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How do **Climate Change** and **Environmental Degradation** contribute to **Violence against Children**?

Literature Review

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Executive Summary

This scoping review of the literature explores the interlinkages between two pressing crises: **violence against children (VAC)** and **climate change (CC)** together with **environmental degradation (ED)**. Only recently have research and policy begun to shine a light on the magnifying effect of CC on children's exposure to violence, exploitation, and abuse, with the role of ED remaining under-explored. To spur academic and political movement in this area, our research aims to help establish the magnitude, direction, and pathways of the relationship between CC, ED, and VAC. We showcase the complexity of that relationship and illustrate, in the form of case studies, why context-specific approaches and more research are needed.

We apply a multi-dimensional framework to understand VAC, considering direct violence (physical, sexual, and emotional) as well as structural drivers of violence rooted in inequitable and unjust systems and institutions. This approach helps us to understand the different implications for children in High-income Countries (HICs) and Low- and Lower-Middle Income Countries (LLMICs). Our conceptualization of CC relates to a change in the global atmosphere directly or indirectly caused by human activity. We use the term ED in two different ways. First, we refer to ED as a result of CC, such as severe heatwaves, droughts, wildfires, soil degradation, desertification or land degradation due to rising global temperatures. Second, ED can also intensify CC as a result of human-induced mass damage and destruction of ecosystems and severe harm to nature, which is widespread and long term, also known as Ecocide.

The effects of CC and ED on VAC are starting to become visible in varying degrees and pathways depending on the type of the **hazards and disaster risk reduction (Section 1)** or **gender (Section 2)**. Literature also points to risks and pathways of VAC in relation to ED and climate-induced **im/mobility (Section 3)** and **child labour (Section 4)**. We also included the negative impact of CC and ED on children's **health (Section 5)** in our analysis. The damage to children's health caused by CC and ED not only deprives them of their most basic human right to health but can also lead to severe physical and mental harm.

Section 1: Hazards and Disaster Risk Reduction

We distinguish between natural, human-induced and socionatural hazards. Studies on diverse locations are building a persuasive body of evidence that natural hazards can lead to an increase in VAC due to parental, economic, and social stress, with significant implications for children's mental and physical health. In both LLMICs and HICs, children from low socio-economic backgrounds experience most harm from natural hazards. There is a striking lack of robust, comparable, and transnational evidence to demonstrate the causality and magnitude of VAC, CC and ED. Research on human-induced hazards and VAC focuses predominantly on children's health or child labour, with studies and data missing to better understand the scale of human-induced hazards (such as deforestation or overfishing) and VAC. The term 'socionatural' hazard is useful to underline that natural and human-induced hazards can intersect, causing large-scale and long-lasting harm for generations. VAC following all kinds of environmental shocks continues to be widely under-reported. LLMICs are challenged by lower resources, infrastructure, and coping mechanisms to prevent and mitigate VAC. An overemphasis on individual resilience in Disaster Risk Reduction (DRR) can obscure the root causes of injustices intensified for children by ED or climate related catastrophes. More research is needed to inform integrated and culturally sensitive plans to respond to weakened child protection systems and preventative mechanisms prior to and following environmental hazards.

Section 2: Gender

Literature on the impact of CC and ED on gender-based violence (GBV) and violence against women and girls (VAWG) is growing, but much of this research focuses on women and girls. The focus on GBV and VAWG nevertheless offers useful insights to understand current knowledge on the relationship of VAC with CC and ED. VAWG and VAC have comparable risk factors, tend to co-occur, and have similar impacts over the life course. There are some important findings and patterns established in research on GBV and VAWG on which studies on VAC can build. These include: the disproportionate impact of CC and ED on women and girls; an increase in child marriage after environmental

shocks; and an increase in IPV (Intimate Partner Violence) during or shortly after extreme weather events, or due to shortages of resources (related to CC, ED or environmental exploitation). IPV can have severe long-term effects on children's development in various age groups. Specific legal frameworks and prevention mechanisms are missing to protect women and children during or shortly after extreme weather events. Nuanced data about boys' exposure to various forms of VAC in the context of CC and ED is missing, as studies tend to focus on masculinities and males as perpetrators but not victims of violence. The effects of CC and ED on children's schooling affect girls and boys differently. Girls are more likely to drop out due to individual level factors such as domestic labour, child marriage, and household violence. Boys tend to drop out when their help is required for rebuilding efforts, or for child labour.

Section 3: Im/mobility

While there is a rapid growth of literature on climate-related im/mobility, studies on how this affects children in particular are only recently emerging. *Mobility* related to CC, natural- or human-induced hazards, includes displacement, migration and relocation, and can happen gradually or be sudden. Existing literature points to three risks of VAC in relation to ED and climate-induced mobility. First, studies highlight an increased risk of VAC within migrating families related to multiple pressures and psychological stress. Second, some studies show that children living in camps and shelters due to environmental shocks or climate-related conflict have a higher exposure to various forms of violence. However, comparable and rigorous data is missing to understand the scale of the issue. Third, emerging research implies that children who are separated from their immediate families, including those living with relatives, tend to be extremely vulnerable to VAC. *Immobility* refers to populations that are unable to move to respond to sudden or gradual climate-related events or ED because of various environmental, social, political, economic, or health-related issues. There is little definitive evidence about how environmental- and climate-induced immobility might lead to VAC. Emerging qualitative evidence highlights that fear of violence in shelters leads women to remain at home after natural hazards, increasing children's risk of harm from the hazard or other forms of violence. In qualitative research, involuntary immobility in the context of ED has also been related to child abuse and injuries due to overcrowding in slum areas, parental stress or precarious living and working conditions.

Only recently have research and policy begun to shine a light on the magnifying effect of CC on children's exposure to violence, exploitation, and abuse, with the role of ED remaining under-explored.

Section 4: Child Labour

Child labour is considered to be on a spectrum from 'light' to the 'worst' forms, the latter including trafficking, child prostitution and pornography, and recruitment of children for armed conflict. Not all studies clearly distinguish between light and worst forms of child labour, which makes it difficult to arrive at general conclusions. Data on what kind of child labour increases in the context of CC and ED, and how this may entail violence, is available in small-scale qualitative research but not evident in large-scale, comparable, and generalizable quantitative studies. This is in part due to the hidden nature and contextual specificity of child labour. Although the evidence on this topic varies widely in quality and typology, existing research suggests that child labour increases after natural hazards, but contextual factors play an important role in this relationship. For example, children in rural areas may be more likely to enter child labour during times of drought, compared to children experiencing drought conditions in urban areas. Research also points to child labour in industries that significantly harm the environment and have been associated with CC, such as: agriculture; fisheries; mining and quarries; fashion industry or tourism. Quantitative data and rigorous academic research to understand the scale of the issue is needed. The interaction between child labour and school attendance is extremely complex, and schooling is not a panacea to prevent and reduce child labour in LLMICs. Research on whether CC and ED lead to school dropout and increases in child labour arrives at very mixed results, depending on context and region.

Section 5: Health

Children's ill-health in relation to CC and ED not only harms them physically and mentally but should also be seen as a structural form of violence depriving them of their basic human right to health, with children born in LLMICs being most disadvantaged. Children are exposed to environmental harms at all stages of their physical and mental development, starting from in-utero exposure. Natural hazards have been associated with poor health outcomes and death among children, affecting in particular children under the age of five. Mental health problems resulting from CC and ED can lead to a rise in perpetration of VAC, including domestic violence. Scholarship points to an increase in mental health issues after a natural hazard, affecting in particular children and youth from poorer socio-economic backgrounds or ethnic minorities. Evidence is also growing about the influence of 'eco-anxiety' in young people because of awareness of CC and ED and fears of the consequences. Despite the vast number of studies available, there are some crucial gaps in the literature as existing data is not comparable, generalizable, lacks more evidence from LLMICs and does not often take into account intersecting factors (i.e. a systems approach).

Taking **all five thematic areas** together, structural violence against children emerged as a cross-cutting theme, creating and reinforcing the conditions for multiple forms of VAC in the context of CC and ED. VAC is thus not just a phenomenon that intensifies during environmental shocks, but is deeply rooted in history, global injustices, systems and structures and therefore disproportionately impacts those living in poverty. Children from LLMICs, as well as children from lower socio-economic backgrounds in HICs, are more likely to be exposed to the many negative impacts of CC and ED. Environmental shocks can affect girls and boys differently, depending on region and context. In addition, children born in LLIMCs are more likely to suffer from the consequences of im/mobility; are at risk of being lured into the worst forms of child labour; are significantly more affected by industries that harm the environment and are more likely to be deprived of their most basic rights to health and education in the context of CC and ED. Structural and institutional factors (such as the absence of policies, laws and reliable implementation thereof) cause additional vulnerabilities for children to the damaging effects of CC and ED.

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List of Abbreviations

ASM	Artisanal and Small-Scale Mining
BBC	British Broadcasting Corporation
CC	Climate Change or Climatic Changes
CCRI	Children's Climate Risk Index
CRC	Convention on the Rights of the Child
DRR	Disaster Risk Reduction
DHS	Demographic and Health Surveys
ED	Environmental Degradation
FAO	Food and Agriculture Organization
FGM	Female Genital Mutilation
GBV	Gender Based Violence
HIC	High Income Country
IDPs	Internally Displaced Persons
ILO	International Labour Organization
IO	International Organization
IOM	International Organization for Migration
IPCC	Intergovernmental Panel on Climate Change
IPV	Intimate Partner Violence
LLMICs	Low- and Lower-Middle Income Countries
OHCHR	Office of the High Commissioner for Human Rights
PTSD	Post-Traumatic Stress Disorder
SRSG	Special Representative of the Secretary General
SRSG/VAC	Special Representative of the Secretary General on Violence against Children
SRHR	Sexual and Reproductive Health Rights
SSA	Sub-Saharan Africa
STIs	Sexually Transmitted Infections
UAPP	Unintentional Acute Pesticide Poisoning
UN	United Nations
UNCRC	United Nations Committee on the Rights of the Child
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNICEF	United Nations Children's Fund
VAC	Violence against Children
VAWG	Violence against Women and Girls
WHO	World Health Organization
WMO	World Meteorological Organization

Case Studies, Excerpts and Figures

Introduction

This scoping review of the literature examines two inter-related crises – a visible and a hidden one. The visible crisis is human-induced environmental destruction in combination with **climate change (CC)** and **environmental degradation (ED)**, making extreme natural events more frequent (IPCC, 2021). The hidden crisis is a global public health issue, namely **violence against children (VAC)** affecting an estimated 1 billion children (aged 0-18) worldwide (Hillis et al., 2016; WHO, 2016).

Almost every child on earth is exposed to at least one major climate or environmental hazard, and 80 million children are believed to be exposed to a total of six overlapping environmental shocks or stresses, such as: heatwaves, cyclones, floods, water scarcity, vector-borne diseases, or air pollution (UNICEF, 2021b). Scientists further estimate that children born in 2020 will experience a two- to sevenfold increase in extreme weather events, particularly heat waves, compared with people born in 1960 (Thiery et al., 2021). Most recently, researchers also warned that there is a 66% chance that the globe will pass the 1.5C global warming threshold before 2027. The 1.5C figure has become an important figure for global CC negotiations, as going over 1.5C every year for a decade or two would see far greater impacts of warming, such as longer heatwaves, more intense storms and wildfires (BBC, 2023). Around 160 million children currently live in areas experiencing high levels of drought, and about 503 million children are exposed to a high risk of floods due to extreme weather events such as cyclones, hurricanes and storms, as well as rising sea levels (UNICEF, 2021b). By 2040 one in four children are predicted to be affected by extreme water stress (UNICEF, 2021b). According to the World Health Organization (WHO) more than one in four deaths of children under five years of age (1.7 million) are attributable to unhealthy environments (WHO, 2017b).

Children in Low- and Lower-Middle Income Countries (LLMICs) are more likely to be exposed to multiple climate-related events or environmental factors (UNICEF, 2021b), pointing to the many social and global injustices inherent in CC (Chakraborty, 2017). According to the Children's Climate Risk Index (UNICEF, 2021a), children in Sub-Saharan Africa (SSA), have the highest exposure to CC and ED.

