on measures created in the promoting safety, strengthening the national mental health system, considerations for culture and context, and community-based response themes	• Implement emergency procedures and plans • Meet basic needs *(e.g. possible provision of food, clean water, and a safe shelter. Needs assessment completed to determine best methods for provision)* • Demarcating child and adolescent safe spaces in shelters and communities *(e.g. a space where they can feel safe, supported, and connected to others)* • Return pre-EWE status through a return to schools and routines *(e.g. potential use of mobile classrooms, UNICEF classroom in a box, or other temporary classroom arrangements)* • Deliver psychological first aid (if applicable) *(e.g. minimise symptoms through emotional support and ensuring child and adolescent safety. Validation in LMICs context needed)*
EXPRESSION AND NORMALISATION OF EMOTIONS	
• Normalise the expression of emotions in daily routines and classrooms *(e.g. provide vocabulary and encourage play-related activities for expression)*	• Encourage child and adolescent expression of emotions specifically in classrooms *(e.g. use similar play-related activities as pre-EWE and continue to provide appropriate vocabulary)*
• Teach culturally relevant coping mechanisms to employ during the EWE	• Psychoeducation in the classroom and community for parents and caregivers (if applicable) *(e.g. outlining common symptoms and outcomes, provide methods for coping, and provide emotion-focused vocabulary. Needs to be validated in LMICs context.)* • Use stepped wise treatment to address poor mental health outcomes *(e.g. screening utilised over diagnostics to identify high risk individuals who are then treated through validated therapy methods.)*

BOLSTERING CONNECTEDNESS	
• Encourage connections to peers *(e.g. through play and interactions in the classroom)*	• Re-establish connectedness to peers *(e.g. continue to encourage play and engagement in activities with peers, and group therapy)*
• Bolster connections with family and caregivers *(e.g. children and adolescents share disaster information learned at school and create emergency plans with family for more rapid reunification)*	• Measures to ensure rapid reunification with family *(e.g. accurate dead body identification and tracing services)* • Therapy delivered to parents or caregivers and potential for family therapy
• Create plans for orphaned and isolated children	• Encourage orphaned and isolated children's participation in activities to help develop their support network
• Promote a trusting relationship between teachers and students and teachers and parents	• Use built relationships with teachers (*e.g. children and adolescents are more likely to confide in teachers, and parents and teachers can collaborate for a multifaceted approach)*

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3.4 Strengthening the national mental health system 419

Consistent with the global goals of increasing the accessibility of mental health resources and care while decreasing stigma, 25 articles identified strengthening the national mental health system as a necessary adaptation measure. The current international mental health programs lack climate change recognition, specifically the impacts on child and adolescent mental health [37]. It is apparent, though, that their resilience could be enhanced by specific focus on climate change and EWE exposure in LMICs. Table 1 includes a list of actions identified in the literature that could address this theme. The successful implementation of programs to strengthen the national mental health system, however, is contingent on demographics, politics, political will, and the general attitude towards mental health and health seeking behaviours [55]. This indicates that the process of strengthening these systems is intertwined with other themes addressed in this review, such as understanding contextual and cultural nuances and empowering community-based, grassroots approaches. In general, future research is needed to investigate affected communities' specific mental health resource needs. 420 421 422 423 424 425 426 427 428 429 430 431 432 433

A limited number of articles discussed strengthening the mental health system by representing child and adolescent mental health in national policy (n = 5). In LMICs there is a 90% treatment gap between those that need mental health care and the available resources [61, 62]. Trends outlined by the WHO in 2017 [63] indicated increased governmental commitment in LMICs to include mental health in the general definition of health [64]. Adequate access to mental health resources pre- and post-EWE could be safeguarded through the integration of mental health in primary healthcare [65]. Therefore, an opportunity exists to combine the national goals of increasing mental health resources, with specific consideration for children and adolescents, in LMICs with the creation of climate change adaptation measures. The articles described short-term solutions for including mental health in primary care following the occurrence of EWE, such as deploying mobile mental health teams [41, 66] and establishing temporary outreach and walk-in clinics [41, 65, 67]. These methods were beneficial as they increased accessibility and prioritisation of care, but they were not sustainable, nor did they contribute to long-term adaptation measures. As EWE become more frequent and severe, mounting short-term responses will likely become less feasible and more costly. This is especially true within the LMICs context where pre-existing conditions like understaffing, inadequate resources, and overwhelmed clinics are exacerbated by EWE [14]. National and local health officials should, therefore, consider solutions that can be maintained as more permanent fixtures in the community. Examples of long-term measures in the 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453

literature included embedding child and adolescent mental health professionals within the community [44, 55, 65, 66, 68] and training members already embedded in psychological response techniques (e.g. nurses, paediatricians, and trusted leaders) [57, 69]. It was identified that children and adolescents were more likely to engage in mental health-seeking behaviours when they confided in already trusted adults [55, 65]. Articles from a wide range of countries including Sierra Leone [55], Haiti [44], Latin America [66], China [70], and international sources [65, 69] recognised the need to increase personnel and mental health disaster training within communities, indicating the importance of long-term solutions for adaptation measures in all countries.

3.5 Improving social determinants of health

Targeted child and adolescent mental health strategies appeared to be enhanced by a general improvement in the social determinants of health (e.g. socioeconomic status, access to education, food, water, shelter, and health care) (n = 12). Fernando et al. (2010) [40] stated that therapy, while important, was more effective when a holistic community betterment approach supported it. A more comprehensive range of psychological distress was combatted by improving non-disaster social safety nets [40, 71, 78, 59].

As climate change is a risk amplifier for social inequities, striving to achieve SDGs, particularly in LMICs, will lessen the experience of the severe impacts associated with EWE, thus benefitting mental health [13, 14, 82]. The reviewed literature presented measures to consider in the risk reduction phase that targeted general improvements in health through access to clean water, sanitation, food, shelter, childcare, healthcare, and education while monitoring child and adolescent growth and development [44, 59, 71, 83, 84]. However, the technical considerations and specifics for achieving these goals were described minimally in the articles. The lack of representation of country-specific measures indicated that while social interventions were promotive in theory, they were more difficult to implement in practice. Further considerations for representing EWE in current and future social policies are needed.

The articles also highlighted a range of social vulnerabilities that adaptation measures should consider in relation to mental health. They included age, gender, race, location, and socioeconomic status. Depending on these factors, children and adolescents experienced EWE differently. Some articles demonstrated that females had an increased likelihood of experiencing adverse impacts and were thus more vulnerable [42, 52, 84], while others demonstrated that male children and adolescents were less likely to express their feelings, so they presented more PTSD symptoms [85, 86]. Researching gendered responses for targeted interventions was recommended by 12 articles. Xu et al. (2018) [86] stated that based on the vulnerabilities in Australia, for example, explicit policies addressing the impacts on indigenous girls were needed. The vulnerabilities between LMICs will likely vary, and created policies should consider which groups in their contexts are most vulnerable.

The crisis management adaptation strategies that included social interventions were less discussed in the literature (n = 4). It was evident that considering social interventions prior to an event bolstered resilience and contributed to positive mental health outcomes during EWE, whereas reacting to an EWE with social interventions likely failed to adequately address the inequities and the experienced effects were already in place [83]. However, continued social interventions targeting child and adolescent secondary stressors should still be considered and indicate a reinvestment in child and adolescent wellbeing [71, 83]. The main consideration post-EWE was ensuring that children and adolescents were safe from violence and abuse [55, 67, 74, 83, 84]. An example of an intervention in Pakistan included an evaluation by trained psychologists to monitor for threats of violence in temporary camps and implement awareness campaigns to promote safe practices among different groups of people (i.e. boy children, girl children, men, and women) [67]. Depending on the resources available, these methods could be adopted and considered in other LMICs. Other secondary stressors that were identified in the articles

included earlier child marriages [52], child labour [44, 59], and decreased school attendance [87] all of which likely impact mental health. These were not widely discussed in the articles but deserved attention in adaptation strategies. Future studies would benefit from investigating tangential mental health relationships with secondary stressors.

3.6 Supporting a community-based, bottom-up approach

Twenty-eight articles identified building community capacity to respond to EWE by supporting a bottom-up approach to adaptation measures. The literature demonstrated that interventions were more inclusive of vulnerable populations and successful when communities could initiate their own mental health response. This was consistent with previous research by Vergunst and Berry (2021) [14] that emphasised the importance of shifting the onus of climate change response from individuals to the community. The measures and actions presented in the literature for increasing community efficacy are included in Table 1.

The first consideration presented for a bottom-up approach was empowering communities to create EWE plans that were supported by non-state parties, as well as local and national governments. Even within the same country, communities experience EWE and disasters differently depending on community infrastructure, if they are rural or urban, economic status, population size, and existing environmental conditions. To capture these differences from a Sub-Saharan African perspective, Bhebhe et al. (2019) [58] suggested that the national government allocate funds to communities and schools for specialised disaster education and plans. During the creation of these plans, it was important to engage diverse stakeholders to ensure the representation of all sectors and vulnerable groups [52, 58, 70]. This presented an opportunity to enhance child and adolescent resiliency through their concrete and purposeful participation in community risk reduction and crisis management measures [46, 52, 67, 71-73]. However, the literature that referenced and encouraged child and adolescent participation was mainly from international sources, illuminating an opportunity for LMICs to consider the roles of children and adolescents in their communities. Yoder (2019) [55] stated that advocacy measures needed to be by, with and on behalf of children and adolescents for climate change adaptation to be successful. Not only do children and adolescents have a fundamental right to participate in all climate strategies, but their participation is also imperative to encouraging a bottom-up approach [55]. Zeng and Silverstein (2011) [73] identified adult resistance as the biggest barrier to their participation, citing claims by adult stakeholders that children and adolescents were too young or needed to be shielded from the harsh realities. Summarised in Table 2 are the provided examples from the literature of various methods to include children and adolescents.

Table 2. Child and adolescent participation examples identified in the reviewed articles.

Themes in Child and Adolescent Participation
General: Overarching Considerations
• Children and adolescents need to be considered active members of the community that possess the right to contribute to preparedness, response, and recovery measures *(Avoid: Tokenism. Participation should be concrete and purposeful)* • Overcome the barrier of adults resisting their participation • Conduct Participatory Action Research to provide an opportunity to include them in pre- and post-EWE actions *(e.g. creating a map detailing damage in the community and using it to inform future community rebuilding plans)*
Risk Reduction: Opportunities for Participation
• Participation in disaster preparedness and risk reduction education • Share learned information about EWE with family and neighbours • Encourage the creation of emergency plans at home and within their families • Pre-EWE training to outline child and adolescent role during EWE • Engage them in risk mapping activities (*e.g. creating a map of the community whereby they identify the riskiest places like rivers during flooding. Embed in planning and disaster education)* • Progress community environmental monitoring and assessment *(e.g. child or adolescent in monitors the area on their walk home and reports potential risks)* • Consult children and adolescent during disaster planning and embed responses into policy and guidelines
Crisis Management: Opportunities for Participation
• They act as messengers between families and within the community *(i.e. can go between neighbours to determine who needs help or give messages about ongoing threats)* • Contribute to rebuilding and clean-up of the community with age-appropriate purposeful tasks *(e.g. caring for younger children to reduce parental stress, engaging children and adolescents in conversations about rebuilding lost infrastructure, and sweeping or other clean up tasks)* • Post-EWE risk mapping activities *(e.g. can be used to determine damage especially if community is spread out they can report damage in their neighbourhoods and maps can be used to discuss recovery)* • Environmental monitoring and assessment for ongoing threats • Participation in and contribution to local and religious ceremonies *(e.g. celebration of life, culturally significant days etc.)* • Create art or projects to commemorate what was lost *(e.g. murals, videos, and plays)*

One of the main arguments for promoting a community-based response was to limit the dependency upon and influence of non-local-NGOs and international aid. In the crisis management phase specifically, the articles highlighted an immediate influx of international aid and NGO presence (n = 8). This phenomenon was demonstrated following disasters in Haiti, China, Sri Lanka, Pakistan, and Nepal and while none of the African articles observed this, it is likely still applicable. The appropriateness and ethics of non-local interventions were questioned by all eight articles, especially when considering the effects on child and adolescent mental health and wellbeing. Akhter et. al. (2015) [52] presented an example from cyclone-affected Bangladesh, where an unintentional impact of an internationally funded intervention was parents marrying off young children to create families eligible for additional financial aid disbursement. The potential for unwanted secondary impacts that cause harm should be thoroughly investigated prior to implementation, with consideration of how the intervention will interact with existing social practices within communities. In another example, a group of international psychologically trained researchers entered a Sri Lankan community and abruptly departed, leaving children and adolescents to process complex emotions that arose during the unfinished intervention [57]. When considering interventions that

involve children and adolescents, ethical approval should be rigorous, sought from the community, and guarantee consistent follow-up. There was evidence of thoughtful approaches for utilising non-local NGOs and international aid, however, and that was dependent on if interventions were created based on local research, trained local community members, and formed a coalition between the organisation and the community [57, 66, 67, 73].

According to the literature, teachers maintained a trusted position in the lives of children and adolescents and were an essential resource to consider in creating community-based adaptation strategies. Eleven of the reviewed articles recommended training teachers in basic psychological response techniques either prior to, or immediately following, EWE. They were also encouraged to monitor for secondary stressors like safety and access to necessities [54, 74, 75]. While training teachers is beneficial for a community-based response, their workload, specifically in LMICs, needed to be considered. Adding an additional responsibility to their job may not be feasible or lead to bitterness and decreased commitment to the response. It was also recommended that teachers were supported by school-based counsellors trained in more complex response techniques and employed in the schools prior to an EWE [54, 60, 74, 76, 77]. Again, this, may not be feasible in many communities in LMICs due to lack of resources, staff shortages, and minimal funding.

3.7 Considering contextual and cultural nuances

Child and adolescent mental health and wellbeing is interwoven with the experience of religion, culture, and other community rituals. Therefore, an essential consideration in adaptation strategies in LMICs was ensuring that interventions were culturally and contextually relevant (n = 29). In one of the reviewed articles, Newnham et al. (2020) [70] stated that mental health, even in non-western countries, was becoming more globalised and, generally, the presentation of symptoms was more similar than different. This was attributed to increased global connection, media, and language sharing [70]. However, many outcomes are still based on westernised diagnoses, and likely miss the subtleties in language or symptom presentation. For example, Felix et al. (2015) [45] identified "ataques de nervios", a Latin American specific outcome that presents like panic attacks but was not validated or diagnosable with the tools currently available [45].

The creation of contextually relevant adaptation strategies primarily included validating and creating child and adolescent, community-specific psychological tools (n = 15). Baggerly (2007) [57] stated that the application of rapid, effective, and inclusive screening, diagnostic, and treatment methods were dependent on their confirmed appropriateness in the community prior to EWE. However, in the reviewed literature a lack of contextually validated tools was consistently identified as a gap and opportunity for future research (Appendix 2.3). Of those that were utilised, they primarily evaluated PTSD or PTSS (n= 9), and, therefore, further prioritisation of child and adolescent-specific diagnoses and tools should remain a priority. Additionally, risk reduction measures should outline appropriate therapy methods and guidelines to implement post-EWE. In the reviewed articles, trauma-focused therapy was widely recommended for addressing PTSD and PTSS [40, 41, 60, 65, 66, 78, 79]. To ensure cultural relevancy, interventions that considered collaboration with trusted traditional healers may also be effective in some communities [55]. For the implementation of interventions or psychological tools to be successful, it is of the utmost importance that their appropriateness is continually monitored and evaluated.

The literature suggested utilising a return to cultural, religious, or community traditions during the response and recovery phase to re-establish connectedness and express and normalise emotions [72, 73]. For example, in China Niu et al (2021) [72], recognised that the connection to Buddha was a protective factor, allowing children and adolescents to justify and heal from the occurrence of an earthquake [72]. Likewise, nine articles identified cultural traditions and religion as resilience-enablers. However, these

were mainly identified in Asian contexts, Haiti, and international sources. In communities where diversity in culture and religion exists, relying on these connections as resilience-enablers requires more research to avoid the exclusion of children or adolescents that possess different beliefs from their peers. Emphasising community-wide participation in pre-EWE traditions and values was necessary for connectedness and emotional expression [65, 67, 73, 80, 81]. One hundred days after an earthquake in China, a ceremony was held to remember all that was lost. Ultimately, this helped children and adolescents mourn with their community and move past the event [73]. Ceremonies like this are likely relevant in other LMICs, however, the type of ritual or ceremony needs to be symbolic and representative of pre-EWE life. Finally, encouraging appropriate ceremonies for the lost or dead restored connectedness to social networks and allowed children and adolescents to process their grief [65, 67, 69, 73, 75, 81]. Local adaptation strategies could, therefore, consider relevant ways to contribute or host these ceremonies.

3.8 Promoting safety

The occurrence of EWE threatened child and adolescent safety physically, socially (e.g. loss of family members or peers) and environmentally (e.g. destruction in natural and built environments). In previous disaster research, Hobfoll et al. (2007) [88] stated that ongoing threats of disaster disrupted child, adolescent, and caregiver sense of safety, contributing to poor mental health outcomes and developmental delays. Therefore, one of the proposed principles considered in disaster interventions was to promote a sense of safety [88]. The reviewed articles were consistent with this research and identified the promotion of safety as a necessary theme for adaptation measures as well (n = 29). The main measures that contributed to the promotion of child and adolescent safety within families, communities, and schools are included in Table 1.

It was apparent that children and adolescents who were educable and educated tended to be more resilient (n=8). This was attributed to utilising pre-EWE provided tools and knowledge to promote their safety during an event [42, 46, 47, 52, 59, 71, 73, 87]. As such, articles that discussed school preparedness measures recommended some form of, disaster and risk reduction education [15, 46, 52, 54, 60, 72]. Curricula in the suggested programs included creating and teaching appropriate emergency procedures (n = 6), practicing emergency drills (n = 4), and providing children and adolescents with transparent information about EWE (n = 3). These programmes were also recommended for community disaster and risk reduction education [52, 53]. However, the value of multi-centred interventions, based in schools and communities, was not illuminated in this review. These would be an important consideration in the future as they are inclusive of children and adolescents not in school and contribute to coordinated emergency plans among families. Disaster and risk reduction education was recommended within a range of countries, indicating that curricula could be adapted to varying contexts. Similarly, there were opportunities to teach country-specific tools that addressed unique risks. For example, in the Sub-Saharan Africa region, Bhebhe et al. (2019) [58] highlighted an opportunity to teach water purification and treatment formulas, hygienic food preparation, and sanitation practices to be utilised after flooding events.

There were additional considerations for promoting safety in community measures, mainly through the creation of emergency planning and procedures. A quick, local response was more likely to produce safer post-EWE environments for children and adolescents, which overlapped with the themes of a bottom-up approach and rapid interventions. To achieve this, planning in the risk reduction phase was essential and ultimately enhanced the services delivered in the crisis management phase [52, 53, 58]. Bartlett (2008) [53] proposed prioritising child and adolescent safety in these plans by conducting impact assessments that recognised their unique risk. While this was an international document, conducting impact assessments is also feasible in LMICs. Other recommendations included the creation of risk communication and early warning systems in planning measures [15, 39, 58]. Accurate warning systems allowed for

immediate reaction to EWE and enabled the implementation of practiced emergency procedures, increasing the likelihood of maintaining safety. A final consideration for community and family plans was the preparation of emergency kits (one at home and knowledge of one at school) [39, 58, 60]. While not discussed by many articles, these kits spared children and adolescents the stress of acquisition of some resources (e.g. medical kits, food, and water) in the short term and acquisition of important documents in the long term (e.g. identity documents and birth certificates) [39, 58, 60]. The practicality of creating emergency kits in LMICs where access to and storing extra resources (e.g. medical kits, food, and water) may not be possible requires further investigation. Finally, promoting child and adolescent safety included evaluating the structural safety and environmental risks surrounding healthcare facilities, schools, and essential community buildings [15, 46, 58]. Minimising the identified risks during preparedness created more resilient infrastructure and increased the likelihood of continued function after an EWE. For LMICs, these measures would likely be less costly than rebuilding damaged infrastructure. The literature demonstrated minimal consideration of recovering damaged or lost infrastructure post-EWE indicative of the potential financial constraints of LMICs. Research including an economic impact assessment of the potential recovery costs versus retrofitting buildings pre-EWE would be beneficial. It would also help determine which infrastructure, if any, should be prioritised and at what point in the preparedness, response, and recovery phases.

The articles demonstrated that safety promotion in the crisis management phase was aligned with the proposed measures in rapid interventions. Therefore, post-EWE 15 articles broadly identified the urgency of promoting child and adolescent safety, which could be achieved by providing safe spaces where children and adolescents were supported and fulfilled their right to play [40, 53, 54, 59, 68, 81, 86]. This intervention was mainly proposed in international literature, though, and the applicability in LMICs was not discussed.

3.9 Implementing rapid interventions

Nineteen of the included articles highlighted the importance of immediate EWE response through the implementation of rapid interventions. Their success depended on strategies and plans created in the risk reduction phase and overlapped considerably with the identified themes of promoting safety, community-based responses, addressing social determinants, connectedness, and strengthening the national mental health system. The main goals that deploying rapid interventions attempted to achieve are included in Table 1. One of the most important considerations following an event was the provision of necessities to families. After conducting a needs assessment, communities maintained the duty of determining the best methods for providing food, water, shelter, and proper sanitary measures to the population [57, 77]. The technical considerations outlining responsibility, funding, implementation, and evaluation were not included in the recommendations and are likely based on the capacity of the community.