The 2022 Annual Report to the United Nations General Assembly (UNGA) by the SRSG (Special Representative of the Secretary General) on VAC recognized for the first time that CC is acting as a threat multiplier magnifying children's exposure and vulnerability to violence, exploitation and abuses (SRSG/VAC, 2022). In the report, the SRSG/VAC notes that although CC is being addressed at the global, regional and national levels, through a wide range of high-level political commitments, treaties, resolutions, frameworks, policies and agreements (pp. 13-18), more needs to be done to make responses to CC child-sensitive.

The SRSG/VAC report is an important step forward. At the time of writing, the interlinkages between VAC, CC and ED were not officially acknowledged in global and most prominent VAC frameworks and instruments, such as INSPIRE (WHO, 2016), UNICEF's Evidence and Gap Map (UNICEF, 2021c) or by the Global Report on Ending Violence in Childhood (Save the Children, 2017b). UNICEF's (2021b) recent 'Children's Climate Risk Index' (CCRI) is a much needed and novel initiative with its specific focus on children's 'exposure' and 'vulnerabilities' to climate and environmental hazards, but its focus on VAC is limited. The same applies to frameworks that measure the consequences of CC such as reports from the Intergovernmental Panel on Climate Change (IPCC, 2018, 2021) or the Global Climate Risk Index (Eckstein et al., 2021).

Apart from the latest report by the SRSG/VAC, there is a growing community of practice around CC and children's rights (OHCHR, 2017). In spring 2021, the United Nations Committee on the Rights of the Child (UNCRC) drew up a 'General Comment' on countries' obligations on child rights and the environment, with a special focus on CC (Kippenberg, 2021; OHCHR, 2021). This General Comment is expected to provide authoritative guidance to the governments of the 196 countries that have ratified the Convention on the Rights of the Child (CRC). In addition, it is anticipated to serve as an impetus for global-level change and as a powerful tool for children and young people as well as their advocates to hold governments and other relevant actors accountable (OHCHR, 2021). These efforts have been followed by a historic resolution adopted by the UNGA in 2022 on the human right to a clean, healthy, and sustainable

environment, making note of children as one of the most vulnerable groups (UNGA, 2022). The resolution is not yet legally binding on all 193 United Nations (UN) member states.

With this scoping review of the literature, we want to contribute to ongoing efforts in policy, practice and research to address the effects of CC and ED on children. However, as scholars, we need to stress that our knowledge on how environmental shocks increase the risk of VAC is still limited. **While it seems plausible that CC and ED increase VAC, the nature of this relationship varies by context and is not fully understood through research and across disciplines.**

This is not to imply that we cannot draw some lessons or knowledge from existing research. As we will show in this extensive and scoping review of the literature, evidence is emerging in some disciplines, specific thematic areas or case studies presented in scholarly work, but also in grey literature. The challenge lies in connecting the dots, learning from in-depth case studies, as well as broader data and identifying patterns to deepen our understanding of pathways and relationships from a diverse body of work. To capture a wide range of topics affecting children in the scope of CC and ED, our guiding question for this scoping review is deliberately broad, namely:

What is the relationship between climatic changes, environmental degradation, and violence against children?

This broad focus allowed us to do justice to our conceptual framings of VAC and CC together with ED (see Graph 1 page 11). It is useful to grasp the magnitude, complexity, and intersectionality of the issue, considering that children are implicitly and explicitly affected by environmental shocks. As we will show in the remainder of this review, the effects of CC and ED on VAC are starting to become visible in varying degrees and pathways, depending on the type of the **hazard (Section 1)** or **gender (Section 2)**. Literature also points to risks and pathways of VAC in relation to ED and climate-induced **im/mobility (Section 3)** and **child labour (Section 4)**. There is a significant body of work on how environmental shocks and natural hazards affect children's physical and mental health. We have decided to include this literature in our review, as we consider the negative impact of CC and ED on children's **health (Section 5)** as a structural form of violence. Depriving children of their most basic human right to health depending on how their home countries can cope with the consequences of CC and ED, is not just an injustice but an act of indirect violence. Throughout all sections structural violence against children has emerged as a cross-cutting theme. Given that children born in LLMICs are most disadvantaged in relation to CC and ED, we pay particular attention to their experiences, but also present and discuss data from HICs as well.

Conceptualizing Violence against Children

Our conceptualization of VAC in regard to CC and ED is deliberately broad if compared to most policy frameworks and quantitative research in public health. The World Health Organization (WHO) defines violence as: 'the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, which either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment, or deprivation'.[1] Violence, in this definition, includes acts leading to physical and psychological harm, and when applied to children under 18 years old, includes maltreatment (including violent punishment), bullying, youth violence, intimate partner violence, sexual violence, and emotional violence (WHO, 2016). Similar definitions have been adopted by many public health and global VAC frameworks, all referring to physical, sexual, and emotional acts of violence, including neglect, perpetrated by individuals, causing harm to children (see: Save the Children, 2017a, 2017b; UNICEF, 2021b, 2023; WHO, 2016). However, over the past decades, research from other disciplines such as political science, sociology, or psychology, has increasingly recognized that these acts of violence are embedded in relationships, systems and structures (eg. Parkes et al., 2013; Salmi, 2006; Stewart, 2005, 2013; Young, 1990). This scholarship argues that focusing attention only on acts that harm children, sidelines why violence occurs, and the multiple conditions reinforcing it over time (Save the Children, 2017b). Violence, in this broader framing, is perpetrated not only by individuals, but by institutions and structures that harm children's physical and psychological well-being.

Against this backdrop, we understand violence not just as a direct act of physical, sexual or emotional force, but also as having its roots in norms and discourses, and in inequitable and unjust socio-economic and political systems and institutions (cf. Lee, 2019). We apply a **multi-dimensional framework of VAC**, building on our own research (Datzberger, 2022; Datzberger & Le Mat, 2018; Parkes, 2016; Parkes et al., 2013), including a collaborative longitudinal cohort study on Contexts of Violence in Adolescents Cohort Study (CoVAC) (see: Devries et al., 2020; Parkes et al., 2020) – thereby approaching VAC as:

> An act of physical, sexual, emotional force, embedded in structural processes and inequities that are either the result of, or occur alongside past and present economic, social or political conditions, as well as harmful norms and discourses.

1 See: https://www.who.int/groups/violence-prevention-alliance/approach, accessed 09.05.2023.

We consequently treat the relationship of CC, ED and VAC as a process and not an event. Our approach also helps us to move away from one-dimensional causations and instead shed light on how complex relationships between environmental changes (such as extreme weather events) together with social structures, norms, institutions, and interactions influence VAC. This approach is needed to highlight how social, political, and economic structures and institutions create and perpetuate horizontal and vertical inequalities for children (Stewart, 2005, 2013) which can result in direct forms of violence in the context of CC and ED. As we will showcase and argue in later sections, depriving children of their most basic human rights such as 'health' or 'education' in the context of CC and ED, is often rooted in structural forms of violence, affecting children born in LLMICs or from lower socioeconomic backgrounds the most. For example, sudden or gradual lack of access to education related to ED or CC poses a risk for children to become easy targets of exploitation or engage in the worst forms of child labour. Children's mental and physical health can also be compromised by sudden or gradual changes in family or community dynamics after an environmental shock.

Hence our review of the literature deliberately includes policy reports and academic research on children's 'wellbeing' and 'vulnerabilities' in the context of CC and ED. This shift in thinking about VAC helps to address persisting 'climate injustices', disadvantaging children born in LLMICs the most and fortified by underlying social and geographical disadvantages (cf. Braveman & Gruskin, 2003). **VAC in relation to CC and ED is also historically built into and perpetuated by global power asymmetries and unjust political, economic and social structures**.

Conceptualizing Climate Change and Environmental Degradation

For the past three centuries, humanity's effects on the planet have escalated (Crutzen, 2002). There is broad consensus among scientists that the Earth's climate started to change with the beginning of a new epoch – the Anthropocene (Crutzen, 2002; Lewis & Maslin, 2015) – a concept which has gained widespread attention and is commonly used by scientific communities and in public discourse. Rapid world population growth, in combination with human activities such as burning of fossil fuels, deforestation, and other human activities that release large amounts of greenhouse gases into the atmosphere, have a significant impact on the Earth's climate ecosystem. The United Nations Framework Convention on Climate Change (UNFCC) therefore defines CC as: 'A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.' (IPCC, 2018, p. 544).

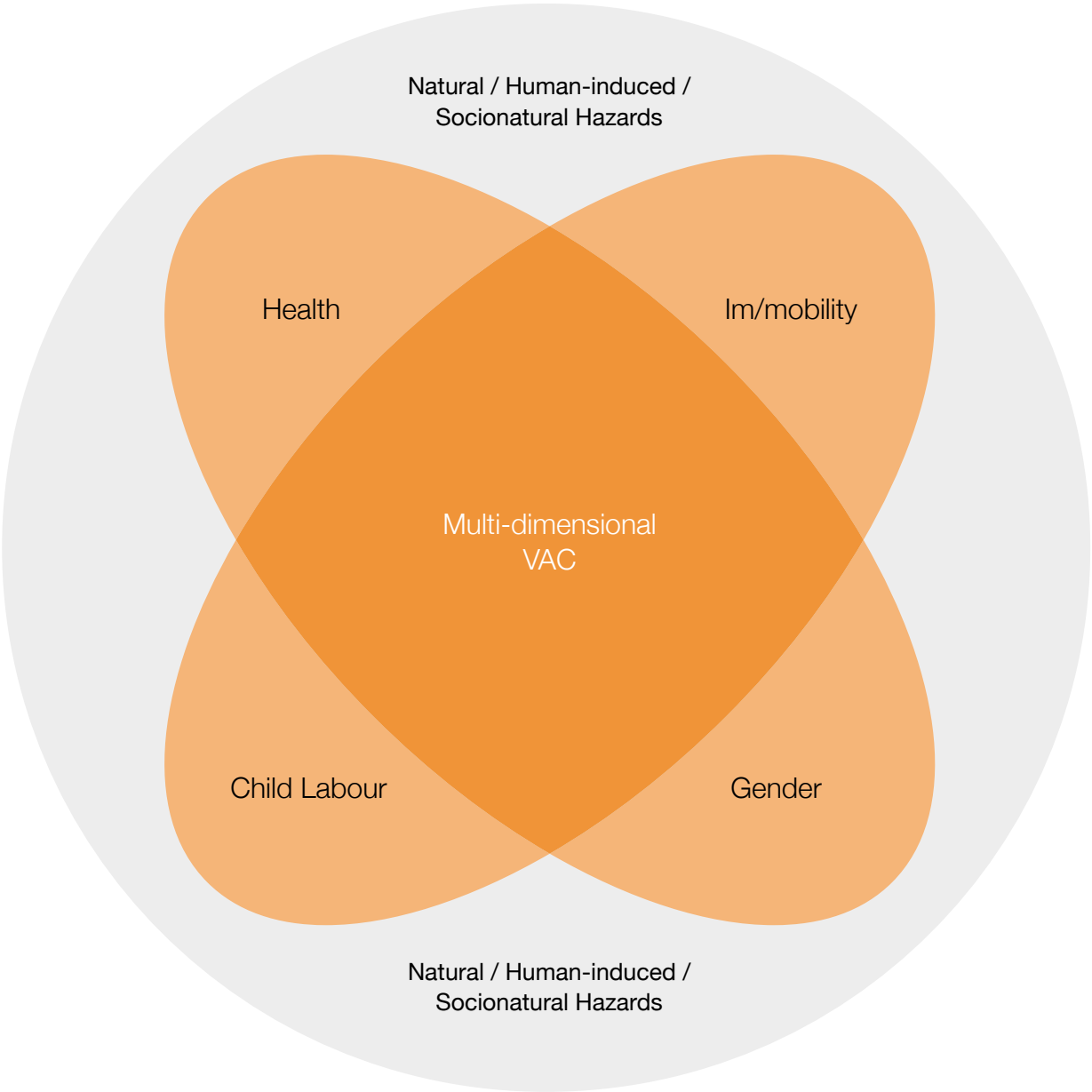
To capture the complexity of human activity and CC, we also make use of the term ED (Environmental Degradation). Our definition of ED is twofold: First, ED occurs as a direct or indirect result of CC, such as severe heatwaves, droughts, wildfires, soil degradation, desertification or land degradation due to rising global temperatures. CC can also manifest in a higher frequency of storms, flooding, and sea level rise, which can cause ED in the form of water pollution, erosion or coastal degradation. Second, ED can also intensify CC as a result of human-induced mass damage and destruction of ecosystems and severe harm to nature, which is widespread and long term, also known as Ecocide.[2] This includes human activities such as: pollution, deforestation, desertification or soil erosion, but also industrialization, urbanization, intensive farming, and resource extraction. CC and ED are thus interrelated and often co-occur as a result of the same human activities.

Our decision to examine both CC and ED helps us to recognize that **CC is not just an environmental issue but also a social, economic and political matter**. Like VAC, the causes and effects of CC and ED are not one-dimensional but embedded in systems, institutions, structures, norms, and interactions. The uneven effects of CC and ED are deeply rooted in history, bringing to light persisting global and social injustices. For instance, children born in LLMICs often face the most severe consequences of CC and ED, yet their home country contributes least to its causes (UNICEF, 2021b). That in itself, we argue, is already a structural form of violence. While the carbon footprint of a person in a HIC is on average 10.3 metric tonnes of CO_2 annually, a person in a LLIMC is estimated to produce as little as 0.2 metric tonnes of CO_2 annually (UNICEF, 2021b). Scholars therefore advocate for the recognition of climate and environmental injustices as well as the complex and interdependent nature of the problem (Mohai et al., 2009). The negative effects of CC and ED, such as VAC, emerge from complex interactions between natural and social systems. This further extends to pre-existing socio-economic vulnerabilities and how they are further exacerbated by environmental stress (Hayward & Ayeb-Karlsson, 2021).

Like VAC, the causes and effects of CC and ED are not one-dimensional but embedded in systems, institutions, structures, norms, and interactions.

2 See: https://www.stopecocide.earth/what-is-ecocide, accessed 21.04.2023.

Figure 1: Thematic areas and relationships



Method

To gain a broad and comprehensive view of the existing literature on VAC, CC and ED we have adopted a scoping review method. Scoping reviews are a rigorous approach to reviewing the literature in emerging fields of study where a systematic review may not be possible due to the broad scope of the research question and varied nature of research methods used to explore the topic (Munn et al., 2018).

There are a few systematic reviews about the relationship between CC and/or ED and GBV, child labour, and children's health (eg. Cerna-Turoff, Fang, et al., 2021; Cerna-Turoff, Fischer, et al., 2021; Helldén et al., 2021; Thurston et al., 2020). However, the authors of this research highlighted a myriad of methodological challenges in comparing and synthesizing studies, making it difficult to draw compelling conclusions from the data. Due to inconsistency of the generalisability and validity of the evidence, we decided to conduct a scoping review, with the aim to (cf.: Munn et al., 2018):

- Identify the types of available evidence about the relationship between CC, ED and VAC
- Examine how research is conducted on the relationship between VAC, CC and ED
- Clarify key concepts and definitions of VAC, CC and ED taking a critical perspective
- Identify what the literature says are the central characteristics and factors influencing the relationship between VAC, CC and ED
- Identify and analyse knowledge gaps in the literature about VAC, CC and ED to highlight areas for new systematic reviews and future research.

We take an exploratory approach that encompasses a broader range of studies than a systematic review, including those of varying quality and methodology (Arksey & O'Malley, 2005; Levac et al., 2010; Munn et al., 2018). We initially searched the literature using three databases: Scopus, PubMed and Google Scholar, and reference lists from papers we identified. Following this initial stage, we continually revised and refined the search terms (Arksey & O'Malley, 2005), as we grew to better understand the complexities of pathways between CC, ED and VAC, and to acknowledge definitional differences between disciplines, such as exploring both migration and im/mobility. We expanded the search to include policy and grey literature, as well as academic literature that did not have an explicit focus on CC or ED and VAC. For example, we reviewed a significant body of literature on child labour which was not explicitly related to the relationship of CC and ED, but findings were still relevant to be included to our analysis. The search of the grey literature and policy documents was informed by the research team's existing knowledge, networks of researchers, relevant organizations and outputs from conferences, as well as meetings and webinars we attended about topics related to this review. The Annex at the end of this review provides an overview of our search terms and search strategy for each section.

In line with our aim of identifying all relevant literature regardless of the study design or research discipline, we did not place strict limitations on search terms or criteria for selecting research to include in the review (Arksey & O'Malley, 2005). We did establish some exclusion criteria post-hoc, which were specific to the thematic sections often based on nuanced conceptualizations of the different phenomena we were considering. We therefore explain at the beginning of each thematic section our scope of enquiry, and how we approach current concepts, theories, debates and trends in the field that informed our literature search and analysis (Levac et al., 2010). For example, in the section on child labour, we justify why we focused mainly on the 'worst forms' of child labour in the context of CC and ED.

Unlike systematic reviews, scoping reviews do not require a quality appraisal of the evidence based on rigour and generalizability. We did not exclude studies based on the quality of evidence, with the aim of presenting what has and has not been investigated about the topic to date. Instead, we provide a descriptive – yet critical – account of the data available, commenting on the relevance, rigour and appropriateness of evidence throughout the literature review (Arksey & O'Malley, 2005). In our analysis of the literature, we refrain from offering broad conclusions deriving from specific studies on age groups or gender, as this data is not applicable to all contexts and results vary not only by region but also among scholars.

Given the complexity and contextual nature of pathways between VAC, CC and ED we have included some illustrative case studies in our review. Illustrative case studies are descriptive accounts of phenomena, presenting either a demonstrative explanation, or an important variation to showcase the what and why of an occurrence (Epler, 2019). The case studies in this review are not chosen for generalizability, but rather provide self-contained explanations of the complex interaction between CC, ED and VAC. Co-authors developed the detailed case studies, drawing on local knowledge based on previous research, or alternatively on academic studies which provided particularly rich and informative accounts of the relationship between VAC, CC and ED.

Concepts of childhood and violence can both be understood and defined differently by different individuals and in different contexts.

Challenges of researching VAC in the context of CC and ED

We are not alone in highlighting that more data and research is needed to better understand the interlinkages of VAC, CC and ED (see: Barnfonden, 2020; Pereznieto et al., 2020). There are several challenges related to creating systematic and generalizable research on VAC.

Large scale studies do not usually do justice to children's perspectives on and understandings of violence they face. In part this is due to missing research that captures young people's and children's experiences and voices. At the same time, including children's views must be balanced with considerations of child protection. This is even more important when researching children's experience of all forms of violence (Devries et al., 2016; Morrow & Richards, 1996). The sensitive nature of research on VAC can therefore lead to several methodological and ethical challenges and barriers to research (Leach, 2006; Veena & Chandra, 2007; WHO, 2002). Ethical concerns related to researching VAC also have important implications for interpreting primary research for a scoping review such as this. We are cognizant of the fact that studies may not present transparent information about ethical protocols and standards for reporting data collection on sensitive subjects. This will be exacerbated in times of crisis when child protection mechanisms are disrupted (Curtis et al., 2000; Seddighi et al., 2021). It also has important implications for the ability to assess whether researchers have implemented the principle of 'do no harm', and to assess how reliable the findings are (Peterman et al., 2023).

Another challenge we faced during our review of the literature relates to conceptualizations and definitions. Concepts of childhood and violence can both be understood and defined differently by different individuals and in different contexts (Parkes et al., 2013). Most studies we reviewed are based on westernized ideals of childhood or children's wellbeing, prioritizing individual over communal children's rights, which can be ill-suited (and at times even damaging) for children in some non-western contexts (Faulkner & Nyamutata, 2020; Pupavac, 2001). It was challenging to find literature that would help us to better understand local and culturally relevant conceptualizations of childhood, including prevention and mitigation mechanisms of VAC.

Thematic Review of the Literature

01 Hazards and Disaster Risk Reduction

Extreme weather events and environmental shocks have come to dominate the 21st century (UNDRR, 2020). In the past twenty years, humanitarian disasters triggered by climate or other natural hazards have been increasing in frequency, severity and duration worldwide (Thurston et al., 2020; UNDRR, 2020). Global environmental changes resulting from rapid world population growth and intensified human development over the past centuries have marked the start of a new geological epoch, termed the Anthropocene (Crutzen, 2002; Lewis & Maslin, 2015). Various natural hazards have been directly related to human (in-)activity. While policy actors have increasingly acknowledged that climatic changes and natural hazards affect children's vulnerabilities (UNICEF, 2021b) and can be a 'threat multiplier' for VAC (UNGA, 2022), research on how specific environmental shocks or hazards explicitly intersect with VAC is still in its early stages.

Most of the literature on VAC and environmental shocks makes use of the term 'natural disasters'. While we reviewed literature applying this term, we deliberately refrain from using it, as it is not the naturally occurring phenomenon that causes VAC, but rather the absence of social, political and economic structures and protection mechanisms or their disruption which can potentially increase exposure to violence (Seddighi et al., 2021). Persistent inequities, such as in living conditions, wealth/poverty, or a government's capacity to respond – thus expressions of structural forms of violence – are all factors that determine whether a natural hazard leads to a disaster. Environmental shocks are inevitable, but the impact they have on society, and consequently on children, is not (Relief Web, 2021).

We therefore organize our review of the literature on VAC in relation to three different types of climate related shocks: ***natural hazards***; ***human-induced hazards*** and hazards that are of ***socionatural*** origin.[3] Putting these three categories in direct relation to CC, we understand:

3 We took inspiration from the UNDRR: https://www.undrr.org/terminology/hazard, accessed 30.01.2023, but significantly revised terminology.

Natural hazards as an abnormal intensity of a natural agent or process (such as: heatwaves, wildfires, cyclones/ hurricanes, riverine and coastal flooding, water scarcity, vector-borne diseases, pollution).

Human-induced hazards as a form of ED or damage that is man-made, caused by human activities and choices that significantly harm the environment and potentially also the climate (such as: deforestation, excessive natural resource exploitation, or oil spills). This further extends to human conflict caused by the effects of CC.

Socionatural hazards as the occurrence of both natural and human-induced hazards, in sequence or at the same time (e.g.: mudslides, floods or avalanches in a previously deforested region).

Environmental shocks are inevitable, but the impact they have on society, and consequently on children, is not.

1.1 Natural hazards

Research on how natural hazards affect children has predominantly focused on children's physical and mental health (e.g.: Dyregrov et al., 2018; Garcia & Sheehan, 2016; Kousky, 2016) (see Section 5 for a detailed discussion). That environmental shocks increase physical, emotional, and sexual VAC is a widely believed and reasonable assumption, but the exact relationship varies by context and is not fully understood. In part this is due to heterogeneity of indicators used in research, different methodologies, study sample sizes, distinctive study contexts and definitions of key terms (such as VAC), or periods of data collection. Crucially, there is a lack of robust data that would allow for comparisons of VAC prevalence before and after a hazard occurred in multiple contexts and not just in one case study. Scholars further point to the lack of clarity about which elements of environmental shocks might lead to increased or specific types of VAC. A systematic review of the literature conducted by Cerna-Turoff et al. (2021) on the topic mapped potential **pathways of VAC and environmental shocks**, on the basis of existing quantitative and qualitative studies. They identified the following:

i. Environmentally induced changes in supervision, accompaniment and child separation (see Section 3)

ii. Transgression of social norms in post-disaster behaviour (mainly related to sexual violence and GBV) (see Section 2)

iii. Economic stress (cross-cutting in all sections of this review)

iv. Negative coping with stress (see Section 5)

v. Insecure shelter and living conditions (see Section 3)

Looking at the specific studies that were reviewed, it is important to note that these pathways are not generalizable and are context dependent. They are not based on transnational and comprehensive quantitative and qualitative data to assess and comparatively demonstrate increases in VAC after environmental shocks. For the time being, we rely on peer-reviewed articles and grey literature on studies that have been mostly conducted in isolation from one another, vary in quality, methods, thematic focus and are therefore very difficult to compare across contexts. However, taking these studies (both qualitative and quantitative) from different contexts together, they start to build an understanding of how some environmental shocks generate stressors that may increase the likelihood of violence affecting children. Hence, we decided to review and summarize existing literature in relation to different types of natural hazards and not by region or country.