Another necessary goal of rapid interventions was to return children and adolescents to pre-EWE status and routines, as maintaining consistency was a protective factor for child and adolescent mental health [40, 53, 73, 78, 89]. In daily life that included reconnecting with family and peers, resuming play activities, and participating in previous roles assisting around the house (n = 15). The measures that ensured children and adolescents returned to pre-EWE status overlapped significantly with their connectedness to social support networks. Another critical aspect of returning to pre-EWE routines was a prompt return to school (n = 19). It was evident that schools, classroom dynamics, and interactions with peers and teachers were protective for child and adolescent mental health and development. If classrooms were damaged, it was recommended that communities establish temporary spaces that maintained a child-friendly, protective atmosphere while mirroring pre-EWE classroom layout and schedule

as closely as possible [39, 54, 73-75]. Returning to school mainly was discussed in international and Asian articles, indicating that the return to school may be more difficult in other LMICs where children and adolescents may need to drop out to support their families by working or taking care of younger children.

3.10 Normalising and expressing emotions

The proposed child and adolescent mental health specific interventions ultimately aimed to encourage the expression and normalisation of emotions (n = 24). There was an interconnection between the preparedness and response and recovery phases. Those accustomed to expressing their emotions pre-EWE were, in turn, more transparent afterward. In the reviewed articles, however, most measures aimed to confront ongoing stress, fear, and anger occurring in the crisis management phase (n=21). There were fewer articles that considered the normalisation of emotions in pre-EWE status.

Details of the recommended school interventions demonstrated that classrooms provided an ideal environment for expression and normalisation (n = 9). Pre-EWE, the classrooms that fostered an understanding and acceptance of emotions, created resilient children and adolescents [15, 46, 54, 58, 72]. This was attributed to a routine of emotional attention that provided the appropriate vocabulary and coping mechanisms to employ during an EWE while also reducing stigma [65, 71, 76, 84, 92]. The main coping mechanisms taught in classrooms were relaxation and breathing exercises [60, 72, 73, 81, 92]. This was mainly recommended in the Asian context which, again, highlighted the context specificity of interventions. Further research identifying potential applicable coping mechanisms in the African context is needed. In the community, there was an opportunity to implement similar programmes pre-EWE to foster community-wide emotional acceptance and expression and include children or adolescents who are not in school.

In the post-EWE setting, it was apparent that interventions that included play-related activities helped encourage the expression of emotions. Confronting emotions through play-related methods provided valuable practices to decrease stigma, reduce stress, and creatively express feelings. Just as in community connectedness, it was participation in play that contributed most to addressing psychological distress. In the response and recovery phase, articles exemplified encouraging children and adolescents to express what they were feeling through freewriting, poem writing, reading, drawing, sketching, singing, miming, drama, and games [39, 60, 73, 75, 93]. Again, the applicability of play was not documented in the included African articles and was based on interventions employed in the Asian context. While play is generally universal, it would be beneficial to investigate this further. Two other specific interventions that could be applicable in many low-resource communities included a "thermometer feeling diagram" [76, 79] and the "Happy Sad Letter Box" [74]. In the first intervention children and adolescents were able to identify what they were feeling visually, while the second allowed them to anonymously express their feelings and place blame through letters. However, Commers et al (2014) [74] cautioned that in some instances teachers were unable to address the issues brought forth (i.e. domestic abuse, violence, and sexual assault) by the "Happy Sad Letter Box". Variations of these interventions may provide schools with simple yet effective methods to encourage expression that fit within their contexts.

A final intervention for emotional normalisation and expression was psychoeducation for children, adolescents, families, and communities about common psychological symptoms and outcomes. Fourteen articles recommended a form of psychoeducation in the community either through media, conferences, or other community-based events, while three articles recommended psychoeducation in the classroom for children and adolescents [39, 60, 93]. As recognised by Nastasi et. al. (2011) [76], the goals were to provide people with the vocabulary to express how they were feeling while detailing common symptoms displayed after a disaster. The applicability of this tool in LMICs, specifically Sub-Saharan Africa, was not discussed. In this review, the

countries that included psychoeducation in their recommendations were Canada, Turkey, Sri Lanka, China, Pakistan, and with the remaining articles being internationally based (Appendix 2.2). The stigma in other communities or lack of attention to mental health and health-seeking behaviours may render this intervention less effective. Therefore, more research needs to be done to determine what this process looks like and how it can be altered to fit within the context of African countries. This is consistent with other research recommending that psychoeducation was culturally sensitive, regionally specific, and rigorously tested [14].

The main clinical implication discussed throughout the articles was utilising screening methods over diagnostics (n = 24). As mentioned by Rezayat et al. (2020) [83], screening maintained a higher sensitivity increasing the ability to identify symptomatic individuals while also being more cost-effective. Screening methods could be considered in combination with interventions that encouraged the expression of emotions. They provided a primary step in a stepped-wise treatment where symptoms reported in the early phases of expression could be identified [39, 47, 69, 78, 79, 84, 94, 95]. Utilising screening in these interventions would also help avoid unnecessary reprocessing of the event in children and adolescents who may not be prone to developing poor outcomes [78, 84, 94, 95]. Screening methods, again, needed to be validated but were effective methods in the first step of treating child and adolescent symptoms.

The articles provided a limited review of therapy types, and more evidence should be gathered before recommending specific methods. However, investigating Rapid Eye Movement Desensitisation and Reprocessing therapy (EMDR) (n=3) and Cognitive Behavioural Therapy (CBT) (n=6) could be beneficial. A community-based assessment can be conducted to determine their feasibility and applicability in the community by evaluating the number of trained professionals and available resources [66, 68]. This is an especially relevant step in resource scarce LMICs where length and complication of delivery represent barriers to practical therapy introduction.

3.11 Fostering and bolstering connectedness with social support networks

Compared to HICs, LMICs are built on a foundation of collectivism where more value is placed on community good rather than the individual [90]. As such, it is important that adaptation strategies consider children and adolescents from a social-ecological perspective, capturing the importance of social relationships [15, 68, 91]. Forty articles in this review recognised the benefits of bolstering and fostering connectedness with social support networks in adaptation strategies, with 21 explicitly identifying it as a resilience-enabler. Additionally, it was evident that strategies described in the risk reduction phase complemented those in the crisis management phase. This demonstrated that children and adolescents rely on the continuity of relationships throughout the experience of EWE.

The importance of bolstering child and adolescent peer connections that, in turn, promoted mental health was identified by thirty articles. During the risk reduction phase, participating in peer interactions particularly within schools allowed children and adolescents to feel supported and simultaneously develop empathy for others, increasing their resilience [46, 54, 58, 72]. After an EWE, returning to these friendships added a protective element for mental health as it provided them with a sense of pre-EWE status and camaraderie. The fulfilment of a child or adolescent's right to play was one of the primary considerations that encouraged connection both pre- and post-EWE (n = 13). Play-related activities, however, were more frequently identified in the crisis management phase. The lack of inclusion in risk reduction was likely because of an assumption that children and adolescents were naturally participating in play. Different activities were recommended throughout the articles to establish connectedness, including arts and crafts (i.e. drawing, painting, and pottery) (n = 7), games (n = 4), sport and physical activity (n = 3), and music and singing (n = 2). Interestingly, play interventions were mostly identified within an Asian or international context, and very few articles from Africa considered play. Investigating appropriate activities in these settings would be recommended. Lastly,

peer group therapy provided an opportunity to encourage connectedness and normalise the expression of emotions in the group [47, 57, 66, 78]. Connectedness in therapy validated the feelings of children and adolescents while showing them that they were not alone in what they were experiencing.

Twenty-nine articles considered the connectedness to family, where parents and caregivers maintained a key role in family recovery and psychological outcomes [44, 45, 89]. Pre-EWE six articles recommended prioritising family connectedness [46, 54, 59, 70, 84, 86]. The main strategy considered was the opportunity for children or adolescents to share disaster and risk reduction education information with families [52, 54, 58, 60]. Families then created coordinated responses which facilitated a faster reunification post-EWE and promoted child and adolescent safety [46, 52, 58]. Prioritising a rapid reunification with family members through tracing services and accurate dead body identification were key factors in the crisis management phase [39, 59, 65, 68, 76]. It was important that children and adolescents knew where family members were for reunification purposes or to begin the grieving process. The specifics for implementing adequate tracing services or dead body identification were not well defined in LMICs, and these considerations were mostly suggested from an international perspective. The articles also demonstrated the post-EWE importance of family and parental therapy (n = 10). The psychological state of parents or caregivers greatly influenced children and adolescents and, therefore, needed to be equally considered in interventions [41, 45, 67, 70, 71, 78]. Pfefferbaum et al. (2019) [78] further noted that when parents were involved in therapy, they recognised symptoms in their child or adolescent with greater frequency. Ultimately, they were the people that had the most success in responding to psychological distress [44, 89]. The stigma in LMICs especially among older generations may be a barrier in parental participation in therapy.

Similarly, promoting trusting teacher-student relationships was, again, identified as an important strategy that led to more emotional expression in the classroom. The community-based theme examined the importance of considering them an essential adaptation resource. The reviewed articles also presented examples for connecting school and home by promoting relationships between teachers and parents (n = 10). These relationships were utilised in the crisis management for a multifaceted approach addressing psychological outcomes [40, 54, 55, 77, 91]. The actual applicability of this may be difficult in the LMICs context due to caregivers working long hours, too few teachers with not enough hours to meet parents, long commutes to schools, and families with many children who may not be able to meet with each teacher.

Lastly, five articles considered child and adolescent connectedness to the community. The goal of community connectedness mainly was to establish a sense of place and belonging [81]. Child and adolescent participation in climate strategies provided an opportunity to enhance feelings of belonging as an equal community member. Table 2 provides participation opportunities that contribute to their connectedness with the community. It was also imperative to consider opportunities for orphaned or isolated children to participate in activities and develop new social support networks [41, 54, 68, 71, 81]. They are a particularly vulnerable population that require explicit mention in adaptation measures.

3.12 Technical considerations

Technical considerations of interventions like whose responsibility they were, financial stipulations, and evaluation and reimplementation were limited in this review. Many articles indicated the importance of a community-based approach, but the feasibility and responsibility of maintaining, evaluating, and reimplementing these strategies and interventions were not outlined. Economically, there was little consideration of the costs for providing child and adolescent mental health treatments following EWE. Child and adolescent mental health policies and resources are underfunded or non-existent in many LMICs [96]. It is essential to immediately invest in

and improve these resources with considerations for EWE to increase resilience and improve general mental health outcomes. Country-specific cost-benefit analyses assessing the financial impact of mental health strategies are needed in the future. In previous literature, Hayes and Poland (2018) [6] also demonstrated the importance of considering mental health indicators in health impact assessments. It can be assumed that developing child and adolescent mental health indicators are also important and another concept not reflected in this review. Therefore, the eight identified themes provided the guidance for including mental health in adaptation strategies, but their appearance in specific communities and countries require the technical research to be successful.

3.13 Resilience

Resilience is innately intertwined with child and adolescent capacity to display positive mental health outcomes while reducing negative ones and should be a main component of planning adaptation strategies. The recognition of child and adolescent resilience was included in half of the articles (n=26), and nine were tangentially related through the mention of coping mechanisms that mirrored resilience-enablers. A summary of the identified resilience-enablers is depicted in Table 3. By maintaining a resilience approach to adaptation strategies children and adolescents are provided with tools to handle an array of adversities, likely leading to generally more successful future societies. As children and adolescents in LMICs tend to face more challenges than those in HICs, promoting their resilience regardless of EWE occurrence is beneficial.

Table 3. Themes identified in the review that address child and adolescent resilience.

Themes Identified in Resilience	
External resilience-enablers	*Internal resilience-enablers*
• Connectedness to family, peers, and community • Meaningful contributions to the community (*e.g. active role in preparedness, response, and recovery efforts)* • Having access to and the ability to acquire necessary resources (*Intertwined with socioeconomic status)* • Participating in cultural rituals, ceremonies, and religious traditions *(Continuity of pre-EWE values and beliefs post-EWE)* • Highly involved, local, and trusted leaders *(e.g. politics and political will)* • The resilience of the community as a whole *(The capacity to react and overcome)* • Frequency and severity of EWE • Creation of EWE preparedness plans and emergency guidelines • Social constructions of gender and race *(The structure of the social environment disadvantaging certain groups)*	• Physical condition and health • Possessing problem-solving skills *(Also referred to as competence)* • Hope, gratefulness, and positivity for the future • Self-efficacy and responsibility • Positive discipline • General personality traits like care for others, even-tempered, getting along with others, listening well, expressing thoughts. • Correct behavioural standards *(a sense of what is right and wrong, and integrity)* • Capacity to cope and generate positive emotions • Having an education and being educable

4. Study Limitations and Future Research

Although this review provided valuable themes to consider for disaster preparedness, response, and recovery, it does not explicitly focus on disasters related to climate change and maintains a broad, general LMICs perspective. It would be valuable for future studies to focus on one country or, even more specifically, a single vulnerable community providing the opportunity for a comprehensive evaluation of strategies to increase their effectiveness. Similarly, the main limitation of this review is that it only included literature published in English due to language constraints of the reviewers. In most LMICs English is not the primary national language, and important country-specific

records were likely missed. Performing a specified review with a breadth of language inclusion may illuminate valuable documents for detailed adaptation guidelines.

Next, the inclusion of all natural disasters, not just EWE, contributed to this scoping review's broad and thematic approach. While the lessons from sudden onset, or sub-acute, disasters applied to floods, fires, and storms, they were potentially less relevant for acute EWE like droughts and heatwaves. These types of events are longer lasting and do not tend to cause the immediate physical destruction of sub-acute events. The impacts of these events and their association to mental health outcomes may, therefore, be more longer-term and require different strategy approaches. Future research investigating only EWE and further limiting literature to only acute events will potentially highlight different intervention techniques to consider.

Based on the existing research, this review also minimally differentiated between strategies specific to childhood and adolescence. Future studies would benefit from focusing on these two life stages as different entities possessing unique needs. While immediate action will likely benefit both groups, more refinement can illuminate and address the subtle variations.

Other gaps identified previously were global mitigation strategies including child and adolescent mental health, technical considerations, contextual and culturally-based mental health understandings, and the inclusion of wellbeing or positive outcomes in interventions. It is imperative to consider the nuances of EWE and all the potential impacted pathways in daily life to progress the creation of inclusive climate strategies.

5. Conclusions

The findings of this scoping review provided a broad narrative of eight important themes to incorporate in resilience planning to protect and promote child and adolescent mental health following exposures to EWE. Overarchingly, developing strategies within a social-ecological framework is beneficial for child and adolescent mental health. As it emphasised specific considerations for relationships, social inequities, and cultural and contextual traditions while providing the opportunity for a bottom-up approach. Simultaneously, addressing the mental health treatment gaps in LMICs, with specific regard to children and adolescents, though the general strengthening of national mental health systems contributed to providing the appropriate staff, resources, and clinic space for implementing rapid mental health interventions following an EWE. Additionally, one of the main, broad goals of preparedness and response strategies should be the promotion of child and adolescent safety. Safety played a role in predicting subsequent mental health outcomes. Finally, the expression and normalisation of emotions should be considered in interventions to address child and adolescent mental health outcomes directly. Further considerations should be given to the impacts of global mitigation, developing preparedness strategies, technical intervention details, evaluation of interventions, and the active participation of children and adolescents. While many LMICs currently lack mental health and even child and adolescent inclusion in adaptation strategies, this review can provide appropriate guidance for future policymaking and adaptation planning discussions. Given the emerging information demonstrating the associations between EWE and child and adolescent mental health, LMICs urgently need to include the identified themes to protect the future populations and communities.

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PART C: APPENDICES

Appendix 1.1 Search terms and proposed PubMed search strategy.

Population:		
#1	MeSH Terms:	Infant OR Child OR Adolescent
#2	Text Word:	adolescent OR adolescents OR adolescence OR babies OR baby OR boy OR boys OR child OR children OR family OR families OR girl OR girls OR infant OR infants OR neonate OR neonates OR newborn OR pediatric OR paediatric OR prenatal OR teen OR teenager OR teenagers OR teens OR toddler OR toddlers OR youth OR youths
#3	**#1 OR #2**	
Issue:		
#4	MeSH Terms:	Weather OR Climatic Processes OR Disasters
#5	Text Word:	Avalanche OR avalanches OR climate change OR cyclone OR cyclones OR cyclonic OR drought OR droughts OR earthquake OR earthquakes OR El Nina OR La Nina OR El Nino OR La Nino OR El Nino-southern oscillation OR extreme cold OR extreme heat OR extreme precipitation OR extreme temperature OR flood OR floods OR flooding OR global warming OR heat wave OR heatwave OR heavy precipitation OR heavy rain OR heavy rainfall OR global warming OR hurricane OR hurricanes OR landslide OR landslides OR mudslide OR mudslides OR natural disasters OR storm OR storms OR tidal wave OR tidal waves OR tornado OR tornadoes OR tsunami OR tsunamis OR volcanic OR volcano OR volcanoes OR wildfires OR weather OR weather-driven

#6	**#4 OR #5**	
Outcome:		
#7	MeSH Terms:	Mental Health OR Mental Disorders OR Adaptation, Psychological
#8	Text Word:	alcohol use OR alcohol abuse OR anxiety OR attachment disorders OR cognition OR cognitive OR coping OR depression OR depressive OR drug use OR drug abuse OR emotion OR emotions OR emotional OR mental OR mood OR phobias OR post-traumatic OR posttraumatic OR PTSD OR psychological OR psychology OR psychosocial OR resilience OR resiliency OR sleep disorders OR substance abuse OR substance use OR temperament OR traumatic OR vulnerability OR vulnerable populations
#9	**#7 OR #8**	
Policy:		
#10	MeSH Terms:	Disaster Planning OR Mental Health Services OR Crisis Intervention OR Risk Management OR Policy OR Guidelines as Topic

		Or Guideline [Publication Type]
#11	Text Word:	adaptation strategy OR adaptation strategies OR adaption strategy OR adaption strategies OR mitigation strategy OR mitigation strategies disaster planning OR disaster management OR disaster recovery OR disaster response OR disaster preparedness OR emergency preparedness OR relief planning OR relief work OR risk communication OR risk management OR risk perception OR policy OR policies OR framework OR guideline OR guidelines OR guide OR recovery plans
#12	**#10 OR #11**	
Filter:		
#13		Low- and middle-income filters [developed from World Bank and the University of North Carolina, Chapel Hill LibGudies [14,75]] English Date 2000-2021
Search Strategy:		
#14	**#3 AND #6 AND #9 AND #13**	

Appendix 2.1. Copy of the actual PubMed search strategy.

"weather"[MeSH Terms] OR "climatic processes"[MeSH Terms] OR "disasters"[MeSH Terms] OR ("avalanche"[Text Word] OR "avalanches"[Text Word] OR "climate change"[Text Word] OR "cyclone"[Text Word] OR "cyclones"[Text Word] OR "cyclonic"[Text Word] OR "drought"[Text Word] OR "droughts"[Text Word] OR "earthquake"[Text Word] OR "earthquakes"[Text Word] OR ("El"[All Fields] **AND** "Nina"[Text Word]) OR "la nina"[Text Word] OR "el nino"[Text Word] OR "la nino"[Text Word] OR "el nino southern oscillation"[Text Word] OR "extreme cold"[Text Word] OR "extreme heat"[Text Word] OR "extreme precipitation"[Text Word] OR "extreme temperature"[Text Word] OR "flood"[Text Word] OR "floods"[Text Word] OR "flooding"[Text Word] OR "global warming"[Text Word] OR "heat wave"[Text Word] OR "heatwave"[Text Word] OR "heavy precipitation"[Text Word] OR "heavy rain"[Text Word] OR "heavy rainfall"[Text Word] OR "global warming"[Text Word] OR "hurricane"[Text Word] OR "hurricanes"[Text Word] OR "landslide"[Text Word] OR "landslides"[Text Word] OR "mudslide"[Text Word] OR "mudslides"[Text Word] OR "natural disasters"[Text Word] OR "storm"[Text Word] OR "storms"[Text Word] OR "tidal wave"[Text Word] OR "tidal waves"[Text Word] OR "tornado"[Text Word] OR "tornadoes"[Text Word] OR "tsunami"[Text Word] OR "tsunamis"[Text Word] OR "volcanic"[Text Word] OR "volcano"[Text Word] OR "volcanoes"[Text Word] OR "wildfires"[Text Word] OR "weather"[Text Word] OR "weather-driven"[Text Word])) **AND** ("infant"[MeSH Terms] OR "child"[MeSH Terms] OR "adolescent"[MeSH Terms] OR ("adolescent"[Text Word] OR "adolescents"[Text Word] OR "adolescence"[Text Word] OR "babies"[Text Word] OR "baby"[Text Word] OR "boy"[Text Word] OR "boys"[Text Word] OR "child"[Text Word] OR "children"[Text Word] OR "girl"[Text Word] OR "girls"[Text Word] OR "infant"[Text Word] OR "infants"[Text Word] OR "neonate"[Text Word] OR "neonates"[Text Word] OR "newborn"[Text Word] OR "pediatric"[Text Word] OR "paediatric"[Text Word] OR "prenatal"[Text Word] OR "teen"[Text Word] OR "teenager"[Text Word] OR "teenagers"[Text Word] OR "teens"[Text Word] OR "toddler"[Text Word] OR "toddlers"[Text Word] OR "youth"[Text Word] OR "youths"[Text Word])) **AND** ("mental health"[MeSH Terms] OR "mental disorders"[MeSH Terms] OR "adaptation, psychological"[MeSH Terms] OR ("alcohol use"[Text Word] OR "alcohol abuse"[Text Word] OR "anxiety"[Text Word] OR "attachment disorders"[Text Word] OR "cognition"[Text Word] OR "cognitive"[Text Word] OR "coping"[Text Word] OR "depression"[Text Word] OR "depressive"[Text Word] OR "drug use"[Text Word] OR "drug abuse"[Text Word] OR "emotion"[Text Word] OR "emotions"[Text Word] OR "emotional"[Text Word] OR "mental"[Text Word] OR "mood"[Text Word] OR "phobias"[Text Word] OR "post-traumatic"[Text Word] OR "posttraumatic"[Text Word] OR "PTSD"[Text Word] OR "psychological"[Text Word] OR "psychology"[Text Word] OR "psychosocial"[Text Word] OR "resilience"[Text Word] OR "resiliency"[Text Word] OR "sleep disorders"[Text Word] OR "substance abuse"[Text Word] OR "substance use"[Text Word] OR "temperament"[Text Word] OR "traumatic"[Text Word] OR "vulnerability"[Text Word] OR "vulnerable populations"[Text Word])) **AND** ("disaster planning"[MeSH Terms] OR "health services needs and demand"[MeSH Terms] OR "risk management"[MeSH Terms] OR ("adaptation strategy"[Text Word] OR "adaptation strategies"[Text Word] OR "adaption strategy"[Text Word] OR "adaption strategies"[Text Word] OR "disaster planning"[Text Word] OR "disaster management"[Text Word] OR "disaster recovery"[Text Word] OR "disaster response"[Text Word] OR "disaster preparedness"[Text Word] OR "emergency preparedness"[Text Word] OR "relief planning"[Text Word] OR "relief work"[Text Word] OR "risk communication"[Text Word] OR "risk management"[Text Word] OR "risk perception"[Text Word]))

Filtered by Year and LMICs keywords

Appendix 2.2. Charted data of the included article characteristics and description

Title	Authors	Year	Location	Type of publication	Aims/Purpose of Publication	Population	Type of EWE and effects	Type of mental health outcomes discussed	Climate change mentioned
Asiasiga I A'oga ma Nu'u: a child and adolescent post-tsunami intervention based on Indigenous Samoan values	Tamasese, T.K.; Bush, A.; Parsons, T.L.; Sawrey, R.; Waldegrave, C.	Published: 2020 Earthquake/ Tsunami: 2009	Samoa an island nation	Intervention implementation	Identifying a culturally inclusive intervention that considers values of local religious and cultural community.	11 different villages. 1295 child participants	Tsunami: 143 people died, 300 hospitalised, and many lost homes.	*Mental wellness in Fa'aSamoa is 'a state of relational harmony where elements of spiritual mental and physical are in balance'*. Post-traumatic stress, depression, anxiety, and substance abuse. Compromised family functioning	Inferred: "rising number of natural disasters"
Assisting Children Caught in Disasters: Resources and Suggestions for Practitioners	Szente, J.	2016	International (INEE, Save the Children, UNICEF, European Commission)	Broad literature review	To introduce common aspects of disasters and outline potential guidance and resources to help children.	Children (age not specified)	All types of disasters: safety and security compromised. Education interrupted	PTSD, Childhood Traumatic Grief, attachment disorders, behavioural problems, and phobias and panic	No
Children and the Sphere standard on mental and social aspects of health	Morris, J.; van Ommeren, M.; Belfer, M.; Saxena, S.; Saraceno, B.	2007	International (LMIC focus)	Literature Review (review of multiple interventions)	To outline key points in the Sphere handbook and how they are framed in a developing country context.	Children and adolescents (age not specified)	All types of disasters	Depression, anxiety, PTSS, behavioural problems, diminished cognitive functioning, non-clinical somatic and social signs	No
Children's Mental Health Following the Haiti 2010 Earthquake	Blanc, J.; van Balkom, I.	Published: 2019 Earthquake: 2010	Haiti: access to food and clean water limited prior to earthquake. Valued connection between social and non-human world. Institutional weaknesses existence. Violence was common among girls and child labour common.	Country specific response outline	Provide insights into the pre- and post-earthquake situation and the interrelationships of physical and mental health in post-disaster settings.	Prenatal, children and adolescents (ages not specified)	Earthquake: 222000 dead, 6000 injured, more than one million displaced, houses damaged and destroyed, debris in the streets, school damage, cholera epidemic	PTSD, PTSS, depression, emotional distress, and behavioural issues. Broadly, post-traumatic psychiatric disorders and neurophysiological changes and emotional development.	Included in full document, but not in this specific article.
China Earthquake relief: participatory action work with children	Zeng, E.J.; Silverstein, L.B.	Published: 2011 Earthquake: 2008	Sichuan China: West Mountain tent school in what remained of Beichuan High School	Intervention: child participatory action project	To describe a child participatory research action project after an earthquake.	30 children aged 7-15 years old. Five times as many boys as girls	Earthquake. Secondary disasters like landslides, rock fall, and floods. Interruption of transportation, water supply, electricity, and infrastructure. 100,000 lives lost,	PTSD	No

							millions displaced and injured.		
Climate change and urban children: impacts and implications for adaptation in low- and middle-income countries	Bartlett, S.	2008	International (focus on urban poverty)	Broad literature review	Highlight adaptation measures that promote health for children experiencing urban poverty	Urban children in poverty	All EWE	Developmental delays, behavioural disorders, attachment disorders, and anxiety. Schooling affected.	Yes. Adaptation urgently required
Climate Change, Conflict, and Children	Akresh, R.	2016	International (mentions LMICS)	Broad Literature Review	Reviews the evidence that potentially links climate change to conflict and the ensuing impacts on children.	Children exposed to conflict (no age specified).	Climate variability increases the risk of conflict. Extreme temperatures increase the risk of intergroup conflict. Lower incomes because of weather shocks in the growing season may be the link	Developmental delays, depression, "psychological wellbeing", emotional distress, and behavioural issues. Schooling affected	Yes. Relationship between violence and changing climate
Cognitive-Behavioural Intervention for young Tsunami Victims	Pityaratstian, N.; Liamwanich, K.; Ngamsamut, N.; Narkpongphun, A.; Chinajitphant, N.; Burapakajornpong, N.; et al.	Published: 2007 Tsunami: 2004	Thailand	Intervention implementation	Evaluate the efficacy of a cognitive-behavioural intervention and its ability to prevent stress symptoms while encouraging spontaneous recovery.	160 children aged 9-15	Tsunami. 230,000 lost lives and 430,000 destroyed homes. Children haunted by the memory of the tsunami, losing family members, and destroyed houses.	PTSS and PTSD	Not mentioned.
Developing a resilience intervention approach for adolescents living with natural hazards risks: A pilot randomised control trial	Niu, Y.; Jiang, X.; Ashong, Z.; Hou, J.; Bai, Y.; Bai, G..; Xu, J.; Ren, W., Geng, G.	Published: 2021 Earthquake: 2010	Yushu in the People's Republic of China. People were Tibetan and had a supernatural understanding of disasters	Pilot RCT of intervention	To develop and implement a resilience intervention among Yushu adolescent survivors and then understand the primary effects on psychosocial wellgeing and resilience	Tibetan adolescents, teachers, and experts. Late adolescents 7-19 who experienced the earthquake. 45 adolescents, 8 local teachers, and 8 experts.	Earthquake	PTSD (intrusion, avoidance, and hyperarousal), anxiety, depression, behavioural issues (aggression), phobias and panic (fear), substance abuse, psychological wellbeing in the future, and social problems. Low school adaptability	Not mentioned.

Domains and Indicators of Resilient Children in Natural Disasters: A systematic Literature Review	Mohammadinia, L.; Ardalan, A.; Khorasani-Zavareh, D.; Ebadi, A.; Malekafzali, H.; Fazel, M.	2018	International: USA, Bulgaria, Japan, France, UN, the Netherlands, Australia, British West Indies, China, Spain, Indonesia, Bangladesh, Zimbabwe, Italy, Canada, Malaysia	Systematic literature review	To determine the criteria and domain of children's resilience in disasters and define their capacity and ability to respond.	Global children under 18	All types of disasters (natural)	Psychological resilience: mental health is a significant contributor to resilience. Factors like cognitive, personality traits and education impact mental health.	Includes articles that mention EWE
Editorial: Global child and mental health-emerging challenges and opportunities	Vostanis, P.	2017	International LMIC focus	Editorial	Recognising the urgency to protect mental health in children and adolescents specifically in LMICs	Global children under 18	All types of disasters	General mental health and resilience (no specific outcomes)	Not mentioned.
EMDR Therapy Humanitarian Trauma Recovery Interventions in Latin America and the Caribbean	Jarero, I.; Artigas, L.; Uribe, S.; Miranda, A.	2014	Latin America: lack of professional resources, few therapists with specific PTSD training	Intervention implementation (Clinical Stories)	Demonstrate the success of EMDR treatment in Latin America and the Caribbean	People that received EMDR therapy after a disaster including children	Natural disasters: floods, hurricanes, earthquakes, and volcano	Mainly PTSD, but it has also been said to be applicable to other clinical complaints	Not mentioned.
Evaluating the Prevalence of PTSD among Children and Adolescents after Earthquakes and Floods: A Systematic Review and Meta-Analysis	Rezayat, A.A.; Sahebdel, s.; Jafari, S.; Kabirian, A.; Rahnejat, A.M.; Farahani, R.H.; Mosaed, R.; Nour, M.G.	2020	International: Armenia, USA, Turkey, Taiwan, Poland, China, Indonesia, Italy, Pakistan, Japan, India, Haiti, Nepal,	Literature Review and Meta-analysis	Aims to evaluate the impact of earthquakes and floods on PTSD prevalence in children and adolescents. While also considering the role of gender.	They defined their population as literature including children and adolescents under the age of 21.	Floods and earthquakes: They were the most destructive because there was no time to protect or evacuate the nearby population	PTSD	Not mentioned.
Facilitating long-term recovery from natural disasters: Psychosocial programming for tsunami-affected schools of Sri Lanka	Nastasi, B.K.; Jayasena, A.; Summerville, M.; Borja, A.P.	Published: 2011 Tsunami: 2004	Sri Lanka. Southern coastal province. Most are Sinhalese	Intervention implementation (qualitative data)	Aims to address whether a psychological well-being curriculum provides children and adolescents with the tools to discuss tsunami-specific and non-tsunami-specific stressors. While also demonstrating coping responses to personal,	15-18 months after the Tsunami they enrolled 120 students from grades 5,7,9 at Vidyalaya W. Fourteen school staff members were responsible for implementing	Tsunami: loss of life, property, and displacement of residents	PTSD	Not mentioned.

					cultural, and contextual stressors.	the program (12 teachers and two administrators).			
Family Functioning Following Wildfires: Recovering from the 2011 Slave Lake Fires	Botey, A.P.; Kulig, J.C.	Published: 2013 Fires: 2011	Slave Lake Alberta Canada. Rural area. Oil, gas, and forestry economy	Qualitative research post-disaster	To document internal family functions and their interactions within the community 4-7 months after the slave lake wildfire.	27 parents (29-48 years) and 26 children (9-12)	Wildfires. Evacuation orders but no injuries or fatalities. Biggest impact was loss of infrastructure like homes, churches, businesses, and the government centre.	PTSS, emotional distress, and behavioural issues. Resilience. The impact of family relationships on psychological well-being.	Wildfires increasing in intensity with climate change.
Family Influences on the Relationship Between Hurricane Exposure and Ataques de Nervios	Felix, E.D.; You, S.; Canino, G.	Published: 2015 Interviews: 1999-2000 Hurricane: 1998	Mostly in Puerto Rico but all Latino survivors	Qualitative research post-disaster	Understanding the characteristics within a family that may be influence the relationship between lifetime experiences of ataques de nervios and the exposure to a hurricane in Puerto Rican children.	One child per household was interviewed and one primary caregiver. Children (50.2%) were ages 4-10 and youth (49.8%) were ages 11-17	Hurricanes cause a disruption to normal life. They are associated with loss of life or property, life threatened, missing family members, and increased stress in the family. The quality of parenting decreases after a hurricane.	Ataques de nervios (attacks of the nerves). Cultural idiom for a reaction to acute or severe distress that is often associated with an actual or threatened loss. Includes emotional expressions like crying, screaming, feeling anguish, anxiety, depression, fear. As well as physical sensations like trembling, chest pain, breathlessness, heart palpitations, headaches, stomach aches, loss of sensation, weakness, convulsion, seizures, and changes in consciousness. Can lead to suicidal ideations. (Ataques de nervios, emotional distress, somatic symptoms, anxiety, phobias and panic, and suicidal ideations)	Not mentioned.
Growing Pains: The Impact of Disaster-Related and Daily Stressors on the Psychological and Psychosocial Functioning of	Fernando, G.A.; Miller, K.E.; Berger, D.E.	Published: 2010 Tsunami: 2004	Eastern Sri Lanka: Collectivistic and traditional culture that is war torn. Families still live in temporary camps. Ampara district one of the regions most affected by the tsunami.	Quantitative research	The aim is to observe the relationship between daily stressors and youth's psychosocial and psychological functioning in disaster-affected countries.	Three groups of students Sinhalese, Tamil, and Muslim. A total of 427 students who were 11-20 years where mean age was 14. Included mostly lower	War and Tsunami: Displacement, damage, and violence	PTSD, depression, anxiety, and psychosocial distress. Stressful social situations and material stress caused or exacerbated by armed conflict. Degree of exposure may be less relevant than living in stressful situations. Living after disasters generates a host of enduring	Not mentioned.

Youth in Sri Lanka						socioeconomic status,		stressful conditions daily life stressors.	
Impact of Extreme Weather Events on Sub-Saharan African Child and Adolescent Mental Health: A Protocol for a Systematic Revie	Rother, H.A.; Etzel, R.A.; Shelton, M.; Paulson, J.A.; Hayward, R.A.; Theron, L.C.	2020	Sub-Saharan Africa: one of the most vulnerable regions to climate change. Diverse culturally, ecologically, and climatically	Systematic literature review: protocol	The aim is to provide insights into both risk and resilience factors for Sub-Saharan African child and adolescent mental health that are exposed to EWE. Ultimately recognising that they need to be addressed by national adaptation plans and included in climate change discussions.	Children and adolescents in Sub-Saharan Africa. Where children are 0-10 and adolescents are 10-19.	All extreme weather events in Sub-Saharan Africa (extreme heat, precipitation changes, rainfall patterns, fires, flooding, droughts, and cyclones). All of them impact food and water security, nutritional status, aeroallergens, incidence of vector-borne diseases, and injuries. Consider displacement, migration, famine, destruction of health and social systems, economic losses, and conflict,	HICs demonstrated: PTSD, anxiety, depression, and behavioural. Direct: impacts to cognitive development, academic performance, and capacity to regulate emotions. Indirect: lack of sleep and disruption to normal life.	Yes.
Impacts of Natural Disasters on Children	Kousky, C.	2016	International	Literature review	To discuss the impacts of disaster on children and adolescents and provide insights on potential policy implications and highlight the gaps	Children and adolescents globally	All sudden onset natural disasters. Global cost ranges from 90 billion to 130 billion. Damage schools and health-care facilities. Destroys household assets. Injury, illnesses, and death. Loss of income.	Psychological wellbeing and PTSD. Some people are more susceptible to developing poor outcomes and may react strongly depending on prior exposure to traumatic events, socioeconomic factors, gender, age, personality traits, relationships, and cognitive skills. Other outcomes include aggression, behavioural difficulties, depression, and general anxiety disorder.	Does mention climate change and states that children in developing countries are most at risk
Improving stress coping and problem-solving skills of children in disaster-prone area through cooperative physical	Nopembri, S.; Sugiyama, Y.; Saryono; Rithaundin, A.	Published: 2019 volcanic eruption: 2010	Indonesia: Near the Merapi volcano	Intervention implementation	To improve problem-solving and coping skills by using holistic relaxation exercises to decrease negative emotions and	15 PE and sports teachers. 810 4th-6th grade students who experienced the volcanic eruption in elementary	Volcanic eruption causing loss of family members, structural loss, and children responses to fear.	Depression, anxiety, stress, behavioural changes, overall emotional distress. The role of coping mechanisms for resilience.	Not mentioned.

education and sports lesson					symptoms, PE, and sports programs.	school. Mean age was 10			
International Interventions and Challenges Following the Crisis of Natural Disasters: Chapter 16	Baggerly, J.	Published: 2007 Tsunami: 2004	North-eastern part of Sri Lanka	Narrative of intervention	To provide a narrative from a therapist that provided play therapy to children in Sri Lanka following a tsunami	Elementary students	Tsunami, but mentions other types of disaster. Mental health professionals must prepare for the devastation of the event regardless of what it is because it likely will lead to displacement, injury, and death.	Depression, phobias and panic, behavioural issues, diminished cognitive functioning, developmental delays, sleep disorders, emotional distress, attachment disorders, PTSD, anxiety, and posttraumatic stress symptoms. Loss of interest in school. Fear and anxiety peaked at 4 months while depression and psychophysical symptoms peaked at 6 months.	Yes, recognises the events will increase and mental health professionals need to prepare
Issues with families and children in a disaster context: A qualitative perspective from rural Bangladesh	Akhter, S.R.; Sarkar, R.K.; Dutta, M.; Khanom, R.; Akter, N.; Chowdhury, Md.R.; Sultan, M.	Published: 2015 Cyclone: 2009	Bangladesh: one of the most disaster-prone countries. Districts were selected based on severity of environmental disaster. Including two costal districts (Bhola and Shatkhira) and one northern district (Kurigram).	Qualitative data collected	The goal was to show behavioural responses pre- and post-disaster of children and their families. Thereby providing indigenous knowledge about adapting to and coping with changed environments	Included parents and teachers of children aged 0-8 years who had experience with natural disaster. 17 participants ages 5-10 were selected for interviews, short scripts, and drawing.	Cyclones and floods destroyed infrastructure and displaced people. Socially caused income shocks and inhibited education.	PTSD, sleep disorders (nightmares, not sleeping alone), attachment disorders (clinginess, dependence, and separation anxiety), behavioural issues, phobias and panic, anxiety, somatic complaints, and social withdrawal. Different age ranges show different symptoms. Impact on education	An understanding the changes are brought about because of climate change
Mental health and psychosocial support after the tsunami in Thailand	Chakrabhand, S.; Panyayong, B.; Sirivech, P.	Published: 2006 Tsunami: 2004	Thailand: six coastal provinces in the South	Overview of mental health response	To provide an overview of how the Thai government and mental health resources were deployed following the tsunami in 2004 to give insights into future response patterns.	The whole Thai population, but emphasis is given to children	Tsunami: 10,000 families and 60,000 people were affected. More than 10,000 injured with a death toll of 5,395 and 3,000 reported missing. 1,000 children orphaned. 22 schools were damaged, and 30,000 students were affected. Finally, 6,000 people moved into temporary shelters.	PSTD, depression, substance abuse, and suicidal ideation	Not mentioned.

A Meta-analysis of Intervention Effects on Depression and/or Anxiety in Youth Exposed to Political Violence or Natural Disasters	Pfefferbaum, B.; Nitiema, P.; Newman, E.	2019	International with LMICs consideration: Palestine, Sri Lanka, Israel, Uganda, USA, China, Lebanon, Nepal, Australia, Gaza, Taiwan, Indonesia, Burundi, Rwanda.	Systematic Review and Meta-analysis	To examine the implementation of youth mass trauma interventions and the impacts on anxiety and depression relative to natural recovery while also considering characteristics like intervention, intervention delivery, context, and population,.	Literature focusing on individuals 18 years old or younger who have been exposed to a trauma or natural disaster.	Mass traumas including war and natural disaster. The natural disasters included hurricane, earthquake, and tsunami where war traumas include terrorism, genocide, and political violence	PTSD, depression, and anxiety. Somatic reactions and emotional distress. Specific phobias, panic disorder, and separation anxiety (attachment disorders)	Not mentioned.
A Natural Response to a Natural Disaster: The Art of Crisis in Nepal	Linton, J.	Published: 2017 Earthquakes : 2015	Nepal: 28 million people live in the countryside and have an economy reliant on agriculture. Strong cultural connection to the earth	Intervention implementation	To describe how an art therapy intervention that specifically uses natural media impacts mental health and its potential use for mental health professionals.	9–13-year-olds in Lalitpur District. 12–14-year-olds	Earthquake: damage to infrastructure.	PTSS, emotional distress, and resilience	Not mentioned.
Post-traumatic stress disorder amongst children aged 8-18 affected by the 2011 northern-Namibia floods	Taukeni, S.; Chitiyo, G.; Asino, I.; Shipena, G.	Published: 2015 Floods: 2011	Namibia: six regions including Kunene, Oshana, Omusati, Ohangwena, Oshikoto, Kavango, and Caprivi.	Quantitative study	To explore the impact of flooding on PTSD outcomes in school children and determine the effectiveness of the response efforts.	Children between the ages of 8-18 who were at least 6 when the floods occurred.	A disruption to delivery of important communication, and sanitation. Floods, earthquakes, droughts, disease epidemics, and wars all disrupt these services. FLOODS and DROUGHTS lead to disease, food shortages, and economic instability. Schools and clinics are disrupted. Towns are inaccessible because road networks are cut off.	PTSD, emotional distress, services like education, health, somatic complains, behavioural issues, anxiety, phobias and panic, and sleep disorders. Depression in older children.	Not mentioned.