There is an emerging body of work on the **effects of floods on VAC** in LLMICs (with most studies conducted in the context of Bangladesh), including children's mental health and wellbeing (e.g.: Hayward & Ayeb-Karlsson, 2021). Biswas et al. (2010) found that in Bangladesh up to 70% of mothers and 40% of fathers in flood affected areas have abused their children, due to extreme mental pressures and inability to control their emotions. The same research found that floods can also increase children's risk of injury, especially when confined to homes with muddy floors, exposing them to greater risks of falls and fractures, burns, drowning, and animal bites. Akhter et al. (2015) and Azad & Khan (2015) further highlight molestation and sexual abuse of children in post-cyclone Bangladesh due to cramped living conditions requiring children to share beds with extended relatives. A qualitative study conducted with frontline healthcare providers and district stakeholders to understand the performance of health systems in Pakistan (Pradhan et al., 2022), found that during and following floods there was increased reporting of sexual and domestic violence. This affected women and children the most, in part due to health sector and infrastructure constraints in the flood-prone regions sampled for the study (see also: Bellizzi et al., 2023). Moreover, literature observes surges of child marriage in LLMICs shortly after floods occurred (Pope et al., 2022; Sundaram, 2017).

Data and research on the effects of floods on children in HICs is still scarce (WHO, 2017a). After the 2021 European floods, occurring in Austria, Belgium, Croatia, Germany, Italy, Luxembourg, the Netherlands and Switzerland, concerns were raised in the media about children's mental health and overall wellbeing in Germany (e.g.: SWR Aktuell, 2021). Rigorous academic research on how floods explicitly affect children in HICs is currently not available.

Numerous studies highlight how **droughts** contribute to children's malnutrition and stunting (see also section 5). For instance, water scarcity caused by droughts has been shown to have severe negative impacts on children's health in the case of Ethiopia (Lumborg et al., 2021). A quantitative mapping analysis by Cooper et al. (2019) found that most drought vulnerable children are in arid areas with weak governments and little international trade, such as Chad, Sudan, Eritrea, South Sudan, Somalia, and Yemen. In addition to these hotspots of drought vulnerability, rainfall anomalies and under-nutrition were also observed in countries throughout Africa, central Asia, and the Middle East, as well as Papua New Guinea, North Korea, and Haiti (Cooper et al., 2019) (see Section 5 for more details on health effects of droughts). In Kenya and Somalia droughts have also been associated with a higher risk of sexual violence and abuse of children (Save the Children, 2010, 2017a). Researchers found an increase in child marriage and Female Genital Mutilation (FGM) during periods of droughts in the Horn of Africa (Bellizzi et al., 2023). By contrast, in India, droughts led to a decrease in child marriage (see Section 2 for a more detailed discussion). This highlights how nuanced and different the impacts of natural hazards on VAC can be, depending on context and region.

Academic literature has also started to examine the severe effects of **hurricanes and cyclones** on children and youth. Most articles focus on the aftermath of hurricane Katrina in the US, pointing to multiple adverse effects for low-income populations, with reported experiences or observations of child abuse (Hawkins, 2009). More evidence and research are needed from other contexts, in particular LLMICs. Currently, a few studies provide us with some insights. In one explorative study conducted post-Hurricane Matthew in Haiti, children reported multiple adverse events, such as witnessing or experiencing interpersonal violence, neglect and abuse in addition to post-disaster stress and limited access to basic needs with a particular high prevalence of depression and Post Traumatic Stress Disorder (PTSD) (Dass-Brailsford et al., 2022). In comparing subgroups, the same study found that children who were in orphanages in the aftermath of Hurricane Matthew reported significantly fewer adverse childhood experiences than those living with their families, which the authors suggest is due to orphanages in the setting creating a safe and stable environment for children (ibid.). Another qualitative study showed how Violence against Women and Children (VAWC) after Hurricane Matthew was triggered by an accumulation of daily stressors such as economic adversity, food insecurity or unemployment (Bermudez et al., 2019). Nearly all adult male and female interviewees (n=36) indicated these structural insecurities were detrimental to the well-being of their family

and their community (ibid). Notably, several articles highlight a surge in peer violence and aggressive behaviour among children, attributed to PTSD in the aftermath of a hurricane or cyclone (Lai et al., 2015; Scott et al., 2014; Self-Brown et al., 2013; Terranova et al., 2009), including higher levels of youth violence in general (Madkour et al., 2011). We summarize and discuss this body of work in more depth in Section 5.2 (mental health) of this review.

Academic research on the effects of **other climate related shocks** (e.g.: bush/wildfires, heatwaves or vector-borne diseases) on VAC is still very difficult to find, apart from a large body of work on how these natural hazards have an impact on children's health (see section 5). Scholarship does suggest that earthquakes or tsunamis can lead to a rise in VAC, primarily where the perpetrators of violence are family members who have experienced emotional stress and loss following the disaster (Catani et al., 2008; Sloand et al., 2017; Sriskandarajah et al., 2015; Subedi et al., 2020). However, the exact nature of the relationship of these natural hazards to CC remains highly debated, while the effects were exacerbated by other forms of stress such as war.

Albeit not generalizable, taken together these studies do suggest that natural hazards create the conditions in which varying forms of VAC can thrive. There is an emerging and solid body of work highlighting increased PTSD in children and youth after floods, hurricanes or cyclones, related to, among other things, parental, economic and/or social stress of already deprived and vulnerable groups. Scholarship further agrees that children from lower socioeconomic backgrounds and ethnic minorities suffer the most.
More knowledge is still needed to better understand the longitudinal effects of specific natural hazards on specific types of VAC in a specific context. We lack solid comparative studies to showcase how children's experiences differ after a natural hazard has taken place, depending on region, country and local circumstances. Finally, it has to be acknowledged that, although environmental shocks affect both LLMICs and HICs, the former are challenged by far lower capacities, infrastructure and coping mechanisms to prevent and mitigate VAC in post disaster settings, as we highlight in Section 1.4.

1.2 Human-induced hazards

Existing research on the explicit relationship between human induced hazards – resulting from human activities that harm the environment and the climate – and VAC, centres predominantly around two main thematic areas, namely health (see Section 5) and child labour, human trafficking, or exploitation (see Section 4).

Examples of research related to health include, for instance, Bruederle & Hodler's (2019) study on the harmful effects of **oil spills** on infant mortality in densely populated areas along pipelines in Nigeria; or Ibrahim et al.'s (2021) research on how **illegal toxic waste** dumping in Malaysia harms children's health.

As far as research on child labour is concerned, a significant body of academic literature focuses on the negative impacts of artisanal and small-scale mining on children (Hilson, 2010, 2012; Maconachie & Hilson, 2016). The work of Landrigan et al. (2022) stresses how mining in LLMICs not only harms the environment but also increases the likelihood of child labour, with severe consequences for children's health. There is also an extensive amount of grey literature (e.g.: reports published by Human Rights Watch[4]) and media providing evidence on the links between human-induced hazards and child labour, trafficking or sexual exploitation. Reports on the threats posed by rainforest mafias (criminal networks that engage in illegal logging) to children in Brazil's Amazon (Muñoz, 2019), or child trafficking and slavery among Cambodian boys and young men in the illegal fishing industry in the waters off Thailand (Urbina, 2015a, 2015b) serve as examples.

While academic literature on the various effects of deforestation on children in LLMICs is still missing, the specific case of Indonesia, where deforestation has been widespread, exemplifies how human-induced hazards can have multiple and intersecting effects on children.

More knowledge is still needed to better understand the longitudinal effects of specific natural hazards on specific types of VAC in a specific context.

4 See: https://www.hrw.org/ accessed 08.06.2023.

Box 1: Case Study: Indonesia's palm oil sector and its effects on children

VAC in Indonesia is commonplace in homes, schools, and communities. The last population-based survey of VAC in 2013 estimated that 38.62% of boys and 20.48% of girls are affected by physical, sexual and emotional violence (Arifiani et al., 2019). More recent data highlights that one in three girls experience violence in their lifetime and one third of boys experience physical violence (UNICEF, 2021b). Indonesia is also one of the most disaster-prone countries in the world, with substantial consequences for children (UNICEF, 2020). The country not only has a high risk for natural hazards (7.7 out of 10 in the INFORM global hazard and exposure index 2022) but has also experienced human-induced ED in the past decades, mainly due to the rapid expansion of the palm oil sector. Between 2002 and 2020, North Sumatra lost 356,000 hectares of humid primary forest, that is 27% of its total tree cover (Global Forest Watch, 2023). The region of North Sumatra provides an interesting and important example of how VAC and human-induced ED can intersect. A study conducted by UNICEF (2016) highlights the many negative effects of the palm oil sector on children's social lives and health in the region. Even though the palm oil industry is often credited for economic growth, poverty alleviation and improving rural infrastructure, children working on plantations continue to face many adversities and forms of structural violence. Most of these children live in remote areas with limited access to basic services such as education and healthcare. The study further points to the many adverse impacts in relation to environmental pollution and poor health and nutrition outcomes. One reason for this is that breastfeeding rates appear to be much lower among women who work in the plantations because of the risk of exposure to pesticides among breastfeeding women, which can seriously harm their child. Women interviewed for the study also reported that they have to spend 25% of their salary on formula, which in return has an impact on the socio-economic wellbeing of their baby.

The same study (UNICEF, 2016) showed that parents working long hours and the lack of childcare (such as nurseries or early childhood education) not only inhibit important child-parent bonds but often also mean that children are unattended when parents are working, exposing them to many risks and abuse. Although large plantations do not hire children directly for work, children have been seen 'assisting' family members to meet harvesting quotas. Workers interviewed by UNICEF claimed that if any children were to be found alongside their parents, their role was mainly 'helping' them after school. No data are currently available on physical, sexual or emotional abuse of children who live in primary regions for the palm oil sector. The case of South Sumatra illustrates why more research is needed to gather further evidence on the links between deforestation and VAC and better understand them.

The final theme in the literature on human-induced hazards relates to the links between CC, ED and **human conflict** (Brzoska & Fröhlich, 2016; Burrows & Kinney, 2016; Nordås & Gleditsch, 2007; Selby et al., 2017). A meta-analysis of studies of trends since 1950 suggests that the magnitude of climate's influence on modern conflict is substantial (Hsiang et al., 2013). For instance, in a recent publication, Unfried et al. (2022) used grid-cell data from Africa and central America for the years 2002–2017, to provide empirical evidence for a link between water mass declines and the likelihood of local conflict. Their results showed that decrease in local water mass, following from droughts and intensifying water cycle, more than triple the local likelihood of social conflict. While there is a large body of literature on the effects of human conflict and war on VAC (Haer, 2019; Saile et al., 2014; Seddighi et al., 2021; Stark & Landis, 2016), academic literature on the precise intersections of climate-related conflict and VAC is still missing.

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1.3 Socionatural hazards

Human-induced hazards or ED can also coincide with, precede or succeed environmental shocks thereby amplifying VAC. Neither academic literature nor policies refer to or explicitly use the term 'socionatural' hazard in relation to VAC. However, cases such as Karamoja in Uganda (see Box 2) show why this distinction and the term socionatural matters. It brings to light that the effects of CC can be even worse when they intersect with deeply rooted, past and present social, political and economic injustices leading to large scale abuses of children's and human rights. In other words, it emphasizes that natural and human-induced hazards can intersect, causing large-scale and long-lasting harm for generations.

Another example of how a socionatural disaster has a negative effect on children are the mudslides in Sierra Leone, which occurred in 2017, shortly after the Ebola crisis and as a result of the loss of protective natural drainage systems from large scale deforestation. Apart from the human loss (in total 1,141 people were declared dead or missing including children), approximately 6,000 people were affected by major damage and loss of housing. The mudslides caused major damage and loss affecting housing, infrastructure, health, sanitation and education (Yoder - van den Brink, 2019). While exact data and research on how the aftermath of the mudslides has impacted VAC is not available, UNICEF (2017) reported that children have been left 'vulnerable, homeless and terrified'. One study in particular was concerned with the lack of proper mental health care services for severely traumatized children (Yoder - van den Brink 2019).