Post-traumatic stress disorder in children and adolescents one year after a super-cyclone in Orissa, India: exploring cross-cultural validity and vulnerability factors	Kar, N.; Mohapatra, P.K.; Nayak, K.C.; Pattanaik, P.; Swain,S.P.; Kar, H.C.	Published: 2007 Super Cyclone: 1999	Orissa, India: Sea side Jagatsinghpur was submerged in the seawater and experienced max impact (High exposure area). Two other districts in India included Low exposure area)	quantitative	The purpose was to determine if there was a difference in the prevalence of PTSD depending on the exposure level to disaster. While also clinically evaluating the relevance of child and adolescent PTSD in Indian culture.	447 children and adolescents that were age 7-17. Included 268 participants from HEA (136 female and 132 male). While 179 participants were from LEA (88 female and 91 male).	Super-cyclone high wind speed and large tidal waves. Villages marooned for over two weeks. 10,000 people died and around one billion US dollar of damages were incurred	PTSD predicted by the severity of trauma exposure, being female, parental distress, and the interaction of multiple stressors. Made worse by the experience of previous events. The manifestation of symptoms depends on cultural and societal response to stress, available support, and coping strategies	Not mentioned.
Preparing children for an uncertain future: the role of the early childhood teacher	Ebbeck, M.; Yim, H.Y.B.; Wei, T.	Published: 2019. Earthquake: 2008	Sichuan China	Intervention implementation	Specifically looks at the relationship between early childhood teachers and how they can increase their understanding child experience of natural or man-made disasters	Early childhood teachers for children birth to 8 years old	Can be implemented with earthquakes, tornadoes, hurricanes, volcanoes, severe flooding, wildfires. THIS STUDY FOCUSES ON EARTHQUAKE that killed 70,000 people and caused destruction. Earthquakes occur without warning and there is no time to minimise loss or damage.	PTSS, anxiety disorders, PTSD, sleep disorders, and phobias and panic. Positive expressions of emotions, empathy, overcoming adversity and resilience.	Mentioned that climate change increases frequency and severity of events
Preventing Abuse and Trauma to Internally Displaced Children Living in Camps Due to Disasters in Pakistan	Asad, N.; Karmaliani, R.; Somani, R.; Hirani, S.; Pasha, A.; Hirani, S.; Cassum, L.; McFarlane, j.	Published: 2013 Earthquake: 2008 Flooding: 2010 Monsoon Rains: 2011	Norwest region of Pakistan	Intervention outline	Outline the effects on child and adolescent mental health in displacement camps and possible interventions for protecting it	Children in displacement areas (ages were not specified). In 2011 60% of people in the camps were children and 18% were under 5	Earthquake: hundreds of thousands displaced. Flood: 11 million displaced in the flood and then an additional 4 million displaced in the monsoon rains of 2011. Leading to people living in camps where abuse, neglect, and access to basic assistance and resources are difficult. High rates	Developmental delays, sleep disorders, depression (helplessness).	Not mentioned.

							of communicable diseases.		
Psychoeducation for Children and Adults after the Marmara Earthquake: an Evaluation Study	Sahin, N.H.; Yilmaz, B.; Batigun, A.	Published: 2011 Earthquake: 1999	Marmara region of Turkey	Quantitative evaluation of intervention	To evaluate the effectiveness of psycho-education seminars the were deployed after an earthquake in six schools	The seminars reached 5300 children and 1280 parents. In this study the participants 463 parents (137 who were in the seminar and 326 who were not) and 774 students (593 in the seminars and 181 not in the seminars)	Earthquake (does not detail the effects)	Recurring images, thoughts, and dreams including smells and sounds. As a result of recurrence, they feel as if "they are going out of their minds" (emotional distress and PTSS). Phobias, panic, and anxiety related to a lack of information or false assumptions.	Not mentioned.
Psychosocial support in disaster-affected communities	Rao, K.	Published: 2006	International	Overview of mental health response	Provides a generalised overview of potential psychosocial care techniques implemented in different phases.	All people affected by disaster and best practices for addressing their needs. Emphasising children as a vulnerable group.	all-natural disaster	PTSD, depression, psychosomatic disorder, prolonged grief, substance abuse and attachment disorders.	Not mentioned.
Reflections on "building back better" cihld and Adolescent Mental Health Care in a Low-Resource Postemergency Setting: The Case of Sierra Leone	Yoder, H.	Published: 2019 Landlside: 2017	Sierra Leone. One outpatient mental health clinic for child and adolescent care in Freetown.	Overview of mental health system in Sierra Leone	Analyses the "building back better" campaign in Sierra Leone from a dissemination and implementation perspective to understand how to strengthen the development of child and adolescent mental health systems	Mental health system with specific recognition and attention for the importance of including children and adolescents	Armed conflict and Ebola Virus. Mudslide in 2017: Flooded rivers and exacerbated existing flooding issues in Freetown. 1141 declared dead or missing.	PTSS including regressive behaviour, changes in play, acting out, shame. Outcomes like: PTSD, depression, anxiety	Not mentioned.
Social and Clinical Interventions After Conflict or Other Large Disaster	van Ommeren, M.; Morris, J. Saxena, S.	Published: 2008	International with focus on LMICs	Commentary on the US Task Force findings	To evaluate the applicability of mental health response in LMICS for children and adolescents based on the recommendations by	Children in LMICs specific age not identified	All types of disasters	Mainly PTSD. Task force recognises that there are other psychological considerations though like prolonged grief, depression, substance use problems, and behavioural problems	Not mentioned.

					the US Task Force on Community Preventative Services				
Strategic approaches for developing a culture of safety management in schools: Indications from literature studies	Bhebhe, s.; Runhare, T., Monobe, R.J.	Published: 2019	Africa	Broad literature review	To outline how disaster management and preparedness can be incorporated into schools in Africa to prepare for disaster.	Children in school, families, and teachers	All EWE prevented children from attending school. Floods in Africa have affected a total of 4.5 million people caused 700 deaths and 500 million dollars in damage. Disruption to education is one of the largest impacts.	PTSS, anxiety, and emotional distress. Resilience. Missing class and dropping out of school completely (education affected)	Yes included.
Structure of the Children's revised Impact of Event Scale (CRIES) with Children and Adolescents Exposed to Debris Flood	Chen, Z.; Zhang, Y.; Liu, Z.; Liu, Y.; Dyregrov, A.	Published: 2012 Landslide: 2010	China	Quantitative	The purpose of this article was to examine the validity of the psychometric properties of the 13 item CRIES among Chinese debris-flow victims.	268 participants were selected with 145 being girls and 123 being boys. They were between the ages of 8-18.	A large-scale debris flow (landslide) that caused extensive damage to residential, industrial, and public infrastructure. 1463 deaths 302 missing 2244 injured and 26543 houses affected.	PTSD documented in Western and Asian countries.	Not mentioned.
Toward best-practice post-disaster mental health promotion for children: Sri Lanka	Commers, M.J.; Morival, M.; Devries, M.W.	Published: 2012 Tsunami: 2004	Sri Lanka: Rural schools that possess few or no communication capacities	Intervention implementation	An evaluation conducted by Plan Sri Lanka utilising a Happy/Sad Letter Box Project to minimize trauma. Also provides a reflection on the implications for best practices.	203 people completed the questionnaire including 120 children, 43 teachers, 17 teacher counsellors and 23 principals.	Tsunami	PTSD. Evidence base for providing interventions addressing PTSD is sparse for children.	Not mentioned.
Tsunami: Psychosocial aspects of Andaman and Nicobar Islands Assessments and intervention in the early phase	Math, S.B.; Girimaji, S.C.; Benegal, V.; Kumar, G.S.U.; Hamza, A.; Nagaraja,D.	Published: 2006 Tsunami in 2005	Andaman and Nicobar Islands of India in the Bay of Bengal. Tribal and nontribal groups.	Intervention implementation with quantitative data	Provides a narrative of the activities and observations made by the National Institute of Mental Health and Neurosciences (NIMHANS) during the islands early disaster response	Children in 10th and 12th year. Children below 15	Tsunami and earthquake. Aftershocks and destruction of important infrastructure like communication, electricity, transportation,	Adjustment disorder, depression, panic disorders PTSD, anxiety disorders, somatic complaints, PTSS, substance abuse, relapse of existing mental health outcomes (schizophrenic episodes)	Not mentioned.

							health facilities, schools, and desalination plants. Lost means of livelihood and land was infertile, and people fled from the islands.		
School-based psychoeducation and storytelling: Associations with long-term mental health in adolescent survivors of the Wenchuan earthquake	Tanaka, E.; Iso, H.; Tsutsumi, A.; Kameoka, S.; You, Y.; Kato, H.	Published: 2019 Earthquake: 2008	Wenchuan China	Quantitative	To determine which factors, promote long-term mental health among adolescent survivors of the 2008 Wenchuan earthquake. Specifically, the associations between mental health and disaster-related storytelling and school-based psychoeducation	2939 students completed the survey of which 1028 of the respondents traumatically experienced the earthquake	Earthquake: left 69227 dead, 37463 injured and 17923 missing. Witnesses to death/injury and home destruction.	PTSD, phobias and panic, depression, and anxiety Long-term psychological distress manifested as somatisation, sleep disorders, and psychotic experiences	Not mentioned.
Measuring adolescent coping styles following a natural disaster an ESEM analysis of Kidcope	Powell, T.M.; Wegmann, K.M.; Overstreet, S.	Published: 2018 Hurricane: 2005	Louisiana, USA	Intervention implementation (quantitative data evaluation)	The purpose was to use a modelling tool (ESEM) to determine the validity of the Kidcope in evaluating child and adolescent coping behaviours in a hurricane-affected area.	652 adolescent females in a New Orleans all-girls private school that were aged 13-18 who Predominantly white and a higher SES status	Hurricane Katrina: 1500 deaths, 875 schools damaged, families displaced, property damage, and economic costs above 200 billion dollars. Led to flooding, storm surges, and high winds	PTSD, depression, and anxiety.	Not mentioned.
Posttraumatic Stress Symptom Trajectories Among Children After Disaster Exposure: A Review	Lai, B.S.; Lewis, R.; Livings, M.S.; La Greca, A.M.; Esnard, M.	Published: 2017	International: China and USA mostly	Literature Review	The purpose was to review the literature available on children's risk and resilience patterns post disaster while identifying factors that predicted trajectories	Elementary school-aged children: 8-11. Secondary school-aged children: 12-16.	Included all types of disasters, but mainly natural. Only one man-made which was the Gulf oil spill. Wenchuan Earthquake, Hurricane Katrina, Sichuan Earthquake, Cyclone Larry,	PTSS: Long term symptoms contribute to poor life outcomes (disrupt education, job attainment, physical health, and mental health)	Inferred: "rising number of natural disasters"

							Hurricane Andrew, Hurricane Gustav		
A Meta-Analysis of Natural Disasters on Internalizing and Externalizing Problems in Youth	Rubens, S.L.; Felix, E.D.; Hambrick, E.P.	Published: 2018	International: organised by continents (most published in Asia and North America none from Africa)	Meta-analysis literature review	The goal was to highlight other mental health outcomes in terms of internalizing versus externalizing as most published literature solely addresses PTSS.	Children and adolescents under the age of 18. Mean age of 13 for internalizing and 10 for externalizing	Natural disasters: blizzard, hurricane/typhoon, earthquake, flood, tornado, tsunami, volcanic eruption, and wildfire (most earthquake and hurricane)	Mostly PTSS. However, there is a range of internalizing and externalizing behaviour problems. Internalizing: depression, anxiety, social phobia, and separation anxiety. Externalizing: disruptive behaviour, aggression, conduct problems, and delinquency	Not mentioned.
Assessment Tools for the Mental Health of School-Aged Children and Adolescents Exposed to Disaster: A Systematic Review (1988-2015)	Lee, M.S.; Bhang, S.Y.	Published: 2018	International	Systematic review	The objective of this article was to evaluate child and adolescent mental health assessment tools for following exposure to disaster. Proposing future mental health evaluation potential in emergency contexts.	School-aged children and adolescents	Type I disasters: natural disasters including earthquakes, hurricanes, tornadoes, tsunamis, cyclones, typhoons, and floods. Type II disasters: man-made like explosions, terrorist attacks, fires, and sinkings	PTSD, behaviour problems, depression, and anxiety	Not mentioned.
Longitudinal Cross-Lagged Relationships Between Posttraumatic Stress Disorder and Depression in Adolescents Following the Yancheng Tornado in China	An, Y.; Huang, J.; Chen, Y.; and Deng, Z.	Published:2019 Tornado: 2016	China: Yancheng City, Jiangsu Province	Quantitative	The aim was to examine the comorbidity and relationship between depression and PTSD over a duration of 12 months.	Adolescent middle schoolers mean age of 14 years old.	Tornado: 99 people died, 800 were injured and houses were collapsed.	Depression and PTSD (the comorbidity of the two)	Not mentioned.
Posttraumatic Stress and Depressive Reactions Among Nicaraguan Adolescents	Goenjian, A.K.; Molina, L.; Steinberg, A.M.; Fairbanks, L.A.; Alvarez, M.L.; Goenjian, H.A.; Pynoos, R.S.	Published: 2001 Hurricane: 1998	Nicaragua: Posoltega (most devastated), Chinandega and Leon (least devastated)	Quantitative	The aim was to determine the severity of posttraumatic stress and depressive reactions among adolescents in Nicaragua after a hurricane. It also	Students from public schools with the mean age of 13 years old	Hurricane: 10,000 people killed, high winds, rainfall causing floods and mudslides, food and crops wiped out, income	PTSS, PTSD, depression	Not mentioned.

After Hurricane Mitch					explored the relationship between the reactions and objective and subjective features.		lowered, damage to infrastructure		
A Three-Tiered Model of School-Based Trauma Services to Address Long-Term Impact of a Major Natural Disaster	D'Amico, P.J.; Carmine, L.; Roderick, H.; DeSilva, M.; Vogel, J.M.	Published: 2017	East Coast of the USA. Rockaway in Queens. Significant social and economic disparities, no adolescent specific services, and limited transportation. 25% people living below poverty level, 12% unemployment rate.	Intervention Implementation review	To outline the implementation of a multi-tiered post-disaster intervention in schools with the collaboration of health systems.	The intervention was aimed at school aged children and adolescents (pre-K-12).	Superstorm Sandy (hurricane): 50 million lives affected, 370,000 evacuated, 3 million without power, 1.1 million students' education disrupted for two weeks. Relocated to schools in Brooklyn and Queens. Unable to receive information. Lack of necessary resources for months.	PTSS, anxiety, depression, substance abuse, and other symptoms impairing functioning	Not mentioned
Will boys' mental health fare worse under a hotter climate in Australia?	Xu, Y.; Wheeler, S.A.; Zuo, A.	Published: 2018	Australia	Quantitative: longitudinal study	The aim of this study was to determine how hotter weather influenced child mental health and how factors like gender, location and SES have an impact on it.	Children aged 6-11	Heatwaves: heart diseases, heat stroke, dehydration, and mortality. Impacts on population and livelihoods.	Internalising and externalising factors.	Yes mentioned. Increase in heatwaves.
Adolescents' perspectives on the psychological effects of natural disasters in China and Nepal	Newnham, E.A.; Gao, X.; Tearne, J.; Guragain, B.; Jiao, F.; Ghimire, L.; Chan, E.YY.; Leaning, J.	Published: 2020	China and Nepal: The Pacific region is significantly disaster-prone. They have a large adolescent population recently exposed to natural disaster, and there is little evidence of mental health provision	Qualitative focus group discussions and key informant interviews	To explore how psychological distress is expressed after exposure to natural disasters in China and Nepal. Also highlights protective factors and PTG.	Adolescents, their parents/caregivers, community leaders, schoolteachers, disaster response tems, and child health experts. The focus was on adolescents aged 13-19.	China: Yunnan Province hit with disaster like earthquakes, floods, landslides, and drought. Earthquake killed 731 and left 1.1 million affected. Nepal: earthquakes and aftershocks leading 8831 dead and 22000 injured. Displacement.	Untreated psychological distress impacts education, relationships, and wellbeing. PTSD: trauma and fear. Understanding the role of karma and self-blame: increases stigma and minimises treatment seeking behaviours. Mind-body connections (cultural implications). Somatisation of symptoms. Expressions of psychological distress defined by thoughts, feelings, and behavioural changes	Not mentioned

Developmental Differences in Children's and Adolescents' Post-Disaster Reactions	Dogan-Ates, A.	Published: 2010	International	Narrative of literature	To describe the post-disaster mental health outcomes and reactions based on developmental age of children and adolescents	pre-schoolers, school-age children, and adolescents	All types of disasters	Preschool: less psychological problems but have more trauma-specific fears and behavioural problems. School-age children: sleep and eating disruption, behavioural problems, and poor school performance. Adolescents: PTSD, depression, anxiety, anger issues, and pessimism surrounding the future	Not mentioned

Appendix 2.3. The charted data of the strategy implications, resilience, participation, and identified gaps and future research.

Title	Authors	Mitigation Strategies	Adaptation strategies or implications for adaptation strategies	Resilience and resilience-enabling mechanisms	Child and adolescent inclusion in policy process	Gaps and/or Further Research
Asiasiga I A'oga ma Nu'u: a child and adolescent post-tsunami intervention based on Indigenous Samoan values	Tamasese, T.K.; Bush, A.; Parsons, T.L.; Sawrey, R.; Waldegrave, C.	None stated	**Vulnerability Risk Assessment:** None **Vulnerabilities Considered:** No children or youth mental health services in Samoa and family functioning compromised. How to promote safety, enhance self and community efficacy, foster calmness, maintain connectedness, and instil hope. **Type of Potential Strategy:** Group-based, community led 3-hour strategy: strengths based, interactive, fun, and appealing to children and families. 3-hour strategy opening with prayer and speeches from village faifeau (minister or priest), messages delivered from previous youth who completed the intervention in a nearby village and then this group would prepare a message for the following community. Physical and vocal exercises to relieve tension and express emotions mixed with familiar Samoan songs and games (e.g. clapping). The 'Tree of Life' connecting them to their sense of self, places of belonging, social support networks, strength and skills. Safety action plans and normalising different emotional experiences **Short- or Long-Term:** short-term immediately following event **Timeline:** Single-session **Mental health outcomes addressed:** PTSS, depression, anxiety, substance abuse, family functioning **Funding:** Not explicit, although seems to be a low cost intervention **Stakeholders:** Tui Atua Tupa Tamasese, The Archbishop Alapti Mataeliga and the Catholic Archdiocese of Samoa, Family Centre, Afeafe o Vaetoefaga, Capital Coast District Health board funding. Community members, families, elders, teachers, students all mentioned **Responsibility:** Community **Other Notes:** Embed indigenous values in post-disaster programmes	Religion and indigenous values. Promoting safety, self-efficacy, maintain connectedness, and instilling hope.	Allowing them to leave messages for the next community	Not being able to evaluate each child and adolescent for outcomes pre- or post-EWE.
Assisting Children Caught in Disasters: Resources and Suggestions for Practitioners	Szente, J.	None stated	**Vulnerability Risk Assessment:** none **Vulnerabilities Considered:** Being in danger, functioning in a dangerous situation, witnessing, or learning about a loss, being separated from parents or support network, fears related to disaster, adjustment difficulties, losing necessities, and interruptions in community-based services. **Type of Potential Strategy:** *Community and Classroom based interventions:* making sure all basic needs of child or adolescent are met. Temporary classrooms (UNICEF school-in-a-box kit and Recreation kit). Play-related activities and engaging them in art and literature as an emotional outlet. Teachers create a culture of caring to provide emotional support. Training community members to be social and emotional responders for children and adolescents as well. *Indicators:* The Children's PTSD Inventory, the Impact of Events Scale, When Bad Things Happen, or the Kauai Recovery Index **Short- or Long-Term:** Short-term **Timeline:** Immediate response between 48-72 hours lays the foundation for the next 6-8 weeks. **Mental health outcomes addressed:** The Post-Impact Phase: exhibiting PTSD symptoms weeks or days after the event. Disruption in cognitive development. Other psychological constructs that are culture specific. **Funding:** General not stated **Stakeholders:** Teachers, local relief agencies, and local/national mental health support systems **Responsibility:** Teachers and communities to consider interventions and disaster preparedness	Protective functions include fulfilment of basic needs (food, water, clothing, or shelter), being surrounded by loved ones, schools, and community-based services	Allowing children to help in the process of rebuilding their school and community helps them process and engage with their feelings at their own pace.	A broad intervention to implement after disaster, but the effects will differ in each place and with each disaster.