Box 2: Case Study: How historical injustices, CC and ED intensify VAC in Karamoja, Uganda

Karamoja is the poorest sub-region of Uganda, located in the North-East. For almost a century (since British occupation), the Karamojong have endured multiple human rights violations, extreme poverty, high child death rates and famine. Karamoja illustrates how remaining and endangered indigenous and pastoralist societies are consistently challenged by attempts to exploit, develop and westernize their habitat. Karamoja is affected by both environmental resource exploitation and CC. In particular, droughts have significantly increased the risk of food shortages and led to multiple famines in the past (Chaplin et al., 2017). Added to this are past and ongoing conflicts (as a legacy of colonialism and related to pastoralism) and the lack of policies (mainly land rights) that would allow the Karamojong to engage in different forms of pastoralism, which has been their main source of livelihood for centuries. Attempts by the government and aid agencies to settle the Karamojong are challenged by the fact that land in Karamoja is not suitable for sedentary agriculture, as the climate is too erratic to support sustainable rainfed crop production, which in part explains why past cropland expansion has not been profitable. This has caused a 'no-win' situation for the Karamojong, who steadily lose land for pasture, and at the same time continue to rely on food aid as the increasing number of agro-based households cannot produce enough food (Nakalembe et al., 2017). Studies convincingly show that pastoralism remains the most realistic livelihood for the Karamojong in the foreseeable future due to harsh climatic conditions and in the absence of other sectors and opportunities (FAO, 2018b; Nakalembe et al., 2017). This intertwined relationship of conflict, political neglect (as a legacy of colonialism), environmental degradation, climatic changes and extreme poverty has created a persistent humanitarian crisis for the Karamojong (Datzberger, 2017, 2022). It is currently estimated that around 61% of Karamoja's 1.3 million people live in absolute poverty (UNFPA, 2018). The inability of most Karamojong to provide sufficiently for their children, has in return intensified child labour (including physical violence) in the form of illegal and dangerous mining activities, charcoal burning, or begging in the streets of Uganda's capital Kampala. Mining activities and charcoal burning not only harm the very environment the Karamojong depend upon, but also children's physical and mental health (Burnett, 2014; Datzberger, 2022; Datzberger & Malagala, 2015). At the same time, Karamoja reports high rates of teenage pregnancy (one in four girls), and early marriage is common (UNFPA, 2018). While the intersections of poverty, livelihoods and VAWG have been well documented in Karamoja (Rujumba & Kwiringira, 2019), how they relate to diverse forms of ED, and especially to VAC, remains under-researched and unacknowledged in policy. We do know, however, that VAC in Uganda is pervasive. Three out of four Ugandan children have faced some form of direct violence (physical, sexual and emotional) (Clarke et al., 2016; Devries et al., 2016).

1.4 Disaster Risk Reduction

Disaster Risk Reduction (DRR) is commonly understood as 'preventing new and reducing existing disaster risk and managing residual risk' (UNDRR, 2023). It is established as imperative not only as an end in itself, but also for sustainable development, strengthening resilience and poverty alleviation (DISR, 2012). Many DRR plans identify VAC as one of the risks from natural hazards or humanitarian disasters (e.g.: DISR, 2012), and aim to explore the role of children in countering CC and helping to reduce or manage the impacts of CC on themselves and their communities. For example, one child-led DDR review found a number of strategies that young people can use, ranging from analysing risk reduction activities, communicating risks and risk management opportunities to family and community members, and mobilizing resources and actions (Back et al., 2009). However, it is difficult to find case studies where integrated approaches to VAC have been deployed as part of a country's emergency preparedness and response planning, or where the results of such planning have been assessed (Pereznieto et al., 2020).

Notably, several scholars, authors or journalists (e.g.: David Chandler, Naomi Klein) have critiqued the term 'resilience', which is inherent in DRR definitions and programming. Resilience can be easily misused as a concept and explanation to place the burden of adapting to difficult circumstances solely on individuals (including children), rather than addressing larger political, economic and structural inequalities. It can be co-opted by those in power to justify maintaining the status quo rather than addressing the root causes of grievances caused by natural, human-induced or socionatural hazards. It can also be misappropriated by suggesting that some individuals or communities are naturally more resilient than others, without considering the local context. Hence it is important to acknowledge that an overemphasis on resilience can obscure the fact that some challenges are simply too great for individuals or communities to overcome without significant support and resources that address the root causes of injustices, that are intensified by ED or climate related catastrophes. All of this has implications for VAC prevention and mitigation mechanisms in LLMICs and HICs.

In HICs risk management practices do tend to focus on providing structural support and resources that aim to address socioeconomic inequalities. For instance, Austrian flood risk management focuses on physical vulnerability and almost entirely neglects social and psychological vulnerability in the decision-making process. England, Wales and the US envisage a much broader vulnerability scale to address social inequities (which also affect children) in the case of a natural hazard, such as flooding (Babcicky et al., 2021). Whether and how this is then put into practice, still remains questionable. Research also underlined the importance of parental support to mitigate mental health issues among children after Hurricane Katrina (Lai et al., 2015).
As far as DRR and VAC in LLMICs are concerned, the literature raises two main concerns. These are:

- To address existing global and national injustices to prevent and mitigate VAC following natural and human-induced hazards.

- To call for more research and knowledge on local and existing initiatives to prevent and mitigate VAC following natural and human-induced hazards.

Global and national injustices

Responding to some of the criticisms made of the term 'resilience', Eckstein et al. (2021) stress that structural and institutional factors (nationally and globally) cause additional vulnerabilities to the damaging effects of natural, human-induced or socionatural hazards for children. Similarly, a systematic review by Seddighi et al. (2021) identified the need for humanitarian organizations to make plans to respond to weakened child protection systems and disruption of preventative mechanisms prior to and following natural hazards. Besides, VAC continues to be widely under-reported following environmental or human-induced shocks because of disruption to infrastructure and reporting mechanisms (Curtis et al., 2000). Examples of how such structural weaknesses affect children are provided in the following studies: Yoder - van den Brink (2019) highlights that the weak mental health infrastructure in Sierra Leone presents a significant risk for children and young people in post-disaster settings, such as the mudslide in Freetown in 2017; Widowati et al. (2022) carried out quantitative research

in elementary schools in Indonesia and found that schools can be sites of vulnerability to natural hazards for students, but also hold the potential to anticipate multi-hazards and improve coping strategies if they work in conjunction with other organizations and institutions. The authors of both studies stress the need for culturally and contextually relevant services, capacity building initiatives and recognition of the contribution of existing health and other support workers (Widowati et al., 2022; Yoder - van den Brink, 2019). Hanna & Oliva (2016) go even further and call for global efforts to address global injustices, structural barriers and increased risks for children in LLMICs. This would include developing new technologies to expand electrification, breeding more weather-resistant crops, improving access to clean water, increasing foreign aid during environmental catastrophes, and offering more assistance to help poor countries expand their safety net programmes (ibid.).

Local, culturally relevant and context-specific VAC interventions

There is a striking gap in the literature about local and existing initiatives to prevent and mitigate VAC following environmental shocks (Wessells & Kostelny, 2021), and many authors have called for more research in this area (Cerna-Turoff et al., 2019; Cerna-Turoff, Fang, et al., 2021; Pereznieto et al., 2020; Pundir et al., 2020; Seddighi et al., 2021). Rezwana & Pain (2021) further emphasize the need to take local norms, traditions and social attitudes into account in the design and operation of DDR programmes.

The few examples that are available in the literature (mostly grey), do offer some initial and valuable insights on the potential of local VAC post-disaster interventions. Cerna-Turoff, Fang, et al. (2021) highlighted some examples from the grey literature in the Pacific region. For instance, following a cyclone villages in Tonga created community childcare initiatives to prevent community violence, drawing on 'traditional' cultural values (OCHA, 2014). After a drought in Papua New Guinea, children were protected from sexual violence due to the role of joint family structures and groups of children going to collect water, rather than travelling alone (Save the Children, 2015). Muzenda-Mudavanhu (2016) explored children's participation in DRR efforts, providing some successful examples, such as in the Philippines, where children worked together with adults to restore degraded mangrove ecosystems, resulting in livelihood gains. However, persisting challenges to child participation in post-disaster settings include: (1) lack of clarity as to what participation means; (2) lack of legislation; (3) adult and cultural resistance; (4) lack of capacities and (5) lack of monitoring and evaluation tools (ibid.). She further warns that the concept of children's participation in DRR should not imply wiping away childhood, treating children as adults or pressurizing them to make choices. Rather, children's participation may be a way of encouraging them to be involved in issues that concern their lives to reduce their vulnerability. The practical implications may yet differ depending on the political, social, and cultural context. While the above examples and research are promising, more evidence and knowledge on 'what works' is needed in this area.

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Hazards and VAC

- Studies on various hazards and in diverse locations are building a persuasive body of evidence on how environmental shocks and the limited responses to these shocks (e.g. by government or aid agencies) can generate stresses for children and families that may exacerbate violence.
- More robust studies, comparable and transnational data is needed to clearly demonstrate direct causal relationships and provide a nuanced understanding of different effects depending on context.

Natural hazards

- Albeit not generalizable, most studies suggest that natural hazards can lead to an increase in VAC.
- Research on how natural hazards affect children focuses predominantly on children's physical and mental health.
- There is an emerging body of work highlighting increased PTSD in children and youth after a natural hazard, intensified by parental, economic and/or social stress of already vulnerable groups.
- Literature agrees that children from lower socio-economic backgrounds in both HICs and LLMICs suffer the most from the consequences of a natural hazard.
- More knowledge is still needed to better understand the longitudinal effects of specific natural hazards on specific types of VAC in a specific context.
- We rely on peer-reviewed articles and grey literature on studies that have been mostly conducted in isolation from one another, vary in quality, methods, thematic focus and do not generate findings that can be generalized across contexts.

Human-induced hazards

- Research on human-induced hazards and VAC focuses predominantly on children's health or child labour.
- More studies to better understand the scale of specific human-induced hazards (such as deforestation or overfishing) and VAC are needed.
- Scholarship and data on how climate-related conflict affects children is not available.

Socionatural hazards

- Though not commonly used, the term 'socionatural' hazard underlines that natural and human-induced hazards can intersect, causing large-scale and long-lasting harm for generations.
- The effects of CC and ED intensify for children when they intersect with past and present social, political and economic injustices, as shown in the examples of Karamoja or Sierra Leone.

Disaster Risk Reduction

- The local capacity for DDR is embedded in historically rooted global and national injustices. Compared to HICs, LLMICs are challenged by far lower capacities, infrastructure and coping mechanisms to prevent and mitigate VAC in post disaster settings.
- An overemphasis on individual resilience in DRR can obscure the root causes of injustices that are intensified for children by ED or climate related catastrophes.
- VAC continues to be widely under-reported following environmental or human-induced shocks.
- Humanitarian organizations need to make plans to respond to weakened child protection systems and disruption of preventative mechanisms prior to and following environmental hazards.
- It is difficult to find case studies where integrated and culturally-sensitive approaches to VAC have been deployed as part of a country's emergency preparedness and response planning, or where the results of such planning have been assessed.

02 Gender

The effects of CC and ED are not gender-neutral (Caridade et al., 2022; Osman-Elasha, 2012; Rao et al., 2019). In the scope of this literature review we understand 'gender' as an identity and role that is socially constructed (already from birth) and distinct from biological sex (Butler, 2004, 2006). Binary gender roles and identities, influenced by varying degrees of hierarchical and patriarchal structures (Walby, 1989) that produce political, social, economic and cultural inequalities and forms of discrimination, can be viewed as structural forms of violence.

We reviewed literature on both GBV (Gender-based Violence) and VAWG (Violence against Women and Girls) in relation to CC and ED. The terms GBV and VAWG are often used interchangeably, yet they are not the same. While both describe forms of violence linked to gendered identities, VAWG is a more specific term by focusing on 'female' experiences. GBV is a much broader concept. We refer to GBV as violence perpetrated on someone because of their gender identity, this includes females, males, sexual minorities or those with gender-nonconforming identities. We refer to VAWG to specifically emphasize the disproportionate impact of CC and ED on women and girls (Osman-Elasha, 2012).

A focus on GBV and VAWG offers some insights to better understand and fill in gaps in current knowledge on the relationship between VAC, CC and ED. VAWG and VAC have comparable risk factors, tend to co-occur, and have similar impacts over the life course (Guedes et al., 2016). Hence, there are some important findings and patterns established in research on GBV and VAWG on which studies on VAC can build, such as the disproportionate impact of the climate and environmental crisis on women and girls and research on child marriage. Overall, there is still limited knowledge on the gendered impacts for boys in the context of CC and ED, and research on structural GBV against children related to CC and ED is in its early stages.

2.1 Disproportionate impacts of CC and ED on women and girls

Research investigating the specific relationship between VAWG and environmental shocks related to CC and ED emerged in the 1990s (Le Masson, 2022). One of the first reviews of the literature, by Fothergill (1996), provided an important starting point to understand the links between gender and environmental shocks, highlighting that VAWG occurs as a result of both the direct impact of natural hazards and humanitarian crisis, and also the failure of protective systems in the wake of these events. More than two decades later, two recent systematic reviews (Thurston et al., 2020; van Daalen et al., 2022) and a comprehensive study (Castañeda Carney et al., 2020) on the interlinkages of climate related ED, GBV and VAWG provide more nuanced findings and conclusions.

In the following, we briefly summarize these three reviews and then synthesize their findings in regard to VAC (see Box 3).

- **Natural hazards, disasters and violence against women and girls: A global mixed-methods systematic review (Thurston et al., 2020)**

This mixed-methods systematic review of 37 studies (20 quantitative, 16 qualitative, 1 mixed-methods) explored the links between VAWG and natural hazards caused by climate and other natural hazards that are increasing in frequency, severity, and duration due to unsustainable human activity. In synthesizing qualitative studies, they found exposure to natural hazards can lead to increases in VAWG through three pathways:

- An increase in stressors that trigger VAWG (housing insecurity; economic insecurity and mental health issues)
- The creation of enabling environments for VAWG to occur (failures in law enforcement and lack of safety in displacement camps and shelters)
- An exacerbation of underlying drivers of VAWG (pre-existing rigid gender roles and discrimination; low status of women and girls)

The review specifically highlights how certain natural hazards appear to increase Intimate Partner Violence (IPV). For instance, heatwaves in Spain between 2008-2016 have been associated with increased IPV risk and intimate partner femicide one to three days after extreme heat (Sanz-Barbero et al., 2018). In SSA, drought was found to significantly increase the risk of physical and sexual IPV (Epstein et al., 2020). In Australia, women residing within high bushfire-affected communities experienced the highest levels of violence compared to women living in medium- and low-affected communities. Increased rates of IPV are associated in the literature with post-hazard changes to income and with PTSD and depression symptoms among women (Molyneaux et al., 2020). This is of relevance in regard to VAC as there is a strong consensus in the literature that IPV can have severe long-term effects on children's development in various age groups (Guedes et al., 2016).[5]

While all qualitative studies in their review identified how VAWG could increase in relation to natural hazards and ED, quantitative studies arrived at mixed results due to variations in methodologies, time scales, indicators and context. There are also many inconsistencies in how individual studies define VAWG or measure exposure to violence in post-hazard settings, alongside an over-representation of evidence from the US (Hurricane Katrina), and Haiti, which limits comparability and generalizability of existing research. None of the studies reviewed by Thurston et al. (2020), however, found a decrease in VAWG in the aftermath of a natural hazard.

- **Extreme events and gender-based violence: a mixed-methods systematic review (van Daalen et al., 2022)**

Another mixed-methods systematic review of 41 studies by van Daalen et al. (2022) specifically looked into extreme weather and climate events and GBV. Although the authors use the term GBV, their review only included experiences of girls and sexual minorities and excluded specific experiences of boys (and men). Similar to Thurston et al. (2020), they concluded that VAWG was generally exacerbated by extreme weather and climate events; and that qualitative studies (n= 15) were of a much better quality than quantitative studies (n= 20) due to methodological flaws and inconsistencies. Broadly related to the pathways identified by Thurston et al. (2020), their study suggests that there are several factors that contribute to the increase in VAWG, including disruptions to social structures, a breakdown in law and order, and a lack of access to essential services.

The extreme weather events studied in their review included floods (n=13), droughts (n=10), hurricanes (n=9), cyclones (n=6), extreme rainfall and rainfall shocks (n=6), typhoons (n=4) and wildfires (n=1). There is again an over-representation of studies conducted in the US (Hurricane Katrina), with research on droughts mainly conducted in SSA and wildfires only in Australia.

van Daalen et al. (2022) find that the relationship between specific extreme weather events and GBV varies across settings due to differences in gender norms, tradition, vulnerability, exposure, adaptive capacity, available reporting mechanisms, and legal responses. To give an example, while there is an observed increase in child marriage in SSA during sudden periods of drought, in India droughts led to a decrease in child marriage (Corno et al., 2020) (see section 2.2 below for more details). This, among other

5 See: https://www.nctsn.org/what-is-child-trauma/trauma-types/intimate-partner-violence/effects accessed 20.02.2023.

factors, makes it difficult to generalize what kind of extreme weather event would eventually lead to an increased risk of a specific form of GBV or VAWG, as context, vulnerabilities and response mechanisms differ by country. While the interlinkages between VAWG, CC and ED are evident, the authors highlight a crucial need for high-quality evidence from large ethnographically diverse cohorts to draw any further conclusions and identify commonalities.

- **Gender-Based Violence and environment linkages: the violence of inequality (Castañeda Carney et al., 2020)**

This study is based on a comprehensive desk review of academic and grey literature (with a strong focus on Latin America), surveys conducted by the authors and case studies from experts. The authors identified links between GBV and ED in three contexts:

1. Access to and control of natural resources (land, forest, agriculture, water, fisheries)

2. Environmental pressure and threats (illegal wildlife trade, illegal logging, illegal fishing, illegal mining)

3. Environmental action to defend and conserve ecosystems and resources (conflict over resources, violence in the environmental sector including the workplace).

All three areas are explicitly linked to GBV, and directly or indirectly also affect children, with underaged girls disproportionately suffering from violence. The study provides case studies and evidence on illegal sex-trafficking of minors (especially girls) in locations where mining industries are harming the environment (Shahinian, 2011; United States Department of State, 2019) and an increase in child marriage in some areas prone to natural hazards (Barr, 2015). Examples are also given of how displacement and loss of livelihoods due to natural hazards can create conditions of economic and social stress that increase the risk of violence, in particular domestic abuse of women and girls (Dankelman, 2016). The authors point to a gap in the literature in regard to VAC (especially sexual abuse of girls) committed by aid and relief workers in post-disaster settings. Existing data that is available on the abuse of children in refugee camps or other humanitarian settings by aid workers or local authorities, highlights the importance of obtaining more data (Naik, 2002; UN Secretary-General, 2017). The study concludes that addressing the root causes of both GBV and ED is necessary to break the link between the two. This includes a continuous promotion of gender equality, ensuring that women have access to land and resources, and addressing the underlying economic and social factors that contribute to both ED and GBV.

Box 3: Findings from research on GBV/VAWG relevant for research on CC, ED and VAC

- Environmental crises and extreme weather events can be related to increased GBV and VAWG, by exacerbating existing gendered and other inequities and stressors that drive all forms of violence, including VAC.

- Context matters. The effects of CC and/or ED on GBV/VAWG vary across settings due to differences in local social gender norms, tradition, vulnerability, exposure, adaptive capacity, available reporting mechanisms, and legal responses.

- Studies observe a general increase in IPV during or shortly after extreme weather events, or due to shortages of resources (related to CC, ED or environmental exploitation). This is of relevance as IPV can have severe long-term effects on children's development in various age groups.

- Specific legal frameworks and prevention mechanisms are missing to protect women and children during or shortly after extreme weather events.

- Research alludes to an increased risk and fears of violence in shelters or disaster relief centres.

- Qualitative studies are assessed as being of much better quality than quantitative studies. The latter frequently show methodological flaws and inconsistencies.

2.2 Child marriage

Child marriage is a violation of children's rights, but is commonly seen by families as a protective measure in response to financial, social and physical stressors. For this reason, child marriage is associated with multiple, often overlapping, shocks including the disruption of education, loss of income, protracted conflict or natural hazards. Recent research from UNICEF found that CC can increase vulnerability to child marriage, highlighting that a 10% change in rainfall due to CC leads to a 1% increase in child marriage (UNICEF, 2023a). There is a small but growing body of academic literature, examining whether CC and ED might exacerbate the drivers of child marriage. Child marriage is generally defined as any formal marriage or informal union between a child under the age of 18 and an adult or another child.[6]

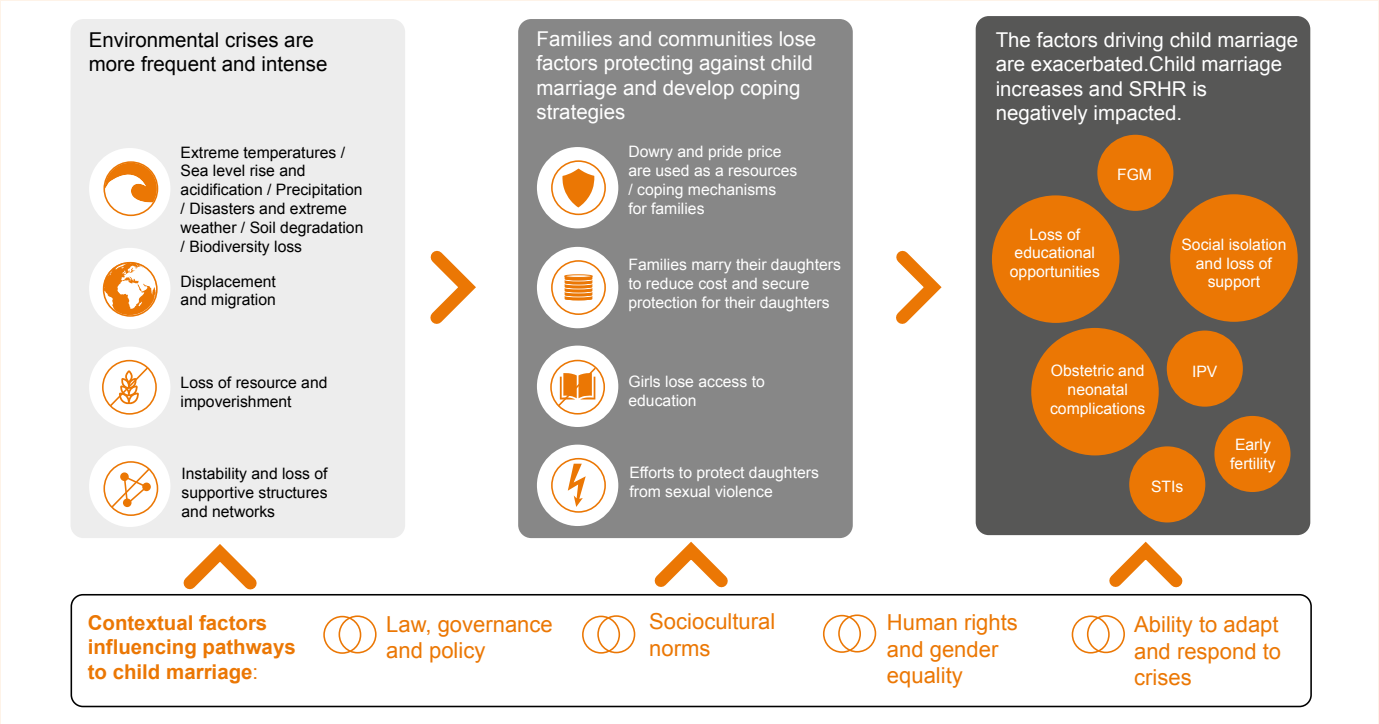
A scoping review of academic and grey literature, which included 24 (8 quantitative and 16 qualitative) studies conducted by Pope et al. (2022), finds that environmental crises worsen known drivers of child marriage in LLMICs, pushing families to marry their daughters early. The geographical focus of existing studies is limited to South and South East Asia (in total 12 articles with 8 articles on Bangladesh), and SSA (13 articles). Across all articles the most common environmental crises studied were drought (12 articles) and floods (8 articles). Across these contexts, Pope et.al. broadly identify the following drivers of child marriage during an environmental crisis (see Figure 2):

Loss of assets and opportunities for income generation (through dowry or bride price)

- Displacement of people from their homes
- Educational disruption
- Settings in which sexual violence and the fear of sexual violence increase.

Pope et al. (2022) conclude that the relationship between child marriage and climate and environmental crises is not linear and reasons can also be overlapping or multifaceted. Besides, the effects of climate-related hazards and ED on child marriage also vary according to context. The majority of studies on the topic are from Bangladesh, due to the country's high prevalence of child marriage and frequency of and vulnerability to extreme weather events (Asadullah et al., 2021). However, the degree to which this evidence can be generalized to other contexts is limited. Different studies suggest that prevalence of child marriage depends on local norms, tradition and context. For example, there is an observed increase in child marriage in SSA during sudden periods of drought, whereas in India droughts led to a decrease in child marriage (Corno et al., 2020). This is in part due to different local cultures and practices. While in India dowry and bride price payments decrease during times of environmental shocks, in SSA receiving a bride price payment may incentivize families to marry off their daughters. Malawi (Nsanje District) serves as an insightful example on how floods led to a rise in child marriage.