			Other Notes: The overall importance of restoring pre-EWE status with a return to school emphasised. Ensuring personal safety by connecting school to home.			
Children and the Sphere standard on mental and social aspects of health	Morris, J.; van Ommeren, M.; Belfer, M.; Saxena, S.; Saraceno, B.	None stated	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *Social Intervention:* 1) ensuring access to credible, reliable, and ongoing information. Like how to care for children's psychological symptoms and where they can get help 2) Cultural and religious events are maintained (reducing aggression by returning to normalcy). 3) Return to school in either a formal or informal way can be done with UNICEF school-in-a-box (establish routine, a peer network, distract a child's mind, is a protective environment, social and emotional cognitive development) 4) Participation in purposeful, concrete, and interest activities which can include emergency relief. (Good for self-esteem and psycho-emotional wellbeing). 5) Activities for separated and orphaned children to facilitate their inclusion in and development of social networks 6) Reunite family members through a tracing service and keeping family members/communities together if they are displaced. *Clinical Psychological Intervention:* 1) Psychological first aid which is non-intrusive emotional support, ensures basic physical needs met, and considerations to minimise further harm. 2) Care for urgent complaints (access to essential medications and drugs). Mental health care should be adopted into primary healthcare and drugs should not be the first option. 3) Previous conditions treated. *Community-based systems for debriefing*: this can include group sessions in school or with the family. **Short- or Long-Term:** Broad interventions that could inform both short- and long-term response **Timeline:** Implementation immediate— to a few months out from disaster **Mental health outcomes addressed:** Resilience, PTSD, anxiety, depression, substance abuse **Funding:** Broad recommendations; does not highlight who is responsible **Stakeholders:** Community, families, schools **Responsibility:** Not specified **Other Notes:** Non-mental health interventions like meeting basic needs contributes ot mental health. Emphasises that most research has been done in the west	Religion; family; social connections; feeling like they are helping their community rebuild; returning to school	Asking children where to relocate schools, water points, religious locations, and sanitation. The benefits of participation are fewer behavioural problems and emotional distress	Future well designed research into each topic. Does not seek other essential interventions that are not presented in the sphere journal.
Children's Mental Health Following the Haiti 2010 Earthquake	Blanc, J.; van Balkom, I.	none mentioned	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** Developed indicators for early detection and interventions. Strengthening mental health system. General improvement of health targets like access to clean water, a sanitation, services that monitor growth and psychomotor development, access to education. Had success with group-therapy (aged 6-13) that was offered once a week for two months. Improving resilience through "art and play workshop" with painting, theatre, games, music, pottery, sport, and socio-educational activities with a free meal. Training of teachers, parents, and the public to respond to trauma and creating a safe and nurturing environment for children (can be done with conferences, education material, and outreach programs via the media (radio, TV, film, CDs)) **Short- or Long-Term:** Both. Responding and creating resilience for future events **Timeline:** Immediate response to event to recovery and resilience for future events **Mental health outcomes addressed:** Mostly PTSD but other psychomotor issues as well **Funding:** Highly dependent on international aid, NGOs, religious institution **Stakeholders:** Government, NGOs, religious institutions, parents, teachers and community **Responsibility:** Same as above, but with heavy presence of NGOs and International aid **Other Notes:** Western psychiatry and psychology is not prioritised and there are not enough mental healthcare professionals. Even further lack of people specialised in child and adolescent mental health.	Social connectedness. A family's commitment to caring for children and community support. Enhancing spiritual beliefs. Sustaining protective and nurturing schools and homes.	not mentioned	Improvement in indicators for development, protection, and child mental health. Considering unique contextual backgrounds (culture, history, family, community, and belief systems

China Earthquake relief: participatory action work with children	Zeng, E.J.; Silverstein, L.B.	none mentioned	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** return to normal routines, resilience, ability to participate, reactions to the earthquake, sustainability of projects **Type of Potential Strategy:** First is *Psychological First Aid School Intervention:* adjusted to fit within culture to help survivors cope. *Phase 1:* Restoring structure and routine (ensuring that the classroom had a similar layout, initiating rules, keeping the same morning routine). *Phase 2:* Developing social group cohesion (Students interacting with each other playdough, handcrafts, bubble blowing, rope jumping, board games, appropriate physical contact, celebration of culture, coping with trauma through their own games) *Phase 3:* Participating in research and action-oriented activity (creating a community map with post-earthquake layout, research on other earthquakes, talking about former schools to inform future schools, expressing feelings and collaboration. One activity was interviewer, journalist, photographer where children act out and "report" on earthquake. *Phase 4:* Community Action (A collective day of mourning 100 days after for cultural relevancy) **Short- or Long-Term:** Short term **Timeline:** Response and Recovery **Mental health outcomes addressed:** PTSD **Funding:** Not stated. But recognises that it probably needs to come from the community **Stakeholders:** Teachers, children, parents, community **Responsibility:** Follow a bottom-up approach should be the responsibility of the community to train teachers and parents and validate the use of psychological first aid **Other Notes:** Avoid external assistance that does not provide an opportunity for community decision or responsibility aka "trauma tourism".	Involving community members and not just seeing them as victims hastens recovery. Screening a DVD in high school stadium (transformed the site of trauma)	Changing the site of trauma through rebuilding. Children and adolescents set their own pace for confronting trauma and connecting with their communities. Re-establishing a sense of place. A bottom-up approach consulting children with an emphasis on mapping, charting, drawings collages, interviews and surveys, puppets, and photography.	Use of non-standardised observations makes comparison across studies difficult
Climate change and urban children: impacts and implications for adaptation in low- and middle-income countries	Bartlett, S.	none mentioned	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Capacity to cope, risks in family and community, age, gender, health, nutrition, sanitation **Type of Potential Strategy:** *Implications for adaptation:* Ensuring optimal health and nutrition (Food aid programmes are relatively ineffective in the long run, local government tackling environmental sanitation issues, community dissemination of information about risks like playing in flood waters. Strengthening family's response and capacity to cope, easing the burden on the family (NGOs building microcredit activities so that loan repayment doesn't compromise food for children; allocate more resources to support mental health; emergency planning considers provision of temporary childcare). Maintaining, restoring, and enhancing the return to daily routines and activities (contact with peers, avoiding schools as shelters, finding them a safe quiet place in shelter to do homework, considering them in activities like paving roads to lessen floods by adding speed bumps). Creating strategies that are inclusive of age and gender. Respecting their capacities and giving them a chance for active involvement ultimately reduces helplessness and anxiety **Short- or Long-Term:** Both **Timeline:** Preparedness, response, and recovery **Mental health outcomes addressed:** More general focus on all health strategies, but states that mental health is a part of health and needs to be considered. Anxiety, PTSD, helplessness. **Funding:** Not stated is general advice for adaptation **Stakeholders:** Community, local government, NGO, national government, international agencies **Responsibility**: It is the responsibility of all to consider adaptation as protection, preparation, relief, and rebuilding **Other Notes:** Children's priorities are different than assumptions made by adults so including them activities represents the full child experience.	Resilience depends on household dynamics, health internal strengths, and levels of social support. Poverty also plays a role. Children that experience approval and success in their lives are more likely to adapt. Schools. Supportive families. Preparedness.	Active members not just victims and they are seen as equals, "not fake " inclusion. Can be involved in reducing long-term risks through environmental monitoring and assessing, child-to-child health approaches, active stewardship. Make information understandable and involve children in monitoring hazards, and risk reduction preparatoins. Response: listening to input and genuine engagement.	None mentioned

					Adapting: giving children a genuine say and embedding responses into planning	
Climate Change, Conflict, and Children	Akresh, R.	not mentioned	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Exposure to violence, safety, gender **Type of Potential Strategy:** There is no evidence for effective policies to best reduce the effects of violence (i.e. Through considerations for foreign aid, refugee support or cash transfers). Also, it is unclear the extent of violence being an issue, it could be related to a mismanagement of resources or poorly run institutions. Reinvestment in children in all aspects of community to reduce the effects of violence especially considering gender, education, and familial/support networks. **Short- or Long-Term:** Long-term minimising the effects of violence **Timeline:** Response and recovery **Mental health outcomes addressed:** gender differences in mental health outcomes, school performance, hopelessness, pessimism, other barriers to fully recovering **Funding:** Not stated **Stakeholders:** Government and international organisations **Responsibility:** From family, to school, to community **Other Notes:** Nothing concrete but links to climate change and an important consideration	none stated	none stated	A lot of gaps on how this is all connected and the policies that need to be put into place
Cognitive-Behavioural Intervention for young Tsunami Victims	Pityaratstian, N.; Liamwanich, K.; Ngamsamut, N.; Narkpongphun, A.; Chinajitphant, N.; Burapakajornpong, N.; Thongphitakwong, W.; Khunchit, W.; Weerapakorn, W.; Rojanapornthip, B.; et al.	not mentioned	**Vulnerability Risk Assessment:** Child Impact of Events Scale 13 (CRIES-13) to assess the post-traumatic stress symptoms across three domains intrusion, avoidance, and arousal **Vulnerabilities Considered:** Developing PTSD and some children being more prone to the symptoms. Return of the memory in intrusive images, nightmare, or repetitive play. Physiological arousal that makes the child more nervous, fearful, and anxious. **Type of Potential Strategy:** *Clinical Intervention Cognitive Behavioural Therapy:* The goal is to ultimately improve functional behaviour by changing thoughts and feelings toward the event. Its focus is on identifying psychological vulnerabilities in the form of cognitive distortion, skill deficits, and maladaptive behaviours and thus modifying them. It should consider cultural specificity like religion, socio-economic, and other cultural backgrounds. Needs to be considered with additional interventions for parents to ensure a thorough sense of stability in the community. Helps children earn genuine self-confidence. **Short- or Long-Term:** Short term **Timeline:** Response **Mental health outcomes addressed:** PTSD **Funding:** Not stated. This was performed by volunteer professionals. **Stakeholders:** Mental health workers **Responsibility:** Mental health workers **Other Notes:** Has only previously been validated in Western contexts. Applicable to Thailand but may not be to other developing nations. Two days of two-hour work including on day one: ice breaking activities, introduction and rules, psychoeducation, progressive muscle relaxation, breathing control, distraction, coping self-statements, imagery, dual attention tasks. Day two: introducing exposure, hierarchy of traumatic reminders, fear thermometer, practice of the techniques, and graded imaginary exposure.	Not explicit but discusses coping skills and creating self-confidence.	none stated	Larger sample size with different backgrounds. CRIES not validated in Thai context.
Developing a resilience intervention	Niu, Y.; Jiang, X.; Ashong, Z.;	none	**Vulnerability Risk Assessment:** Connor-Davidson Resilience Scale (resilience) Mental Health Inventory of Middle School Students (mental health), Multidimensional Multi attributional Causality Scale-Academic Achievement Attribution subscale (causal attributions to academics)	Disaster awareness enhances disaster resilience. Other enablers include a positive	none stated	Qualitative interviews with adolescents and

approach for adolescents living with natural hazards risks: A pilot randomised control trial	Hou, J.; Bai, Y.; Bai, G..; Xu, J.; Ren, W., Geng, G.		Chinese Academic Procrastination Questionnaire (procrastination), Rosenberg Self-Esteem Scale (self-esteem) Coping Style Scale for Middle School Students (coping style) and the Interpersonal Competence Questionnaire (interpersonal skill) **Vulnerabilities Considered:** resilience, coping styles, interpersonal skills, academic performance, previous mental health concerns, PTSD, anxiety **Type of Potential Strategy:** *School-based intervention:* Introduction to resilience (introducing the concept, "get out of trouble game", shift perspective on dilemma, create a goal for improving resilience). Learning competence training (motivation for academic achievement, concentration, time management, test anxiety management). Self-confidence training (strengths, find and appreciate the good in other, play to your strengths). Self-confidence training 2 (look for intrinsic motivation, reflect on the meaning of youth). Stress management (identify stressors, correct improper cognition, solve problems, pour out negative emotions, relaxation work, Buddhist wisdom, make a plan). Interpersonal competence (assertive communication, learn to listen, mutual trust and acceptance, improve the art of making friends, value of social resources, being considerate, empathy, gratefulness). Disaster coping (prevention, self-help, mutual help, normalising response) **Short- or Long-Term:** Long-term **Timeline:** preparedness, response, recovery **Mental health outcomes addressed:** resilience and minimising psychological reactions **Funding:** Not stated **Stakeholders:** Teachers and other volunteers **Responsibility:** teachers **Other Notes:** Importance of Karma and impermanence from religion and understanding how they perceived the earthquake was from Buddha. Integrating daily life resilience with disaster resilience through academic work, group interaction, and skill practice	attitude, self-regulation, competence, connections with support networks, contributions to community, and adjusting to post-earthquake life. Relying on religious and naturalistic explanations. Active participation in earthquake drills. The 7Cs model of resilience (competence, confidence, connection, character, contribution, coping, and control)		teachers after the intervention to explore possible changes that can be made in the intervention mechanism. Longer follow up time
Domains and Indicators of Resilient Children in Natural Disasters: A systematic Literature Review	Mohammadinia, L.; Ardalan, A.; Khorasani-Zavareh, D.; Ebadi, A.; Malekafzali, H.; Fazel, M.	none	**Vulnerability Risk Assessment:** LM-CRID to evaluate children's resilience in disaster **Vulnerabilities Considered:** Specifically emphasises that vulnerability is a more common than resilience **Type of Potential Strategy:** *School-based interventions:* One of the best places to promote resilience through disaster management and enhancing knowledge (emergency drills). Structural safety of schools should also be considered. Local methods to develop and improve education. **Short- or Long-Term:** Long-term **Timeline:** Preparedness **Mental health outcomes addressed:** Enhancement of mental health through resilience. **Funding:** Not stated. This study provides the basic information for more specific future research **Stakeholders:** teachers, children, communities **Responsibility:** Community **Other Notes:** Focuses on the resilience-enabling mechanisms	Education and preparedness build resilience and contributes to safety. *Internally:* Mental health factor (Cognitive, personal characteristics, educable) Spiritual health factor (religious), physical factor (physical health and genetics). *Externally*: socio-behaviour factor (relationships with family and friends, roles in the community, schools, and neighbourhoods, cultural inclusion, social networks, environmental and ecological factors (built and natural). *Most important and to consider during disaster:* Spiritual health and its relationship to calmness, responding with strong cognitive factors, health is directly related to the	Sendai emphasises the importance of participation but does not provide any explanation for the benefits to their resilience. Public participation of children will ultimately enhance their resilience both internally and externally	Future research with quantitative measurements. Designing an appropriate and specific tool for measuring resilience.

				interaction with a person and their community.		
Editorial: Global child and mental health-emerging challenges and opportunities	Vostanis, P.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** In LMICs vulnerabilities for addressing mental health include stigma, limited policy input, low levels of resources, a lack of specialists, and a lack of contextualised and culturally appropriate psychosocial interventions. **Type of Potential Strategy:** *National Policy domains:* Should address child protection, welfare, physical health, and education. All of which ultimately address children's mental health needs. Incorporating mental health into existing framework to increase resources. Development, testing, and making available culturally relevant methods and instruments to evaluate mental health. *Clinical:* Reprocessing the experience of trauma through different therapeutic frameworks individually or within a group. To do this it is necessary to upskill supporting and frontline staff. *Community response:* Understanding the collective experience. Training volunteers within the communities. *Family Response:* Parenting and family support to promote safe, positive parenting styles and raising mental health awareness within families (particularly of high risk). *School Response:* Both resilience building and trauma focused interventions can be introduced. **Short- or Long-Term:** Both **Timeline:** Mental health considered through all the stages **Mental health outcomes addressed:** Resilience and negative mental health outcomes that were unspecified. **Funding:** National governments should invest in considering mental health, but not fully specified **Stakeholders:** NGOs, national government, teachers, primary health care providers, social workers, community volunteers, specialists, families, and children. **Responsibility:** The effectiveness of a multicentred implementation. Interventions and mental health considered across a spectrum **Other Notes:** All interventions should consider existing infrastructure, resources, incorporate social support systems, enhance interprofessional working, consider stigma, and cultural aspects within the community	Promoting resilience through interventions at different levels (individual through education, family, and parenting styles in social networks, and within the community)	none	Getting each country to uptake and make measures of their own risks and resilience
EMDR Therapy Humanitarian Trauma Recovery Interventions in Latin America and the Caribbean	Jarero, I.; Artigas, L.; Uribe, S.; Miranda, A.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Stress reactions leading to PTSD **Type of Potential Strategy:** *Clinical: EMDR* (Eye movement desensitisation and reprocessing therapy). The goal is to process dysfunctional stored memories to prevent re-emergence of symptoms. This intervention is an early intervention for rapid treatment. It was validated for the use in Latin American settings as stated in this article. Can also be given in a group setting with the EMDR-Integrative group treatment protocol which includes 8 standard treatment phases, art therapy, and the butterfly hug for bilateral stimulation. This treatment is cost and time effective, does not require many resources and produces lasting results. **Short- or Long-Term:** Short-term **Timeline:** Response **Mental health outcomes addressed:** Mostly PTSD but can also be effective in preventing other psychological effects **Funding:** Mostly been given by NGOs in a disaster setting (AMAMECRISIS) **Stakeholders:** NGOs **Responsibility:** Should be trained specialists and therapists **Other Notes:** Training of local therapists for more long-term solutions.	None stated	none	The need for culturally inclusive indicators
Evaluating the Prevalence of	Rezayat, A.A.;	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Large populations, psychological distress	none	none	A relationship between age and

PTSD among Children and Adolescents after Earthquakes and Floods: A Systematic Review and Meta-Analysis	Sahebdel, s.; Jafari, S.; Kabirian, A.; Rahnejat, A.M.; Farahani, R.H.; Mosaed, R.; Nour, M.G.		**Type of Potential Strategy:** *Clinical:* Provision of rapid screening and intervention to address mental health with continuous observations. Screening checklists have higher sensitivity than diagnostics and can detect early stages of psychological response. Screening also costs less and the researchers state that it can give a clue to depression and anxiety as well. Those that are deemed in the "high impact group" or have positive diagnostic results need psychosocial support. Recognises that one screening test may not be enough and there should be other programs of diagnosis, follow-up, and treatment. **Short- or Long-Term:** Short-term **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD **Funding:** Not stated. **Stakeholders:** Mental health workers **Responsibility:** Policymakers determine the quantity and quality of support **Other Notes:** PTSD remained prevalent 18-24 months after the disaster, but the effects do shrink eventually. PTSD was significantly higher among girls than boys (they are more emotionally and mentally vulnerable), but girls are more likely to have a better recovery.			the prevalence of PTSD was not conclusive in this review. The study did not include an even distribution of people from the districts.
Facilitating long-term recovery from natural disasters: Pscyhosocial programming for tusnami-affected schools of Sri Lanka	Nastasi, B.K.; Jayasena, A.; Summerville, M.; Borja, A.P.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** losing possessions, academic issues, not enough aid for the family, feelings of depression, teasing, fears about the future, and feeling unloved. **Type of Potential Strategy:** *School-based intervention: Participatory Culture-Specific Intervention.* Consisted of ten 90-minute sessions after school on a voluntary basis (Agenda: Introduction, feelings I, feelings II, environmental stressors, helping the community, school stressors, family stressors, friend-peer stressors, life ecomap, and what we learned: coping stories). Methods include developing vocabulary, identifying ways to express emotions, thermometer activity to express intensity of feelings, body map of feelings, environmental ecomap to identify events, community circle activity for communal responses, school ecomap, family ecomap, friend-peer ecomap, practice coping strategies, and create coping stories. Normalising emotional responses rather than pathologizing them in group interventions (rather than psychotherapies) and brief problem-focused intervention. Reunite and rebuild families, re-establish routines, express feelings, identify benefits, share resources. **Short- or Long-Term:** Short-term **Timeline:** Response (more long-term recovery needed) **Mental health outcomes addressed:** **Funding:** Not stated but probably NGO **Stakeholders:** Teachers as program implementers, providing parent education sessions, somebody to train the teachers **Responsibility:** Implementation by 12 teachers and two administrators supported by the researchers through initial training and continued communication. School-based mental health counsellor a good resource potentially. **Other Notes:** Adding a psychological aspect to the Sri Lankan non-profit Centre for Women's Research (CENWOR) recovery efforts in re-establishing schools.	Not explicit but mentions coping strategies	none	Future studies to investigate combining a recovery focus in the existing school-based mental health programming and considering the role of school-based mental health professionals.
Family Functioning Following Wildfires: Recovering from	Botey, A.P.; Kulig, J.C.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** The function of the family **Type of Potential Strategy:** *Family-based social intervention:* Returning the family to normalcy as quickly as possible. Parents play a key role to play in family recovery. Following an event, it is likely they spend more time prioritising meetings with insurance companies, rebuilding houses, cleaning yards and not prioritising child or adolescent needs. Children may internalise the experience and not disclose fears or concerns to protect their parents. It is important to provide	Community resilience: individuals contributing to a higher level of community functioning. Functioning families lead to community resilience.	none	No information prior to the fires. Not inclusive of views of all the families only those interested in sharing. Presence

the 2011 Slave Lake Fires			parents with emotional and practical support so that they can be parental figures. Other factors promoting family recovery is dissemination of information, time spent with children, having conversations about their feelings to alleviate stress and anxiety, and re-establishing family routines. Play and interactions with friends should also be encouraged. **Short- or Long-Term:** Short-term **Timeline:** Response and recovery **Mental health outcomes addressed:** Stress and anxiety **Funding:** Not stated. **Stakeholders:** Family (parents and kids), and community **Responsibility:** Parents **Other Notes:** No direct policy implications on how to promote family, but important to keep in mind the relevance of social support and family interactions			of parents may have influenced interviews
Family Influences on the Relationship Between Hurricane Exposure and Ataques de Nervios	Felix, E.D.; You, S.; Canino, G.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Disasters affecting family relationship leading to increased family conflicts and a negative home environment. **Type of Potential Strategy:** *Clinical*: The importance of attending to issues of cultural diversity to screen and create indicators for ataques among other mental health symptoms. Risk of ataques continues for 18 months after the disaster so support needs to be long-term. *Family-based:* Assess, monitor, and address family relationships and parenting styles. Providing therapy to parents and children individually as well as culturally sensitive family therapy. **Short- or Long-Term:** Both **Timeline:** Response and recovery **Mental health outcomes addressed:** Increased distress because of family home environments and ataques de nervios **Funding:** Not stated. No clear intervention **Stakeholders:** Parents, children, youth, mental health workers and clinicians, communities **Responsibility:** Clinicians and families **Other Notes:**	Parent-child involvement decreased the risk of experiencing ataques in the children. Positive discipline also mediated the relationship between ataques.	Not explicit but implied that listening to children and adolescent's relevant viewpoints and their views of family relationships.	No pre-disaster information about family dynamics or mental health. An increase in cultural and linguistically appropriate measures. Observational studies of families as there could be report bias.
Growing Pains: The Impact of Disaster-Related and Daily Stressors on the Psychological and Psychosocial Functioning of Youth in Sri Lanka	Fernando, G.A.; Miller, K.E.; Berger, D.E.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Loss, violence, material deprivation, witnessing interparental conflict, and child abuse increased psychological and psychosocial distress. Christian and Muslim children more vulnerable. **Type of Potential Strategy:** Highlights the difference between trauma-focused response and more holistic psychosocial interventions. *Trauma-focused clinical arguments:* PTSD within cultural contexts, PTSD being the most critical indicator of mental health, and children's distress is mostly related to traumatic exposure. *Holistic community-based approaches arguments:* naturally strengthen support systems, normalising daily routines, and child friendly spaces that promote recovery and don't only focus on the trauma. Some argue that PTSD does not have cross-cultural validity and that even where it is relevant it may be a secondary concern as there are other expressions of distress. Daily stressors represent current and proximal sources of stress. Their research points to the development or expansion of child abuse prevention programs and meeting basic needs of children and adolescents (water, safe housing, and schooling). Another more specific example is that children were more scared of looming snakes in the area after the tsunami rather than the fear of another tsunami. **Short- or Long-Term:** Long-term **Timeline:** Preparedness, recovery, response **Mental health outcomes addressed:** PTSD but recognises the other impacts on psychological and psychosocial health	none	none	War leads to different outcomes than tsunami. Single disastrous events. Which types of events are associated with specific outcomes. Excluded children not in school. Wider age range in including younger kids. More long term. The impact of poverty on daily stressors.