Figure 2: Relationship between child marriage and climate and environmental crisis.
Source: Graph adapted from: Pope et.al (2022, p. 13)



6 See: https://www.unicef.org/protection/child-marriage, accessed 23.02.2023.

Box 4: Case Study: How floods relate to child marriage in Malawi

It is estimated that up to 60% of Malawi's land is currently affected by soil erosion. Over the last 40 years, more than half of Malawi's forests and woodlands have vanished, and those that remain are being 'thinned' through over extraction and more frequent forest fires (Malawi Government, 2019; World Bank Group, 2019). The country has the highest deforestation rate in the SADC (Southern African Development Community), with 33,000 hectares lost per year (Malawi Government, 2019). In the past five decades, Malawi has experienced more than 19 major floods and seven droughts, with these events increasing in frequency, magnitude and scope over the years (Malawi Government, 2019). Nsanje District is the poorest district of Malawi and has been most affected by multiple and severe flooding (the latest in 2019) and drought with temperatures as high as 52C (IFRC, 2016; Malawi Government, 2019; World Bank Group, 2019). It is estimated that two out of three Malawians experience violence in childhood (IFRC, 2016). The country has the highest rate of child marriages in Southern and Eastern Africa, with particularly high child marriage rates in Nsanje District (UNICEF Malawi, 2020). A government report alluded to the high risk of early marriage and human trafficking as one of the effects of the 2015 floods (Malawi Government, 2015).

The story of Ntoya Sande (aged 15), from Nsanje District, published by 'Brides of the Sun' (Chamberlain et al., 2017) exemplifies how floods combined with the loss of harvest can lead to early marriage:
'It was the flood that ensured that Ntonya's first year as a teenager would also be the first year of her married life. Up to the moment it swept away her parents' field, they had been scraping by. Afterwards they were reduced to scavenging for bits of firewood to sell. So when the young man came to their door and asked for the 13-year old's hand in marriage, the couple didn't think about it for too long, lest he looked elsewhere. Ntonya begged them to change their minds. She was too young, she pleaded. She didn't want to leave. But it was to no avail.
Her parents sat her down and spelled it out for her: the weather had taken everything from them. There was not enough food to go around. They couldn't afford another mouth at the table. That night she lay down in bed for the first time with the man she had never seen before and followed the instructions of her aunt, who had coached her on the important matter of sex. Ten months later, she gave birth to their first daughter.'

In an interview Ntonya describes her situation as follows:
'I tried to negotiate, to tell my parents that I wasn't ready, that I didn't want to get married, but they told me that I had to because that would mean one mouth less at a table. I had to get married because they didn't have enough to feed the whole family, I was sent to be married because of shortage of food in the house. Otherwise they would have waited. That's what I believe. Before an aunt talked to me. I was told I had to have sex. I managed to sleep with my husband the very first day when we got married. Every day, when the day breaks, I go fetching for firewood. Sometimes my husband comes with me. Then we sell it. With the money we get from what we sell, we buy food. At times when we sell a lot of firewood, we buy maize and we prepare porridge, and if we have enough money, we also buy sweet potato, and in other situations we buy nyemba beans. Sometimes we only eat once a day, only in the afternoon, sometime we eat twice in the afternoon. It's almost the same. We were struggling. Now that I am married, I am also struggling.'

Latest figures from UNICEF Malawi estimate that currently 42% of girls are married before the age of 18 and 9% below the age of 15 (UNICEF Malawi, 2019). The high prevalence of child marriage in Malawi is generally driven by poverty as well as deep cultural and religious traditions (OHCHR, 2020). Ntonya's story showcases how these drivers can be aggravated during extreme weather events in regions such as Nsanje District.

Most qualitative and some mixed methods studies, including grey literature, provide solid and context-specific evidence on the reasons for marrying off children during environmental crises (e.g.: Ahmed et al., 2019; Barr, 2015; Chamberlain et al., 2017). However, there is insufficient quantitative data of good quality to provide conclusive evidence about the association between extreme weather events and forced or early marriage (Carrico et al., 2020; Tsaneva, 2020). Many quantitative studies include a high risk of bias, due to their reliance on retrospective reporting of marriages dating back to 1989, or comparing DHS (Demographic and Health Surveys) data about marriages and weather in the same month, making conclusions about causality difficult to interpret. Overall, existing research on the relationship between child marriage, CC and ED reinforces the conclusion that environmental shocks exacerbate existing gendered inequalities and vulnerabilities (Ferdous & Mallick, 2019; Hossen et al., 2021).

2.3 Violence against boys

Most literature on GBV, CC and ED tends to conflate 'gender' with 'women and girls'. Our knowledge on violence against boys is therefore still very limited. There is some research emerging on masculinities in the context of CC (Enarson & Pease, 2018; A. R. Khan et al., 2022; Nagel & Lies, 2022; Temple et al., 2011), revolving around the following three debates:

- How hegemonic masculinities (i.e. masculine ideas of dominance and control), in combination with capitalism and individualism, might either contribute to or inhibit action to mitigate CC and/or ED. This is because men tend to dominate CC research and policy and hold much of the power in the perpetuation of CC (Nagel & Lies, 2022).

- How being unable to live up to hegemonic masculine ideals in the aftermath of a natural hazard can increase GBV or IPV, due to increased stressors related to housing and income and the inability to protect and provide for the family (Bermudez et al., 2019; H. T. Nguyen & Rydstrom, 2018; Parkinson, 2019; Parkinson & Zara, 2013).

- How the intersections of class, race and masculinity render impoverished men more vulnerable to CC and ED than men from a higher socio-economic background, caste or class (A. R. Khan et al., 2022).

The above studies implicitly highlight that certain masculinities might influence men's perpetration of VAC in a context of climate related hazards and ED. One study also found an increase in boys physically or sexually assaulting their dating partners after Hurricane Ike, which hit Northern America in 2008 (Temple et al., 2011). Research mostly focuses on young men and male adolescents as perpetrators of violence. Concrete and comprehensive data on boys' specific vulnerabilities and exposure to various forms of violence in the context of CC and ED are generally not included in GBV research, and it is therefore not easy to disaggregate their experience from studies that exist. Some insights can be found in research and reports on human trafficking and forced labour (see Sections 3 and 4) in relation to CC and ED. There is also evidence of violence against boys in the context of illicit natural resource exploitation which harms the environment and contributes to CC (Bondaroff et al., 2015; Urbina, 2015a, 2015b).

Research mostly focuses on young men and male adolescents as perpetrators of violence. Concrete and comprehensive data on boys' specific vulnerabilities and exposure to various forms of violence in the context of CC and ED are generally not included in GBV research.

2.4 Gender and schooling

As explained in our definition of VAC, we perceive persisting inequities that prevent children and youth from fully harnessing the benefits of their education as structural forms of VAC. Depriving children of their right to high quality education can be fundamentally harmful to children, exposing them to increased risks of child labour, substance or sexual abuse, early pregnancy or suicide (Rosenberg et al., 2015). CC and ED can disrupt education in multiple ways such as: damage to infrastructure and transport links, displacement, loss of livelihoods and poverty, destruction of education facilities, or using schools as shelters (A. Anderson, 2019; Sims, 2021). For instance, the Government of Malawi mentioned in a report, that the destruction and destabilization of the education system after the 2015 floods had increased the risk of early marriage, child labour and human trafficking (Malawi Government, 2015).

There is a significant body of literature on how girls' education is affected by CC and environmental degradation (Pankhurst, 2022; Sims, 2021). Some research has focused on school drop-out; for example, a longitudinal study by the Young Lives Project led by the University of Oxford since 2001, showed that among 12,000 children across poor communities in Ethiopia, India, Peru and Vietnam, girls are more likely to drop out of school due to the impacts of CC, such as water scarcity, floods, or other natural hazards (Porter, 2021). In a recent rigorous review of the evidence on the impacts of CC on girls' education, Pankhurst, (2022) found that CC can cause disruption at multiple levels ranging from the entrenchment of inequitable norms at the systems level, to damage to infrastructure and supply of teachers at the schools' level. The review (Pankhurst, 2022) also found a prioritization of boys' schooling at the household level. This is also reflected in a survey conducted by Alston and colleagues in which 14% of girls and 9% of boys were taken out of school by caregivers due to climate related events in Bangladesh (Alston et al., 2014). The consequences of CC and ED for livelihoods, food security and household income can also affect educational attainment in LLMICs. A study in Zimbabwe found that while girls' school enrolment had increased in the past decades, droughts had a negative impact on their educational outcomes (Nordstrom & Cotton, 2020).

The converse relationship is that girls' education might have a positive impact on CC (Sims, 2021). A study using data from 125 countries found that female education is the most important factor in reducing deaths following environmental shocks (Striessnig et al., 2013). Girls' education was associated with decreased vulnerability to natural hazards and decreased fertility leading to less pressure on resources at the individual level, greener domestic behaviours, more gender equitable schools, and women and girls contributing to the green economy and environmental programmes at the systems level (Pankhurst, 2022; Sims, 2021). However, the research on this area is limited, and the pathways between girls' schooling and CC are yet to be fully articulated (Pankhurst, 2022). In addition, there are many assumptions about the quality of girls' education wrapped up here, related to the instrumentalization of education, and in many cases the education sector is not ushering in the changes needed to combat CC (Casey, 2021; Kwauk, 2020). Hence, these findings need to be interpreted with caution.

The data on the impact of CC and ED on boys' schooling is less clear. The review by Pankhurst (2022) does suggest that boys' education may be detrimentally impacted by CC, through many of the same pathways as girls – especially at the school and household levels. There is some emerging evidence that boys drop out of school in cases where their efforts are required in rebuilding following environmental shocks. A study from Bangladesh found that parents took boys out of school to help with reconstruction (Mottaleb et al., 2015). Data is missing on what education to improve environmental and climactic outcomes might look like for boys.

Gender

- The effects of CC and ED on children are not gender-neutral.
- There is a growing and noteworthy body of literature on how CC and ED intersect with and are the driving forces of GBV and VAWG – pointing to specific pathways relevant for research on VAC.
- However, this body of work tends to be centred around issues affecting female adults, conflating the term 'gender' with 'women', without sufficient attention to the gendered effects of CC and ED on female and male children.

Disproportionate impact on women and girls (see Box 3 above for more findings)

- Context matters. The effects of CC and/or ED on GBV/VAWG varies across settings due to differences in local social gender norms, tradition, vulnerability, exposure, adaptive capacity, available reporting mechanisms, and legal responses.
- Academic research on CC and ED and GBV/VAWG is dominated by studies conducted in the US and only a few countries in LLMICs (such as Bangladesh). Regionally more diverse research and data is needed.
- While high quality qualitative studies are generating rich data on pathways, quantitative studies on GBV/VAWG, CC and ED show methodological flaws and inconsistencies.
- Specific legal frameworks and prevention mechanisms are missing to protect women and children during or shortly after extreme weather events.

Child marriage

- Existing research and recent data suggest that CC and ED can worsen known drivers of child marriage in LLMICs.
- The relationship between child marriage and climate and environmental crises is not linear and reasons can be also overlapping or multifaceted.
- The geographical focus of academic studies is limited to LLMICs with evidence from South and South East Asia (mostly on Bangladesh); and a few countries in SSA.
- Prevalence of child marriage depends on local norms, tradition and context. For example, there is an observed increase in child marriage motivated by the receipt of a bride price payment in SSA during sudden periods of drought, whereas in India droughts led to a decrease in child marriage to delay dowry payments.

Violence against boys

- Research on young men and male adolescents generally focuses on how CC and ED can affect men's and boys' ability to subscribe to 'hegemonic masculinities' or on men and boys as the perpetrators – rather than victims – of violence.
- Concrete and comprehensive data on boys' specific vulnerabilities and exposure to various forms of violence in the context of CC and ED are generally not included in GBV research, making it difficult to disaggregate their experience from studies that exist.
- Some insights on the effects of CC and ED on boys can be found in research and reports on human trafficking and forced labour (see Section 3 and 4).