			Funding: Government, communities, and people investing in disaster management **Stakeholders:** Government, health care workers, mental health clinicians, communities **Responsibility:** Strengthen all parts of community, but mostly through government led interventions. **Other Notes:** PTSD is a western psychological practice this area represents a collectivistic culture where general functioning is dependent on social roles, networks, cultural practices, and religious beliefs.			
Impact of Extreme Weather Events on Sub-Saharan African Child and Adolescent Mental Health: A Protocol for a Systematic Revie	Rother, H.A.; Etzel, R.A.; Shelton, M.; Paulson, J.A.; Hayward, R.A.; Theron, L.C.	None.	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Being a child or adolescent in LMICs, resilience, gender, poverty, political and economic instability, burden of disease **Type of Potential Strategy:** No concrete policy recommendations as it is a protocol, but there is a nuance to including child and adolescent mental health in adaptation plans and stresses the importance of doing so. Recommendations include resilient health care infrastructure, developing an applicable mental health diagnostic tools (or validating existing ones), promoting risk communication, a commitment to increase and improve health care providers response, improving educators response, research needed to develop and inform appropriate interventions, consider school-based interventions **Short- or Long-Term?:** Both **Timeline:** Preparedness, response, and recovery **Mental health outcomes addressed:** Goal was to determine which mental health outcomes to address **Funding:** N/A **Stakeholders:** National government, local community and government, educators, health care providers, and child and adolescents **Responsibility:** Not stated. **Other Notes:** Was more focused on presenting a study to determine which mental health outcomes need to be addressed and how, but gives insight into resilience and risk factors for potential inclusion	Resilience is important to focus on from a social ecological perspective. It includes the interaction of resources found within the personality of a child or adolescent and their role within sociocultural, relational, and ecological systems. How can it be promoted in climate change adaptation?	not mentioned	The gap of research about mental health in children and adolescents in LMICs. The importance of culturally relevant indicators. Inclusion in adaptation plans.
Impacts of Natural Disasters on Children	Kousky, C.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** All physical and mental health impacts **Type of Potential Strategy:** *Social Interventions:* Improving non-disaster safety net programs and general ways of life may be the best way to protect children and adolescent's mental health. Many studies can't fully account for how pre-disaster mental health impacts post-disaster mental health but improving it pre-disaster will likely enhance post-disaster. Post disaster considerations included reuniting families quickly, providing family-friendly shelters, continuing to promote breastfeeding for infants, and maintaining supplies like food (food aid) and water. Programs and considerations for income and consumption smoothing or how to help households maintain a constant level of income and/or spending when insurance and credit markets may not be fully functional. Recognising that children will also be more likely to enter labour force than go back to schools. Providing small cash transfers to pay for school, soap or medical may be helpful. *Preparing for disasters:* Focusing on strengthening policies not designed for disaster like access to credit, subsidies for school enrolment, and social insurance policies. Building safter schools and infrastructure. **Short- or Long-Term:** Both **Timeline:** Preparedness, response, and recovery **Mental health outcomes addressed:** Poor mental health outcomes and strengthening resilience **Funding:** Role of governments and NGOs as well as international organisations **Stakeholders:** Communities, schools, teachers, families, children, adolescents, health care members	Supportive parents. Resilience is that even with high risks an individual can demonstrate a good outcome and remains proficient under threat. Reunification with families and promptly returning to school. Age, gender, social structures influence but needs more research.	Participatory research to understand their needs and responses	A research priority should be to further identify mechanisms and pathways behind the outcomes. How effects differ between rural and urban areas. Policy evaluation studies to determine which interventions are most effective. Overarching effects of living with the risks of disaster and that effect on children's

			Responsibility: Government to create and strengthen policies with help from international organisations and NGOs. **Other Notes:** Up to this point there is no general consensus on how best to protect and promote mental health in children and adolescents in developing countries. More research needs to be done, but in the meantime, it needs to be considered.			behaviours and wellbeing.
Improving stress coping and problem-solving skills of children in disaster-prone area through cooperative physical education and sports lesson	Nopembri, S.; Sugiyama, Y.; Saryono; Rithaundin, A.	None.	**Vulnerability Risk Assessment:** Evaluating coping and problem-solving on two different scales that was developed for students. **Vulnerabilities Considered:** Coping mechanisms, stress, and problem-solving skills **Type of Potential Strategy:** *School-based interventions:* Physical education, sport, and cooperative games as a useful psychosocial rehabilitation. The benefits are that it requires critical thinking, inquiry, problem solving, and collaboration while allowing children to release built up energy through regular physical activity. Enhances responsibility and problem-solving techniques to enhance coping. **Short- or Long-Term:** Long-term **Timeline:** Preparedness, response, and recovery. **Mental health outcomes addressed:** Stress and coping skills **Funding:** Not stated but educational institutions **Stakeholders:** PE teachers, coaches, and children **Responsibility:** Schools **Other Notes:**	Not explicit but includes coping skills like problem-solving skills and social interaction.	not explicit	More investigation into the specific relationship between the developed skills and psychological aspects. More findings to make the argument for PE and sport robust.
International Interventions and Challenges Following the Crisis of Natural Disasters: Chapter 16	Baggerly, J.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *Pre-incident phase:* Community preparedness and teachings or improvement in coping skills (mental health professionals inform policy, determine capacity for rapid interventions, train community members, and collaborate with other stakeholders). *Impact phase:* Communication and survival are the goals. (Psychological first aid supporting most stressed, provision of basic needs, monitoring the environment, providing caregivers with training and consultation). *Rescue phase:* Determining needs through a needs assessment, disseminate information (fostering more rapid recovery and resilience), outreach set up, and triage. *Recovery phase:* Planning and appraisal of damage (monitoring the recovery environment, observing ongoing threats, and monitoring services). *Return-to-life phase:* reintegration (individual, family, and group psychotherapy to reduce symptoms and improve functioning). *Consider 6Cs of disaster mental health treatment (Clinical):* calmness, common-sense, compassion, collaboration, communication, and control. *Play therapy*: Make sure toys are culturally relevant (i.e. not using a dog where dogs are not adored). Facilitate the play for decision making but ultimately provide the opportunity for them to assume responsibility and control. Use in psychological first aid to normalise symptoms (puppet show, art, symptom charades). Manage hyperarousal through self-soothing and relaxing techniques (blowing bubbles or balloons, muscle relaxation, positive images, singing, rubbing stomach, stories). Increase accurate cognitions (blame box for who they blame, acting out a radio show, cooperative game play, social support, creating stories, poems, or songs to express hope. Consider team processing with therapists. **Short- or Long-Term:** Long-term **Timeline:** Preparedness, response, recovery **Mental health outcomes addressed:** See mental health block **Funding:** Not stated. **Stakeholders:** School-based counsellors. **Responsibility:** Mental health professionals as advocates for international intervention. **Other Notes:** The importance of training therapists within country for sustainability. In one	Play is a right and a resilience enabler	none stated	How to engage culture within play techniques.

			instance a volunteer asked what the most frightening event was and then left. Should also only go to a disaster site if they are deployed by an official representative or government agency. Most importantly continue to follow-up			
Issues with families and children in a disaster context: A qualitative perspective from rural Bangladesh	Akhter, S.R.; Sarkar, R.K.; Dutta, M.; Khanom, R.; Akter, N.; Chowdhury, Md.R.; Sultan, M.	None	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Children's unique vulnerabilities to natural disasters and the impact on their family. Frequency of disaster. A perception of helplessness **Type of Potential Strategy:** *Disaster Risk Reduction:* Early childhood development activities should be incorporated in DRR. Making the programs more comprehensive and tackling development issues. Training people on how to prepare themselves for disaster was the most helpful (practical knowledge and skill provided) *Creating a sharing platform to inform policy:* Cooperation between and amongst local communities, regional, and national levels of government (facilitates mutually beneficial partnerships through information and knowledge sharing). The overall goal of advocacy to enhance services for 0–8-year-olds and creates an opportunity for local authorities, practitioners, communities and policy makers to collaborate and create relevant policies for planning and response guidelines. *Mental and psychosocial support in post-cyclone and post-flood* (not specified how or what that looks like but should be considered). *Social interventions*: Supporting children in both pre- and post-disaster settings is important to build capacity and enhancing attention to relief and rehabilitation at a grassroots and national level. *NGOs:* Provided immediate help with food, water, clothing, medicine, and cash. However, this is not sustainable and leads to children being married younger and other cultural issues (i.e., offering cash for families so parents marry their children to form another family) **Short- or Long-Term:** Both **Timeline:** preparedness, response, and recovery **Mental health outcomes addressed:** Gendered mental health outcomes, fear, helplessness, anxiety, cooperation, and togetherness **Funding:** Avoid funding from outside organisations that do not consider cultural context. International, national, regional, and local communities. **Stakeholders:** Mental health workers, NGOs, international bodies, national, regional, and local communities, children, **Responsibility:** Same as funding **Other Notes:** Important to consider gender response like parents are more worried about girls' security and that it is unsafe to send them off to further education. Also, to consider the presence of outside NGOs and their impact. Finally, there was a demonstrated sense of cohesion in the community where everyone came together to solve problems and capitalising on this.	Understanding of risks and knowledge of emergency procedures (knowing what to do). Age. Family. Contribution to community.	Engaging them in preparedness and mitigation activities as well as considering their unique perspective and allowing them to contribute.	Further studies on long-term psychosocial impacts
Mental health and psychosocial support after the tsunami in Thailand	Chakrabhand, S.; Panyayong, B.; Sirivech, P.	none	**Vulnerability Risk Assessment:** *Psychosocial needs surveyed:* General Health Questionnaire (GHQ-12), Suicide item, Primary Care-PTSD, and CAGE a tool screening for alcoholism. **Vulnerabilities Considered:** PTSD, alcoholism, suicide, and general health **Type of Potential Strategy:** The response to the tsunami was completed in different phases where the first priorities of the Thai government were to provide essentials like clothing, food, medicine, and housing. *Phase I: Emergency and crisis phase:* Department of Mental Health (DMH) provides mobile mental health teams (can include psychiatrist, psychiatrist nurses, nurse aid, pharmacist, social worker, psychologist, and driver) for immediate evaluation and information gathering. Forms connections with local health offices. Provision of Psychological First Aid, triage, and acute care to normalise the reactions to grief and the event. Set up a disaster centre at central level and frontline. *Phase II: Post impact phase (2-3 months after the disaster):* Providing potential early psychiatric interventions and mental health support. Outreach services deployed that assess, treat, refer, and provide psychoeducation and group activities to communities. Severely ill patients taken to main hospital. Focus on vulnerable groups like children in this phase (finding new cases with the	Interventions for community resilience. Culture develops resilience	none	The effectiveness of this response is not stated just what they did.

			GHQ-12). Command Centre at the Deputy level established for health monitoring (presence of epidemic diseases, physical health rehab services, and mental health resources). Dead body identification. *Phase III: Rehabilitation/Recovery phase (more than 3 months):* Improve quality of life to reduce psychological impact. Three levels of prevention in mental health programs. Primary prevention: promotes community resilience through peer group activities, radio programs to educate on mental health, and illumination of self-care skills. Secondary prevention: Finding new cases and offering treatment while creating a referral network. Tertiary prevention: managing difficult mental health problems for special treatment and follow-up sessions. *Ensuring sustainability through a Mental Health Recovery Centre:* to coordinate work between departments, building capacity of local community (teachers, local health workers, childcare providers, and NGO staff), establish mental health surveillance systems, community health work and village health volunteers supported. *Community interventions:* Trained by the DMH volunteers from within the village to take care of 8-15 families. DMH becomes supporter not facilitator. Reducing stigma of seeking mental health services and acknowledge culture in the village to develop resilience. *Child specific:* Co-operation with Ministries of Health, education, Interior and Social Development and Human security to register orphans allowing them to receive scholarships, material needs, and specialised psychological support. DMH and Ministry of Education provide training for teachers to provide basic psychological support. MHRC provides positive activities like books, toys, and drawing materials. Prevention programme for 0-3 specifically that are in living in temporary shelters, were impacted by the disaster, or were orphaned. Physical and psychosocial development evaluated and treatment for parents with mental health problems. Children under six have access to programmes run by local health office **Short- or Long-Term:** Both **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD and depression **Funding:** Government **Stakeholders:** Different departments in government (see below), schools, teachers, volunteers in the community, parents, students, mental health teams **Responsibility:** Department of Mental Health, Ministry of Health, local health centres, departments of the Ministry of Public Health, Ministry of Education **Other Notes:**			
A Meta-analysis of Intervention Effects on Depression and/or Anxiety in Youth Exposed to Political Violence or Natural Disasters	Pfefferbaum, B.; Nitiema, P.; Newman, E.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Experiencing a mass trauma, pre-existing vulnerabilities, reactions to trauma **Type of Potential Strategy:** *Clinical Trauma-focused:* Cognitive behavioural therapy, exposure therapy, and EMDR this mainly focused on PTSD, and it is unclear if it confers benefits for depression and anxiety. CBT is the most studied in crisis situations and yielded the largest effect on PTSS *Intervention Delivery:* Most effective when parents are also involved in the interventions, administered in a health or mental health setting, by a mental health professional, and in a shorter format. However, group interventions are less costly and decrease the stigma associated with mental health services and the social component is important for depression or anxiety. Recommending trauma-focused interventions be paired with other components for anxiety and depression. Necessary to consider culture in interventions and tools. **Short- or Long-Term:** Short-term **Timeline:** Response **Mental health outcomes addressed:** PTSD, depression, anxiety **Funding:** Not stated **Stakeholders:** Mental health workers, parents, youth, schools	none	none	A necessity for culturally sensitive interventions and assessment tools as western concepts of mental health may not address the dynamics of non-western cultural and social influences. Need to be developed and test. Other aspects of intervention delivering like service issues, timing, and setting

			Responsibility: Not stated. General reflection on past interventions. **Other Notes:** The applicability of Western concepts where expression of depression and anxiety may vary across cultural contexts and coping mechanisms. Interestingly, there was no difference in the effectiveness of interventions delivered to address political violence or natural disaster.			need to be examined.
A Natural Response to a Natural Disaster: The Art of Crisis in Nepal	Linton, J.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** The deep connection with the earth and feeling the earthquake as a sense of betrayal, faith in god, safe spaces for children **Type of Potential Strategy:** *Art-based intervention*: Informed by the UN Child Friendly Spaces the first step was to create a space in or near the shelter (I.e. in this case in an open space near the school under a large tree and in a designated space in the temporary shelter). Worked with Sangai Khelaun (Let's Play Together) led by Srijanalaya a creative learning charity. Drawing on connection with the natural world and art to regenerate and rejuvenate children. They were tasked with foraging for leaves, seeds, roots, and flowers to use. The children created artwork and then were able to discuss their connection to mother earth and the art piece. Important to uphold the collective spirit, providing children with a safe place, and a sensory quality of expression **Short- or Long-Term?:** Short-term **Timeline:** A four month period during response and recovery **Mental health outcomes addressed:** anxiety, uncertainty, lack of trust, resilience **Funding:** Considered the amount of minimal resources and can be implemented relatively cheaply (using seasonal supplies from nature) **Stakeholders:** NGOs emphasising creativity, children, leaders **Responsibility:** Should be established in every refuge to uphold the right to a safe place and the right to play. **Other Notes:** The author works for Art Refuge UK and is from the UK: the NGO works with displaced people due to natural disaster, armed conflict, famine, trafficking, and political or religious persecution.	Art strengthens their internal resources to encourage supporting themselves. Re-establishing religious connections to the land.	Young people as the producers, designers, and curators. Able to cultivate their hopes and dreams for the future community.	How to build long term relationships and nurturing local capacity to engage in these activities. Particularly as this was implemented by an international organisation.
Post-traumatic stress disorder amongst children aged 8-18 affected by the 2011 northern-Namibia floods	Taukeni, S.; Chitiyo, G.; Asino, I.; Shipena, G.	none	**Vulnerability Risk Assessment:** Government conducted a needs assessment post-disaster utilising the damage and loss assessment methodology (the overall economy and the household level). They found impacts on different sectors of housing, health, education, tourism, industry, agriculture and environment. Assess signs of PTSD in children through the Child Trauma Screening Questionnaire (CTSQ) which had been adapted for use in Namibia **Vulnerabilities Considered:** The direct and indirect impact of these sectors on children **Type of Potential Strategy:** *Government needs to train personnel*: The Ministry of Education, Sports and Culture, reported that the country is unable to provide the necessary skilled human resources for the development of interventions. Requires an increase in school and community counsellors and psychologists to provide appropriate psychological and emotional support following floods and disaster. Also training special-education teachers to address the needs and educational requirements of children expressing emotional or behavioural disorders. *Programs to support and consider social well-being*: Ensuring the structures for personal security and emergency sanitary facilities are availabe. **Short- or Long-Term:** Both **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD. The prevalence in symptoms is clear where older learners are more affected than younger ones and symptoms persist two years after the events **Funding:** Government **Stakeholders:** Government, trained mental health workers, special education teachers, psychologists	none	none	Research depended on the ability of children to remember events that happened two years prior. Children might have embellished their responses. No recommendations for how government should go about training

			Responsibility: Government responsible for implementing plans **Other Notes:**			
Post-traumatic stress disorder in children and adolescents one year after a super-cyclone in Orissa, India: exploring cross-cultural validity and vulnerability factors	Kar, N.; Mohapatra, P.K.; Nayak, K.C.; Pattanaik, P.; Swain,S.P.; Kar, H.C.	none	**Vulnerability Risk Assessment:** To evaluate PTSD the researchers utilised the International Classification of Mental and Behavioural Disorders 10th Revision: Diagnostic Criteria for Research (ICD-10-DCR). **Vulnerabilities Considered:** Gender, age, education, socioeconomic status, disaster warning, degree of exposure, and previous exposure **Type of Potential Strategy:** *Clinical:* PTSD looks similar in this community as it does in western societies. It is feasible to assess children in schools and villages with the ICD-10-DR method. Although it should be noted that it does not consider comorbid depression. *Things to consider for interventions according to research:* More female children were affected than males. Amongst the age group children between the ages of 11-13 were most affected. Greatest impact on the middle-class families there is a link between resource loss and stress. Disaster warnings may lead to anticipatory stress reactions so consider this when providing disaster warning messages to children. Finally, parents often do not recognise the symptoms of PTSD so it is necessary to provide public education about post-disaster psychiatric sequelae and active screening. **Short- or Long-Term:** Short **Timeline:** Response **Mental health outcomes addressed:** PTSD, depressive, anxiety and somatic **Funding:** Not stated this is very much a study demonstrating PTSD determinants and does not give concrete information on funding **Stakeholders:** Not stated. **Responsibility:** More general recommendations **Other Notes:**	Cognitive immaturity potentially protective for younger children, or the PTSD manifestation may be different. Greater resilience in older children with a higher education level. Socioeconomic status	none	There is no standardised diagnostic instrument and makes comparison difficult. The influence of other factors like pre-existing mental health conditions and physical ill health with concurrent life events. Research into other factors. Relationship between disaster warning, anticipatory stress, and vulnerability to PTSD development.
Preparing children for an uncertain future: the role of the early childhood teacher	Ebbeck, M.; Yim, H.Y.B.; Wei, T.	None	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Emotional self-regulation helps children feel in control **Type of Potential Strategy:** *School-based intervention:* Teachers play a role before, during, and after a disaster. Observation of the child in a naturalistic play or work contexts. *Before disaster:* 1) Encouraging children to express feelings (drawing faces, drawing silhouettes of their body with emotions) 2) Encouraging children to use words to express their emotions by normalising their feelings and teaching them self-regulation 3) Developing empathy in children (understanding the feelings of others) 4) Developing resilience *During a disaster:* Implement the emergency policy and management plans (VERY IMPORTANT). Ensure children's safety through a well-rehearsed procedure. The physical context will determine the actions needed to respond (type, frequency, intensity, and probability). *After:* 1) Observing if the child has access to basic needs (shelter, water, food, and clothing). Find out how the family can be supported and provide a place to rest and meals 2) Create a classroom that is safe physically and emotionally. Arranging for counselling and if the school is destroyed a mobile classroom can be created. 3) Maintaining a trusting relationship: creating a bond and a sense of belonging promoting well-being. 4) Positive communication with children: listening, answering questions honestly, model and affirm the normality of human emotions. 5) Creating an environment with consistent and predictable routines. 6) Allowing opportunities for children to make friends: small group projects. 7) Playing out fears in diverse ways: drama, expressive arts, and storytelling but they need to have freedom to choose the activities. *Collaboration with Parents:* Before about how they can encourage children. During to find a safe meeting places and provide them with information. Sustained support. *Familiar comfort toys.* **Short- or Long-Term:** Both **Timeline:** Preparedness, Response, Recovery **Mental health outcomes addressed:** Resilience and minimising negative outcomes	Resilience is developed in children when they are: Provided challenging tasks, discussions about what to do in terms of risks, teaching them to persist through problems, building confidence through encouragement, playing outdoors in different environments like obstacle courses to develop physical skills. Well-being is linked to self-confidence, self-esteem and resilience so providing a sense of well-being after disaster is imperative. Establishing friendships to encourage resilience.	Participation in risk reduction and preparedness measures to consider their perspectives and hear their voices	Continue developing ways to help meet the needs of children after and while experiencing difficult circumstances.

			Funding: Not stated **Stakeholders:** Mainly teachers, collaboration with families, support of mental health personnel **Responsibility:** Teachers and education system. They need to be trained in this information **Other Notes:** A lack of resources and specialists may impede the recovery of a child. It is necessary for teachers to be supported within the community to accomplish supporting children			
Preventing Abuse and Trauma to Internally Displaced Children Living in Camps Due to Disasters in Pakistan	Asad, N.; Karmaliani, R.; Somani, R.; Hirani, S.; Pasha, A.; Hirani, S.; Cassum, L.; McFarlane, j.	none	**Vulnerability Risk Assessment:** Analysis of socio-demographics and a health assessment both captured in a survey to identify high risk children and families. **Vulnerabilities Considered:** Displacement (in temporary camps they are physically, emotionally, and mentally vulnerable), lack of parental supervision, overcrowding, exposure to violence in their peer group and gang behaviour, and parents displacing anger onto children. Access to education and health services, adequate nutrition, and clean water and sanitation. **Type of Potential Strategy:** *Psycho-social interventions to prevent abuse:* Community-based recreational and cultural activities for children (arts and games). Other therapeutic activities and role-play activities to increase sense of self-control and self-protection (drama and puppet shows). Parents taught violence education and awareness (developing skills to increase security and decrease vulnerability). Using other communicative modes for younger children to express themselves like playing, drawing, or singing. Educating elders on how to protect children from abuse and violence. *Framework of primary, secondary, and tertiary levels of protection. Collaboration with hospital-based team specialising in child protection:* Using roles of paediatricians, nurses, and mental health profession to manage child abuse. *Proposed Intervention:* 1) initial assessment 2) camp and home visitations by midwives, lady health, nurses or nursing and medical student, psychology interns (providing basic healthcare and psychological support) 3) Formation of teams within the community to collect and distribute food and supplies while being trained in basic life skills to protect children and women. 4) Coalition building (NGOs, educational services, and other agencies) to work within the teams 5) Group therapy stratified by age and gender or men, women, and children (including specific safety, health, and life skills measures) 6) Documentary/puppet shows enhanced and empowered protective behaviours in women and children. 7) Teams use debriefing exercises and follow safety measures. 8) Regular quality checks to monitor process 9) Evaluation **Short- or Long-Term:** Short term **Timeline:** Response and recovery in camps **Mental health outcomes addressed:** The effects of abuse on mental health and resilience **Funding:** Not stated explicitly (government) **Stakeholders:** Communities, parents, families, elders, healthcare workers, government, NGO, educational agencies **Responsibility:** Not explicitly stated but government, communities, healthcare, and other concerned parties need to coordinate. **Other Notes:** The interventions need to be grounded in the socio-cultural context of each community. Community-centred projects are also good for children's development.	Teaching children how to protect themselves, engaging them through community interventions, and being able to express emotions.	not explicit	The applicability of these measures within different socio-cultural environments and the actual implementation of the intervention.
Psychoeducation for Children and Adults after the Marmara Earthquake: An Evaluation Study	Sahin, N.H.; Yilmaz, B.; Batigun, A.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *Psychoeducation programs:* Programs need to be implemented early so psychological outcomes can be viewed as acceptable, recognisable, and increase the use of social support to express reactions. Effective and economical large-scale intervention that can be an early mental health intervention technique (can add on a treatment element). Should consider *School-based interventions* and *Parent-directed interventions. Psychoeducation for children:* Include activities like play therapy interventions (biblio-therapy, art therapy, and guided therapy). Important for regaining a sense of control, give meaning to the event, and normalise reactions. Small groups and	Does not explicitly mention the word resilience but includes coping. Knowledge about the event, expressing feelings, relationships in families and with parents.	not explicit	Setting up a monitoring system to improve the methods and materials for psychoeducation while also continuously

			several activities to keep children interested. *Parent-directed:* Include a variety of issues to discuss for a stronger impact and more attention. Presentation of many concrete examples, visual materials, repeating critical messages, and modelling positive examples. Should not just be visual material but include lectures, questions, and discussion (active participation). Continuously monitored and evaluated to improve effectiveness of materials and methods. **Short- or Long-Term**: short-term **Timeline:** response **Mental health outcomes addressed:** normalising all reactions to disaster to prevent poor mental health outcomes **Funding:** Not stated **Stakeholders:** Schools, parents, students, psychologists, clergy, administrators **Responsibility:** Psychoeducational programs including physicians, clergy, parents, teachers, and other caregivers. Educator, psychologists, and administrators should make the plans for interventions **Other Notes:**			evaluating interventions
Psychosocial support in disaster-affected communities	Rao, K.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *Psychosocial support*: The process that addresses a range of psychosocial problems by promoting social cohesion, infrastructure repair, independence, and dignity in groups and individuals. *Rescue phase 2 weeks after:* Provision of necessities (food, water, sanitation, and shelter) and prioritise safety. Walk in clinics and outreach services set up. Normalising reactions and providing credible information to people about psychological reactions. Controlling disaster tourists and media attention. *Psychological first aid*: Comfort, consultation, threat protection, immediate medical attention, reunification, identifying who needs help, sharing experiences, culturally relevant ways to grieve the dead, and returning to pre-EWE status. *Relief phase two to six months after:* Primarily supportive psychosocial care focusing on reducing immediate distress, encouraging problem solving, and returning to normal functioning (children specifically an important consideration). *The rehab phase one to two years after:* Community level activities, learning effective ways to cope, brainstorming solutions, problem sharing, mutual emotional support, Problem sharing and brainstorming solutions, learning effective ways to cope, and emotional support. *Clinical interventions:* Cognitive behavioural therapy, interpersonal therapy, and group work. *Rebuilding phase years after and includes disaster preparedness*: strengthen resources, enhance resilience, disaster mental health programmes that address prevention and preparedness. Capacity building within the community including college students, teacher, organisations, women's self-help groups, primary health care workers. Integrating mental health into general health care **Short- or Long-Term:** Both **Timeline:** Response and recovery then informing preparedness **Mental health outcomes addressed:** psychosocial problems **Funding:** Not stated **Stakeholders:** Communities, local government, national government, NGOs, teachers, parents **Responsibility:** Not stated **Other Notes:** Not fully focused on children and adolescents	Religion and belief in a higher power.	not explicit	More focused response and examples of utilising these efforts within a specific country
Reflections on "building back better" Child and Adolescent Mental Health Care in a Low-	Yoder, H.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *Social interventions and Community Response:* Addressing health seeking behaviours and religion in mental health perceptions (reduce stigma). Understanding how to translate knowledge from HICs to interventions that are feasible in low resource settings with different belief systems. Effective elements could be identified and developed based on	Resilience measures need to be adapted for children and youth in Sierra Leone. Found consolation in faith	"Advocacy by, with, and on behalf of children and adolescents to give a voice to the	Authors own biases in the document it is only one persons' critical analysis of the mental health

Resource Postemergence Setting: The Case of Sierra Leone			community-based practitioners. An increase in cultural competence and understanding of the cultural context. General capacity building through the acknowledgement of the role of community-based practitioners. Dismantling Sierra Leoneans views and beliefs that they are inferior to international workers. Apprenticeship model for training local providers and training people in different background to have general mental health awareness to reduce stigma and promote referrals. Considering the role of faith-based health. Decentralise care across the country. *Need for comprehensive policy making, planning, and funding:* Specific policy for CAMH to develop the whole system. **Short- or Long-Term:** Long term **Timeline:** Preparedness **Mental health outcomes addressed:** None specifically the mental health system as a whole **Funding:** Lack of funding and minimal suitable policies is a hinderance. Government and international donors **Stakeholders:** Local community practitioners, mental health workers, children, and adolescents **Responsibility:** Should be on the community but government enhances their ability to respond **Other Notes:** Psychological First aid manual considers children and adolescents but when implemented in Sierra Leone it was mainly focused on adults. Should include communication through play or art.		significant part of the population"	system. Bridging the gap between science and practice to ensure comprehensive policy making, funding, and planning.
Social and Clinical Interventions After Conflict or Other Large Disaster	van Ommeren, M.; Morris, J. Saxena, S.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** LMIC vulnerabilities varying from HICs see other notes **Type of Potential Strategy:** *Clinical:* Recommends CBT to treat PTSD. May be more difficult with fewer trained mental health professionals and PTSD is a controversial diagnosis as it is only one type of psychological outcome (applicability outside of Western context?). If we assume applicability of treatment across cultures other issues arise like not enough skilled workers (especially in rural areas), CBT is a complex intervention. Exposure therapy is easier to train. *Social interventions needed:* Utilising a socioecological model (viewing a person as an individual, within a family, within a community, and at a wider society level). Establishing family tracing, return to formal or inform schooling, providing safe spaces for play, activities for the inclusion of isolated children, and involving adolescents in relief efforts and other organised social supports. Training nonformal staff or paraprofessionals when interventions are not difficult (train the trainers). Barriers include people training (trainees) might not have teaching skills and trainees need to receive supervised practice before training others but there are generally not enough supervisors. Conduct more RCT to evaluate complex community-based interventions. **Short- or Long-Term:** Long-term **Timeline:** Preparedness, Response **Mental health outcomes addressed:** PTSD but also recognising that other psychological stresses exist **Funding:** Not explicit **Stakeholders:** Mental health workers, LMIC governments, international bodies, and communities **Responsibility:** Should be the responsibility of the community **Other Notes:** HICs typically focus on clinical evidence-based treatments. Important considerations for an LMICs context social and health systems, human resource availability, mental health training, attitude and practices surrounding mental health.	none	none	Improve evidence for social interventions.
Strategic approaches for developing a culture of safety management in	Bhebhe, s.; Runhare, T., Monobe, R.J.	none	**Vulnerability Risk Assessment:** Performing a needs identification and evaluating a schools risk based on geographic setup, previous disasters, and community trends (i.e. poor structural design, subpar building materials, being built in low-lying areas, etc) **Vulnerabilities Considered:** Missing school, dropping out of school, school plans and preparedness	Help children and adolescents identify past coping mechanisms and obstacles they have overcome in the past. Considering tone, voice pitch	not explicit	Future research and action into creating disaster management teams in schools that are

schools: Indications from literature studies			**Type of Potential Strategy:** *School-based Intervention:* African schools need to consider urgent policies that are clear and responsive to threat. All school plans need to be uniquely designed. The importance of schools after disaster is that they provide safety and place for children and adolescents to go. Evaluating schools and rebuilding them in safer locations (not between rivers, in low lying areas, lightning rods, better construction). Schools on monitor for cases of diarrhoea, cholera, malaria, and provision of a mobile clinic. Education on sanitation practices, water purification and treatment formula techniques, and hygienic food prep. Disseminate information and provide guidance. Expressing emotions and peer support through discussions, drawing, stories, audio and video recording, and games. Family role and engagement. Teachers trained in the symptoms of stress to identify it in themselves and children. *Community-based preparedness:* Government and non-state parties develop plans to minimise damage, loss of lives, and enhance effective response methods. Emergency exercises, training, reserves of food, equipment, water, medicine, and other essentials. Early warning systems, accurate communication systems, resource inventories, evacuation plans, emergency personnel lists, and public information systems. Crisis-management team in schools that work with community. Immediate response of meeting basic needs. Including community groups, law, public health, EMS, paediatric, mental health teams. **Short- or Long-Term?:** Both **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD and other psychological distress **Funding:** Funds to be set aside for schools to use (Social Relief of Distress Fund in South Africa) **Stakeholders:** The community, national government, teachers, professional groups, emergency personnel, family **Responsibility:** Everyone should play a role **Other Notes:** In Africa most societies react to disaster instead of being proactive and taking preventative, preparedness steps.	and facial expression when talking to them. Connecting them with community resources		knowledgeable in the principles and practices of disaster management.
Structure of the Children's revised Impact of Event Scale (CRIES) with Children and Adolescents Exposed to Debris Flood	Chen, Z.; Zhang, Y.; Liu, Z.; Liu, Y.; Dyregrov, A.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** PTSD symptoms after disasters of different types **Type of Potential Strategy:** *Clinical:* The Children's Revised Impact of Event Scale (CRIES) has good psychometric properties to screen for PTSD in the Chinese context. It is also stable, in China, across age, gender and different types of traumas. **Short- or Long-Term:** short-term **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD **Funding:** Not stated **Stakeholders:** Mental health workers **Responsibility:** Mental health workers **Other Notes:** Children that were older tended to reexperience and have more arousal after the trauma than younger children (indicating that developmental level may be more important than the risk exposure). Older children may also be influenced by parental distress, memory, social skills, coping styles, and adaptation. It appears children are more similar than different even from diverse cultures.	Not explicit. Does include coping style and investigates gender, age, and different types of traumas affecting outcome of PTSD	not explicit	Within the tools an understanding of the arousal factor stability following different types of traumatic events needs to be considered
Toward best-practice post-disaster mental health promotion for	Commers, M.J.; Morival, M.; Devries, M.W.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *School-based intervention:* First focus was on normalisation. It was created and implemented in an area that was still experiencing chaos (resource and cost effective and culturally appropriate). They were left for a nine-month time span and children were told that they could write letters with their names or anonymously. Things to consider: effective at identifying PTSD but questionable if children with severe PTSD would use it (better in heavily	Not explicit	not explicit	Future studies investigating the effectiveness of HSLB methodology (clinical) and attention to the

children: Sri Lanka			impacted schools), basic needs were prioritised first, clinically it is not effective because there is a lack of follow-up, engages students in a full range of daily stressors (especially taboo like domestic abuse, sexual abuse, alcohol abuse, pornography, and neglect) but this demands further infrastructure, Well-coordinated with existing structures, lacked evaluation of clinical outcomes (unsure of effectiveness of treatment). Develop clear protocols for addressing ethical dilemmas. **Short- or Long-Term:** Could be employed long term with correct support **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD **Funding:** Cost effective (just needs funding for support) **Stakeholders:** Teachers and schools and students **Responsibility:** Teachers and schools **Other Notes:** Would include a prospective evaluation CRIES-8			ethical dilemmas that can arise.
Tsunami: Psychosocial aspects of Andaman and Nicobar Islands Assessments and intervention in the early phase	Math, S.B.; Girimaji, S.C.; Benegal, V.; Kumar, G.S.U.; Hamza, A.; Nagaraja,D.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Different groups of islands required different needs. Other challenges included: minimal mental health awareness, only a few trained mental healthcare personnel, large population affected, aftershocks, emptiness in leadership, no schools, flight of manpower, conflicts when people returned, and absence of local media. **Type of Potential Strategy:** *Early-phase:* Assess community needs and available resources, pyschiatric morbidity directly following the event, immediately treat patients, increase mental health awareness in the community awareness, long-term partnerships with NGOs, and empower community. Teachers are good resources to use to care of children and families. Training teachers in basic principles of counselling and mental health associations to disasters. Innovative ways of interacting with children: normalise routines using activities like drawing, sketching, singing, and miming to engage them in informal education. *Presence of mental health team in early intervention is imperative.* Avoiding psychiatric labels. Utilize community resources and participation (so that it local accepted and adapted). **Short- or Long-Term:** Short term **Timeline:** Response **Mental health outcomes addressed:** Adjustment disorder, PTSD, panic disorder, or somatic complaints. **Funding:** NGO trained the teachers, government organization deployed so not explicit **Stakeholders:** teachers, NGO, mental health responders, families, communities **Responsibility:** Mental health responders, teachers, government **Other Notes:**	High resilience in the joint family system	not explicit	Further information needed on how to address the ethical dilemmas presented by the intervention.
School-based psychoeducation and storytelling: Associations with long-term mental health in adolescent survivors of the Wenchuan earthquake	Tanaka, E.; Iso, H.; Tsutsumi, A.; Kameoka, S.; You, Y.; Kato, H.	none	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *School-based intervention:* Mental health education lesson takes between 60-90 minutes. Starts with a brief psychological lecture on stress and trauma. Students identified their current mental health through a self-administered questionnaire. They were taught and practiced relaxation techniques like breathing and muscle relaxation techniques. Teacher then introduced their personal story about PTSD recovery. Students expressed their experiences through discussing, writing, drawing, and singing. *Disaster education:* aimed at protecting themselves when disaster happens by promoting safety. Included one complete disaster drill, lecture about disaster, and discussion of hazards. Preferred Storytelling to lay supporters (family or friends) than seeking help from professionals. Expressing emotions enhanced recovery. In general, local mental health professionals did not have training in post-disaster situations. Inappropriate interventions by international volunteers like psychological debriefing. MHE and DE allowed participants to better express feelings and thoughts. *Part of the project was psychological first aid, cognitive behavioural*	Social support: family members, friends, and teachers.	none	The exposure variables in the questionnaire were original and not validated. Subjective analysis. 6 years is too long to remember intervention. Findings need to be confirmed in the future

			therapy, and disaster education with mental health aspects (all train the trainer model). **Short- or Long-Term:** Long term **Timeline:** Preparedness, response, recovery **Mental health outcomes addressed:** OCD, depression, anxiety. **Funding:** Project for Capacity Development on Mental Health Services for Reconstruction Support of Sichuan Earthquake (by Japan International Cooperation Agency and All-China Women's Federation **Stakeholders:** See above implemented, then teachers and community members **Responsibility:** Larger organisations brought it in **Other Notes:**			
Measuring adolescent coping styles following a natural disaster an ESEM analysis of kidcope	Powell, T.M.; Wegmann, K.M.; Overstreet, S.	None stated.	**Vulnerability Risk Assessment:** Kidcope **Vulnerabilities Considered:** Gender, SES, community bonds **Type of Potential Strategy:** *Disaster specific coping assessment tools: Clinical:* The kidcope comes in a child version and an adolescent version. Assesses use of coping mechanisms like distraction, self-criticism, social withdrawal, cognitive restructuring, blaming, emotional regulation, problem solving, wishful thinking, social support, and resignation. Exploratory structural equation modelling (ESEM): good when measurement is underdeveloped (understands the factors of the coping mechanisms and their applicability). A move in the field to measure coping and post-traumatic growth instead of clinical DSM-V diagnoses. Provides a validation for coping measurement. The best model includes four factors: wishful thinking, positive coping, blame and anger, and social withdrawal. More research on coping is needed considering culture, developmental patterns (age), racial background, religion, and spirituality. **Short- or Long-Term:** Short-term **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD, anxiety, and depression and how these are minimised based on coping strategies. **Funding:** Not mentioned **Stakeholders:** Mental health workers **Responsibility:** Clinical mental health workers evaluating children and adolescents **Other Notes:** May change based on the population and the nature of the disaster. No studies have analysed coping measures by demographics (ethnicity, gender, economic circumstances, development).	Not explicit but mentions coping strategies	Not stated.	Adds to the research of coping mechanisms but more is needed to inform how it is protective mechanism for disaster-affected youth. Specifically how the factors of gender, age, culture, race/ethnicity, religion and spirituality, and type of disaster play into coping.
Posttraumatic Stress Symptom Trajectories Among Children After Disaster Exposure: A Review	Lai, B.S.; Lewis, R.; Livings, M.S.; La Greca, A.M.; Esnard, M.	None stated.	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** Existence of PTSD, age, gender, exposures, and coping styles **Type of Potential Strategy:** *Clinical:* Stepped care model of intervention: triage children based on needs and risk factors (children with most risk receive most intensive care). Different instruments to evaluate PSS were used UCLA PTSD Reaction Index for children, child report, and parent report. Factors distinguishing chronic from resilience: age, gender (female identified as risk), severe PTSD at time 1, numerous exposure and recovery stressors, general anxiety symptoms, lack of social support, coping styles, and community/neighbourhood violence. Difference between recovery and resilience: numerous exposures, age, anxiety symptoms, and recovery (more loss, trauma, or disruption), and coping styles. Difference between chronic and recovery: PTSD at time 1, blame and anger coping styles, anxiety symptoms, multiple exposure and recovery, and social connectedness (family). *Person-centred approaches.* Avoid misclassifying children based on early symptom levels as some will recover on their own and therapy may not be effective but only require them to reexperience the events. Biggest factors that influence symptoms during a disaster are threat to own life, threat to parents, housing disruption, evacuation, violence and low social support and connectedness. Social support throughout is hugely protective. Disaster preparedness should	Identified resilience as a trajectory: child characteristics (age, gender, having PTSD, general anxiety, number of children in the family), exposure stressors (loss of family, traumatic scents, previous loss/ trauma, life threat, parental life threat, evacuation), recovery stressors (more negative life events, loss or trauma, problems with family, school, friends, mental health consult, housing disruption, violence) social support (low family	Not stated.	Future studies to clarify symptoms of chronic outcomes from recovery and which factors and circumstances influence the differentiation. Also, could be used to determine models. Meta-analysis may be a method to address disaster field. More research on

			include focusing on increasing children's social support networks. **Short- or Long-Term:** Both **Timeline:** Response and Recovery **Mental health outcomes addressed:** PTSS trajectories (risk and resilience factors) **Funding:** By identifying risk levels can identify which children need costly interventions. **Stakeholders:** Mental health workers and intervention planners **Responsibility:** N/A **Other Notes:**	connectedness , low social connectedness, less support), and coping (positive, negative, blame/anger, and avoidant)		children in developing countries
A Meta-Analysis of Natural Disasters on Internalizing and Externalizing Problems in Youth	Rubens, S.L.; Felix, E.D.; Hambrick, E.P.	None stated	**Vulnerability Risk Assessment:** None **Vulnerabilities Considered:** location, age, PTSD as a risk factor for other outcomes **Type of Potential Strategy:** *Clinical:* Screen for outcomes other than PTSS including depression, panic, anxiety, and aggressive behaviour. Trauma-focused interventions are mainly based on PTSS reduction (i.e. CBT) so there is a need for a consideration for a wider range of problems. Interventions need to be developed or validated to include both internalizing and externalizing problems. Important to consider parental mental illness and stress (externalizing problems in youth). Consider the effects in developing nations (cultural and contextual factors). Continuity of care (rapid interventions and monitored in long term). Mental health workers need to move beyond diagnosing symptoms to consider the areas in which natural disaster impact areas of well-being (relationships, prosocial behaviour, emotion regulation, and health behaviours) **Short- or Long-Term:** Both **Timeline:** Response and recovery **Mental health outcomes addressed:** Both internalizing and externalizing factors as mostly PTSS and PTSD have been addressed **Funding:** Not stated **Stakeholders:** Researchers in psychology, mental health workers, policy makers **Responsibility:** Researchers and mental health workers **Other Notes:** Newer areas are of study include culture-bound syndromes, posttraumatic growth, sleep problems, prosocial behaviour, and community support.	Not stated.	Not stated.	Increase in empirical attention to more nuanced areas. The children's ecological systems that promote post disaster adaptation Future Research opportunities: Considering gender and race. Cultural definitions of child vs adult (can vary)
Assessment Tools for the Mental Health of School-Aged Children and Adolescents Exposed to Disaster: A Systematic Review (1988-2015)	Lee, M.S.; Bhang, S.Y.	None stated	**Vulnerability Risk Assessment:** UCLA PTSD-RI (cost effective and user friendly) **Vulnerabilities Considered:** **Type of Potential Strategy:** Conducting appropriate mental health assessments and following them up with high-risk interventions. Rapid interventions, but consideration for long-term. Consider other aspects like concentration, sleep, cognitive function, daily life, and quality of life in initial evaluations. Self-report should be followed up by a clinician. Parent-report could include their own psychological symptoms and the observations of their child. Mental health professional evaluation is recommended though. *Clinical:* Screening first followed by an assessment to select high-risk groups as to not include anyone that does not need treatment **Short- or Long-Term:** short and long-term **Timeline:** response and recovery **Mental health outcomes addressed:** Psychological responses to stress and trauma mainly present as depressive disorders. **Funding:** Not stated **Stakeholders:** Mental health workers **Responsibility:** Mental health workers and clinicians **Other Notes:**	Not stated.	Not stated.	Future reviews including other languages and children younger than school-aged.
Longitudinal Cross-Lagged	An, Y.; Huang, J.;	None stated	**Vulnerability Risk Assessment:** None **Vulnerabilities Considered:** PTSD and susceptibility to it	Not stated.	Not stated	The study relied on self-report data so

Relationships Between Posttraumatic Stress Disorder and Depression in Adolescents Following the Yancheng Tornado in China	Chen, Y.; and Deng, Z.		**Type of Potential Strategy:** *Clinical:* Attention given to people diagnosed with PTSD especially adolescents with higher levels of it which can then prevent subsequent depression. Coping with family is important (full support during Chinese holidays). Government provided timely rescue and home reconstruction and this support may have helped survivors too. **Short- or Long-Term:** Short and long term **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD and depression **Funding:** Not stated **Stakeholders:** mental health workers **Responsibility:** mental health workers **Other Notes:** PTSD in early phases potentially predicts depression, but depression had no significant impact on PTSD in other time periods.			there could have been an overestimation of symptoms. Larger sample size needed. Considerations for pre-trauma variables would be good too.
Posttraumatic Stress and Depressive Reactions Among Nicaraguan Adolescents After Hurricane Mitch	Goenjian, A.K.; Molina, L.; Steinberg, A.M.; Fairbanks, L.A.; Alvarez, M.L.; Goenjian, H.A.; Pynoos, R.S.	None stated	**Vulnerability Risk Assessment:** Child PTSD Reaction Index, Depression Self-Rating Scale **Vulnerabilities Considered:** Level of impact, sex, death of a family member, relocation, thoughts of revenge **Type of Potential Strategy:** Systematic screening of affected population. Stratifying interventions based on risk assessments. Trauma and grief focused interventions followed by monitoring during recovery. **Short- or Long-Term:** Short and long term **Timeline:** Response and recovery **Mental health outcomes addressed:** PTSD and depression **Funding:** Not stated **Stakeholders:** Mental health workers, researchers, policymakers **Responsibility:** Mental health workers **Other Notes:**	not stated.	not stated.	Future research: creating comprehensive disaster recovery programs considering posttraumatic stress and depressive symptoms.
A Three-Tiered Model of School-Based Trauma Services to Address Long-Term Impact of a Major Natural Disaster	D'Amico, P.J.; Carmine, L.; Roderick, H.; DeSilva, M.; Vogel, J.M.	not mentioned	**Vulnerability Risk Assessment:** **Vulnerabilities Considered:** **Type of Potential Strategy:** *Schools are a good place for a first intervention.* However, they have a limited capacity to implement large-scale and comprehensive disaster-focused interventions. Schools lack of pre-existing mental health infrastructure and personnel. Three-tiered school intervention. *Tier 1:* Student resiliency programming. Developing social connections and nurturing relationships (activities include yoga, practicing relaxation and presence, creating a Public Service Announcement video, mural creation, coping booths, learning healthy coping mechanisms). Also included psychoeducation for children and adolescents. Different methods for education depending on age. Older children appreciated apps on phones and tablets where younger children had more creative and game approaches. *Tier 2:* Activities for parents and teachers. Connecting school to home. Provision of information on natural disasters and preparedness. Psychoeducation for parents to recognise symptoms in themselves and in child or adolescent. Educators can observe children in school and report their trauma presentation. Creating a partnership between families and schools and increase school attendance and academic progress. *Tier 3: Clinical:* Screening and treatment phase. Screen for PTSD, depression, substance abuse, and general wellbeing. Direct referrals from educators. Treated with Cognitive Behavioural Intervention for Trauma in Schools (group) and Trauma-Focused Cognitive Behavioural Therapy (individual). One or both. Parents treated with psychological first aid. Important considerations: Local community action plans, focus on the central role of the school, include relationships with health systems in the community, training school staff. **Short- or Long-Term:** Both **Timeline:** Preparedness, response, and recovery	Resilience promoted through schools. The "how's your 5?" method: care for body, feelings, play, school, and thoughts. How to bounce back. The importance of social connections and connection to community	Participation in leadership roles within the school led to a sense of empowerment. Creation of the art mural and public service announcement video allowing them to be involved.	The researchers recommend that funding is available for schools to be involved in disaster planning efforts. Training clinical staff and creating partnerships outside the school.

			Mental health outcomes addressed: PTSD, depression, anxiety substance abuse **Funding:** Grant funded through a New York State Block Grant **Stakeholders:** Northwell Health, schools, administrators, mental health providers, teachers, parents, children **Responsibility:** Mental health workers, teachers, parents, school administrators **Other Notes:** loss of community supports, family, and friends. Role of parental stress after a natural disaster			
Will boys' mental health fare worse under a hotter climate in Australia?	Xu, Y.; Wheeler, S.A.; Zuo, A.	None stated	**Vulnerability Risk Assessment:** Strengths and difficulties questionnaire (behavioural screening) **Vulnerabilities Considered:** Gender, average temperature, socioeconomic status, physical activity, indigenous people **Type of Potential Strategy:** Consider age and gender specific effects of climate. This study shows that impacts may be greater for boys. Poverty-temperature interaction. Participation in physical activities should be a policy consideration. Mitigate identified negative effects of organised physical activity (i.e.. heat protection). Access to indoor physical activities. Targeted mental health policies for indigenous girls and children of low socioeconomic status. Community improves recreational and green spaces. **Short- or Long-Term:** Both **Timeline:** Preparedness **Mental health outcomes addressed:** All mental health outcomes (internalising, externalising, indirect, and direct): The SDQ evaluates emotional problems, hyperactivity, conduct problems, and social problems **Funding:** Not stated **Stakeholders:** Researchers, policy makers, community **Responsibility:** Policy makers and community **Other Notes:** None.	Not explicitly. Mentions coping and the effects of SES, gender, participation in physical activities	Not explicit	Considering gender in research investigating links between mental health and environment. Other mediating variables like air pollution, urban heat islands, and interaction with green space were not considered.
Adolescents' perspectives on the psychological effects of natural disasters in China and Nepal	Newnham, E.A.; Gao, X.; Tearne, J.; Guragain, B.; Jiao, F.; Ghimire, L.; Chan, E.YY.; Leaning, J.	None stated.	**Vulnerability Risk Assessment:** None. **Vulnerabilities Considered:** Scale and recency of the event, loss, ongoing post-disaster adversity **Type of Potential Strategy:** Considerations: unsafe building, inadequate living conditions, poor sanitation, and increase in violence or harassment were daily stressors. Presence of physical symptoms: insomnia, lack of appetite, headaches, tremors, stomach aches, pains, vomiting, sweating, and difficulty breathing. Cultural possession episodes in Nepal. Engagement in unsafe, antisocial, or disruptive behaviours in adolescents. Violence and crime increase in adolescents. Participation in disaster response and dissemination of the information contributing to PTG. Care and support of younger children and peers. Responses to disaster may be universal in adolescents. Moving towards more westernised notions of PTSD. "Globalised psychology" because of expansion of pharmaceutical markets international aid, media coverage, and globalisation. Still a single diagnostic framework isn't enough. Considering culture to locally tailor services. Local perceptions and engagement in treatment. Parental support and family cohesion and addressing economic insecurity. Interventions for parents, caregivers, and family's psychological wellbeing just as important. General improvement of health and economic outcomes. Strengthening community support for youth involvement in disaster preparedness and response programs. Access to schooling **Short- or Long-Term:** Both **Timeline:** Preparedness, response, recovery **Mental health outcomes addressed:** anxiety, posttraumatic stress, mood disturbance, somatic complaints, and behavioural difficulties. Post-traumatic Growth. Suicide risk. **Funding:** Not stated **Stakeholders:** Policy makers, researchers, adolescents	Adolescents more resilient than parents. Willingness to help others, learning about disaster response, engaging in preparedness efforts. Connectedness with the community. Parental support is a positive factor. Connectedness with family. self-efficacy and mastery. Confidence. Hopefulness and improvements in living conditions.	Role in disaster preparedness and disseminating information to more vulnerable groups. Adolescents can be effective leaders following disasters.	Data from more rural districts are needed and longitudinal assessments to understand longer term impacts.

			Responsibility: Communities **Other Notes:**			
Developmental Differences in Children and Adolescent's Post-Disaster Reactions	Dogan-Ates, A.	None stated.	**Vulnerability Risk Assessment:** None. **Vulnerabilities Considered:** Developmental age **Type of Potential Strategy:** The role and responsibility of nurses, paediatricians, and psychologists that frequently work with children and adolescent to design developmentally specific interventions. Mental health assessments are age appropriate. Assisting parents in recognising normal responses. Psychoeducation. Considering culture in interventions. **Short- or Long-Term:** Short **Timeline:** Response and recovery **Mental health outcomes addressed:** See mental health outcomes **Funding:** not stated **Stakeholders:** parents, children, adolescents, nurses, paediatricians, and psychologists **Responsibility:** Professionals that work with children **Other Notes:**	Not stated.	Not stated.	Future research opportunity for professionals to use developmental information to create targeted and specific interventions.

Appendix 3.1. Template for International Journal of Environmental Research and Public health with included instructions for authors.

Type of the Paper (Article, Review, Communication, etc.)

Title

Firstname Lastname [1], Firstname Lastname [2] and Firstname Lastname [2,*]

[1] Affiliation 1; e-mail@e-mail.com
[2] Affiliation 2; e-mail@e-mail.com
* Correspondence: e-mail@e-mail.com; Tel.: (optional; include country code; if there are multiple corresponding authors, add author initials)

Citation: Lastname, F.; Lastname, F.; Lastname, F. Title. *Int. J. Environ. Res. Public Health* **2022**, *19*, x. https://doi.org/10.3390/xxxxx

Academic Editor: Firstname Lastname

Received: date
Accepted: date
Published: date

Abstract: A single paragraph of about 200 words maximum. For research articles, abstracts should give a pertinent overview of the work. We strongly encourage authors to use the following style of structured abstracts, but without headings: (1) Background: Place the question addressed in a broad context and highlight the purpose of the study; (2) Methods: briefly describe the main methods or treatments applied; (3) Results: summarize the article's main findings; (4) Conclusions: indicate the main conclusions or interpretations. The abstract should be an objective representation of the article and it must not contain results that are not presented and substantiated in the main text and should not exaggerate the main conclusions.

Keywords: keyword 1; keyword 2; keyword 3 (List three to ten pertinent keywords specific to the article yet reasonably common within the subject discipline.)

0. How to Use This Template

The template details the sections that can be used in a manuscript. Note that each section has a corresponding style, which can be found in the "Styles" menu of Word. Sections that are not mandatory are listed as such. The section titles given are for articles. Review papers and other article types have a more flexible structure.

Remove this paragraph and start section numbering with 1. For any questions, please contact the editorial office of the journal or support@mdpi.com.

1. Introduction

The introduction should briefly place the study in a broad context and highlight why it is important. It should define the purpose of the work and its significance. The current state of the research field should be carefully reviewed and key publications cited. Please highlight controversial and diverging hypotheses when necessary. Finally, briefly mention the main aim of the work and highlight the principal conclusions. As far as possible, please keep the introduction comprehensible to scientists outside your particular field of research. References should be numbered in order of appearance and

indicated by a numeral or numerals in square brackets—e.g., [1] or [2,3], or [4–6]. See the end of the document for further details on references.

2. Materials and Methods

The Materials and Methods should be described with sufficient details to allow others to replicate and build on the published results. Please note that the publication of your manuscript implicates that you must make all materials, data, computer code, and protocols associated with the publication available to readers. Please disclose at the submission stage any restrictions on the availability of materials or information. New methods and protocols should be described in detail while well-established methods can be briefly described and appropriately cited.

Research manuscripts reporting large datasets that are deposited in a publicly available database should specify where the data have been deposited and provide the relevant accession numbers. If the accession numbers have not yet been obtained at the time of submission, please state that they will be provided during review. They must be provided prior to publication.

Interventionary studies involving animals or humans, and other studies that require ethical approval, must list the authority that provided approval and the corresponding ethical approval code.

3. Results

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

3.1. Subsection

3.1.1. Subsubsection

Bulleted lists look like this:

0. First bullet;
1. Second bullet;
2. Third bullet.

Numbered lists can be added as follows:

1. First item;
2. Second item;
3. Third item.

The text continues here.

3.2. Figures, Tables and Schemes

All figures and tables should be cited in the main text as Figure 1, Table 1, etc.

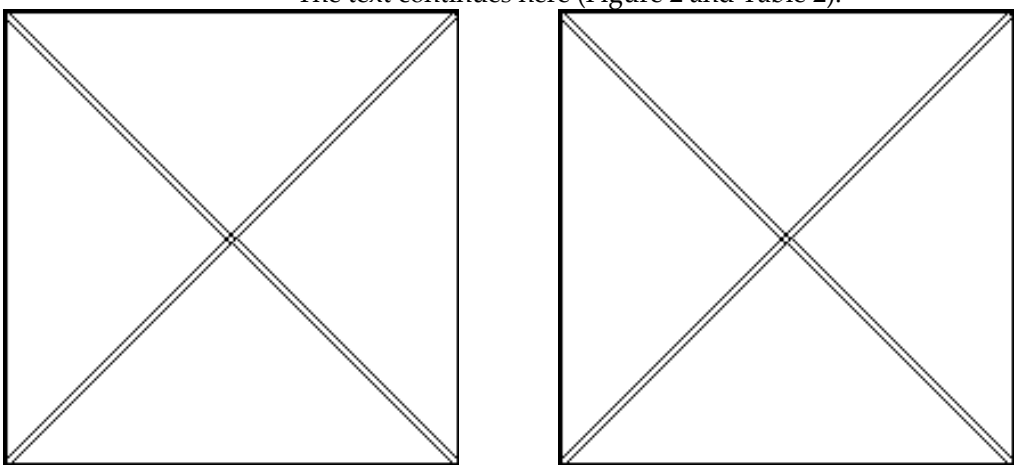
Figure 1. This is a figure. Schemes follow the same formatting.

Table 1. This is a table. Tables should be placed in the main text near to the first time they are cited.

Title 1	Title 2	Title 3
entry 1	data	data
entry 2	data	data [1]

[1] Tables may have a footer.

The text continues here (Figure 2 and Table 2).



(**a**) (**b**)

Figure 2. This is a figure. Schemes follow another format. If there are multiple panels, they should be listed as: (**a**) Description of what is contained in the first panel; (**b**) Description of what is contained in the second panel. Figures should be placed in the main text near to the first time they are cited. A caption on a single line should be centered.

Table 2. This is a table. Tables should be placed in the main text near to the first time they are cited.

Title 1	Title 2	Title 3	Title 4
entry 1 *	data	data	data
	data	data	data
	data	data	data
entry 2	data	data	data
	data	data	data
entry 3	data	data	data

	data	data	data
	data	data	data
	data	data	data
entry 4	data	data	data
	data	data	data

* Tables may have a footer.

3.3. Formatting of Mathematical Components

This is example 1 of an equation:

$$a = 1, \tag{1}$$

the text following an equation need not be a new paragraph. Please punctuate equations as regular text.

This is example 2 of an equation:

$$a = b + c + d + e + f + g + h + i + j + k + l + m + n + o + p + q + r + s + t + u + v + w + x + y + z \tag{2}$$

the text following an equation need not be a new paragraph. Please punctuate equations as regular text.

Theorem-type environments (including propositions, lemmas, corollaries etc.) can be formatted as follows:

Theorem 1. *Example text of a theorem. Theorems, propositions, lemmas,* etc. *should be numbered sequentially (i.e., Proposition 2 follows Theorem 1). Examples or Remarks use the same formatting, but should be numbered separately, so a document may contain Theorem 1, Remark 1 and Example 1.*

The text continues here. Proofs must be formatted as follows:

Proof of Theorem 1. Text of the proof. Note that the phrase "of Theorem 1" is optional if it is clear which theorem is being referred to. Always finish a proof with the following symbol. □

The text continues here.

4. Discussion

Authors should discuss the results and how they can be interpreted from the perspective of previous studies and of the working hypotheses. The findings and their implications should be discussed in the broadest context possible. Future research directions may also be highlighted.

5. Conclusions

This section is mandatory.

6. Patents

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Appendix A

The appendix is an optional section that can contain details and data supplemental to the main text—for example, explanations of experimental details that would disrupt the flow of the main text but nonetheless remain crucial to understanding and reproducing the research shown; figures of replicates for experiments of which representative data is shown in the main text can be added here if brief, or as Supplementary data. Mathematical proofs of results not central to the paper can be added as an appendix.

Appendix B

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References

References must be numbered in order of appearance in the text (including citations in tables and legends) and listed individually at the end of the manuscript. We recommend preparing the references with a bibliography software package, such as EndNote, ReferenceManager or Zotero to avoid typing mistakes and duplicated references. Include the digital object identifier (DOI) for all references where available.

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3. Author 1, A.; Author 2, B. *Book Title*, 3rd ed.; Publisher: Publisher Location, Country, 2008; pp. 154–196.
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