Gender and schooling

- CC and ED can disrupt education in multiple ways such as: damage to infrastructure and transport links, displacement, loss of livelihoods and poverty, or destruction of education facilities, or using schools as shelters – increasing the risk of VAC exposure.
- Studies highlight that the causes of school drop-out due to CC and ED are different for girls and boys because of pre-existing gendered norms and expectations, such as the prioritization of boys' schooling.
- Data that is available on CC, ED and schooling suggests that girls are more likely to drop out due to factors such as domestic labour, child marriage, or household violence. Boys tend to drop out when their labour is required for rebuilding efforts, or for child labour.

03 Im/mobility

While there is a rapid growth of literature on climate-related im/mobility, studies on how this affects children in particular are only recently emerging. In this section we discuss and summarize existing literature on how both **mobility and immobility in the context of CC and ED can relate to VAC.**

Patterns of im/mobility due to CC and/or ED vary widely by context. Some experts argue that without CC and ED, the world would have seen less migration during the past 30 years. At the same time environmental shocks can also prevent people from escaping, affecting populations in LLMICs in particular (Rikani et al., 2023). Many academic debates remain in regard to terminologies, the scale of the issue, response mechanisms and how CC and ED might cause or prohibit population movement (Ferris, 2020; Heslin et al., 2019).

Mobility related to CC, extreme weather events, natural- or human-induced hazards, includes displacement, migration and relocation, and can happen gradually or be sudden (McMichael et al., 2020; Zickgraf, 2021). UN definitions of migration are broadly based on categories related to (1) the circumstances in which people left their place of residence, such as whether it was voluntary or due to fear of serious harm, and (2) the location where they have moved to, typically whether it is internal or international movement (Heslin et al., 2019). In 2020, UNICEF estimated that 9.8 million children were internally displaced because of extreme weather events (UNICEF, 2021a). However, exact numbers on how many children are affected by climate-induced mobility in a wider sense are not available. In the context of migration, children are often statistically invisible. According to the IOM (International Organization for Migration) and UNICEF (2021b), there is an urgent need for more and better data and evidence. Data that exist on migrants, refugees and Internally Displaced Persons (IDPs) are usually derived from registers, censuses, administrative data and surveys, with hardly any information on age, sex, origin or travel situation (ibid).

Immobility, on the other hand, refers to populations that are unable to move and change location in the context of sudden or gradual climate-related events. Reasons for immobility can be found in a wide range of intersecting factors linked to environmental, social, political, economic or health related issues (Ferris, 2020). Some may also choose not to move or do not manage to escape in time and instead, end up (in-)voluntarily immobile or 'trapped' (Ayeb-Karlsson, 2021).

3.1 Mobility

The influences of climate- and ED-related mobility on children are increasingly recognized in the literature (Ferris, 2020; Richards & Bradshaw, 2017; UNICEF, 2017a). There is widespread acknowledgment in publications from practitioners, policy actors and scholars that children face multiple heightened risks in the context of displacement and migration, such as family separation, exposure to exploitation, violence and abuse, loss of education, increased vulnerability to psychological trauma and physical harm, and their right to an identity (UNICEF, 2017a, 2022).

Migrating families are often forced to face multiple deprivations, poverty and social exclusion which can harm children as well (Ayeb-Karlsson, 2021). Children are at risk of harm and violence during both the process of moving and resettlement (Richards & Bradshaw, 2017). Recent research in the Pacific suggests that climate-induced mobility is informed by prolonged impacts of CC and ED, but also that poorly planned mobility decisions can magnify risks (such as food insecurity or water shortages) for mobilized and host communities (McNamara et al., 2021). A study conducted after Hurricane Katrina in New Orleans also found that children who were displaced experienced much higher levels of emotional distress than children who were able to remain in place during the disaster and its aftermath (Abramson et al., 2010). Overall, literature tends to focus on three different circumstances in relation to CC and ED-induced mobility and VAC, namely: risk of violence within families because of migration, violence in camps and shelters, and violence because of separation from families.

Violence within displaced families

Some studies have shown that in displaced families, children may be more exposed to violence and abuse by caregivers due to pressures resulting from CC and ED related displacement (Bartlett, 2008; Richards & Bradshaw, 2017). There is evidence from case studies on increased domestic violence after an extreme weather event. For instance, research from Australia found that following the 2009 Black Saturday bushfires, homelessness and increased living in cramped conditions, in addition to feelings of grief and loss led – in part – to an increase in domestic violence immediately after the fires (Parkinson & Zara, 2013). Similarly, research following Hurricane Matthew in Haiti has shown that the loss of homes in subsequent floods led to an increase in daily stressors and feelings of loss of control at the family level, both of which resulted in heightened levels of VAC (Bermudez et al., 2019). While we cannot generalize from the above case studies in regard to climate related mobility, scholarship has largely established that parents who are generally under extreme pressure are also more likely to perpetrate violence on their children (e.g.: Geprägs et al., 2023; Whipple & Webster-Stratton, 1991). Also, research on non-climate related refugee settlements and camps highlights an increase in parental VAC due to PTSD (Hecker et al., 2022).

In addition, children can be placed at higher risk of neglect following displacement due to additional economic pressures on their families. A study conducted in Northern Mozambique on internal displacement due to conflict and a cyclone in 2019, has shown that children suddenly had more responsibility for contributing to the family income, increasing their exposure to abuse and exploitation, as well as causing them to miss out on their education (Sturridge et al., 2022). A study conducted in the Horn of Africa found that parents who engaged in circular migration in order to find work following flooding, left older children at home unattended, sometimes for weeks or months, to care for their younger siblings (Afifi et al., 2012).

Violence in camps and shelters

Children living in refugee camps or emergency shelters are generally at a high risk of experiencing violence (Digidiki & Bhabha, 2017; Hecker et al., 2022). Scholarship is also emerging on the specific situation of children in camps and shelters after natural hazards or climate-related shocks. To give a few examples: research with IDPs in Pakistan following several natural hazards showed that children living in camps were exposed to emotional violence, exploitation and abuse, peer group violence and gang behaviour (Asad et al., 2013). In the context of Bangladesh, Rashid & Michaud (2000) found that young women and girls were significantly more vulnerable to harassment in shelters by male strangers as they either lacked their former protective network of social relations, or were confined to the shelter with no option to maintain sufficient space and privacy. Similarly, qualitative research in the Philippines recounted evidence of children being sexually assaulted when staying in an evacuation centre following Typhoon Haiyan in 2013 (H. T. Nguyen, 2019). A systematic review by van Daalen et al. (2022) found qualitative evidence that perpetrators have increased access to women (including under-aged girls) in emergency shelters, or that relief workers may request sexual favours in return for services.

The case study of IDP camps in Benue, Nigeria (see Box 5) is particularly insightful, as it illustrates the lived experiences of children who have been displaced by both extreme floods and conflicts related to CC.

Literature tends to focus on three different circumstances in relation to CC and ED-induced mobility and VAC, namely: risk of violence within families because of migration, violence in camps and shelters, and violence because of separation from families.

Box 5: Case Study: Internally displaced children, floods and climate-related conflict in Benue, Nigeria

The Benue region of Nigeria consists of minority ethnic groups whose major occupation is farming and fishing. Due to heavy rainfall swelling the River Benue and neighbouring water bodies like the Niger River and the Lagdo reservoir in Northern Cameroon, Benue has in recent times witnessed major floods (Brooks et al., 2020; Ologunorisa et al., 2022). As a region with extensive arable farmlands and grasslands, it has also experienced recurrent herder–farmer clashes which are now intensifying as a result of CC (Njoku et al., 2023; Vanger & Nwosu, 2020).

This nexus of floods and CC-induced herder–farmer clashes have impacted rural communities leading to internal displacements of vulnerable populations including children. By 2022, more than 110,000 people were displaced across 104 communities in the region due to flooding alone (Duru, 2022b). As of 2021, a special report from the government in the region stated that over 1.5 million persons had been displaced due to the herder–farmer conflicts (Daily Trust, 2022). These displaced persons are sheltered in IDP camps and as of 2020, there were over 27 IDP camps in the Benue region of Nigeria (Duru, 2022a).

The living conditions in these camps are dreadful. Makeshift shelters are made from sticks and mosquito nets (Nongo & James, 2023), and in some cases accommodate households of up to five persons or more. This exposes the most vulnerable among them, especially children, to adverse weather conditions, diseases, violence and abuse. Also, due to a lack of proper government intervention, hunger and malnutrition are taking a toll on vulnerable children in these camps. Women and young girls resort to transactional sex in order to obtain food for their families (UN News, 2016). Not only is the transactional sex a violation of children's rights, but it has resulted in an increased number of births in the camps.

A statement by the region's Emergency Management Agency revealed that about 80 babies were born in IDP camps in Benue within a space of 7 months (The Guardian Nigeria, 2022). While it is unclear whether these were born as a result of transactional sex alone, the conditions in which they were born and the conditions to which they are exposed within the camps, raise questions about basic child rights violations and access to healthcare at birth. Although UNICEF, WHO and other agencies are helping (UNICEF Nigeria, 2022; WHO Africa, 2017), the displacements have hindered proper access to medications, vaccinations and immunization facilities for children (Korave et al., 2021).

Concerns for access to education and poor mental health of children living in these IDP camps have also been raised. The region's government reported that about 80% of children have now dropped out of school due to internal displacement (Okoh, 2022). Also, studies have picked up signs of post-traumatic stress and other mental health challenges among children in IDP camps in Benue (Edeh et al., 2023; Sahara Reporters, 2022). These challenges and others highlighted here show only a fragment of the precarious conditions faced by internally displaced children in Nigeria. There is therefore need for research efforts to be tailored to understanding the lived experiences of these vulnerable populations, so as to inform evidence-based interventions both for the time when they are in the IDP camps and for their reintegration into the society.

Overall, there is a notable lack of robust data on children's exposure to violence in disaster relief shelters or camps due to sudden or gradual effects of CC and ED. The above studies imply that this is a phenomenon which merits far more attention and requires comprehensive data collection and analysis to gain better insights on the scale of the issue, regional and contextual differences, and to inform preventative measures.

Violence due to separation from families

Children who are separated from their immediate families, including those living with relatives, tend to be extremely vulnerable to abuse and violence (Heslin et al., 2019; Richards & Bradshaw, 2017). After a typhoon in the Philippines, human traffickers took advantage of unaccompanied children's vulnerabilities and lured them into sexual exploitation (Calma, 2016). We also know from general refugee contexts, not necessarily related to CC or ED, such as refugee camps in Greece, that unaccompanied minors face a much higher risk than accompanied children and adolescents of severe sexual abuse and trafficking (Digidiki & Bhabha, 2017).

3.2 Immobility

Immobility caused by CC or ED is a complex and non-linear process. It can occur due to a variety of intersecting reasons, including physical barriers, lack of resources, poverty, limited access to transportation or fears of increased exposure to violence in shelters or relief centres (Ayeb-Karlsson, 2021). A person's decision or ability to migrate is influenced by several interlocking factors (such as social, economic, political or health related factors), and these factors may serve as barriers for people to leave harmful situations caused by CC and ED. This is more pronounced for children, whose dependence on others may make them particularly vulnerable to being unable to escape when facing violence. Recently, scholars have also explored how a range of subjective, cultural, social and economic factors can constrain people's ability to escape in contexts of CC and/or ED (Ayeb-Karlsson, 2021; Ayeb-Karlsson & Uy, 2022). As an emerging area of study, there is little definitive evidence about the relationship between environmental or climate-induced immobility and VAC, but some initial factors are emerging in the literature that are of relevance.

Immobility during humanitarian crisis

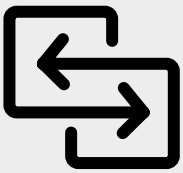
Research on the effects of cyclones in Bangladesh found that particularly vulnerable people (including those with children), did not evacuate their homes when cyclones occurred. In part this was due to fears related to travelling to the shelters with children who could not swim and might drown during evacuation, or because of the perceived and real risk of violence and poor construction of shelters (Ayeb-Karlsson, 2020; Rezwana & Pain, 2021). Rezwana & Pain (2021) further bring to light the 'layering' of stressors, arguing that after natural hazards, people trapped in remote locations with little service provision and overlapping socio-economic deprivation are at increased risk of domestic violence and GBV – also affecting children.

Other studies have shown a similar pattern, where fear of violence in shelters leads women and children to stay at home and not evacuate when natural hazards occur (H. T. Nguyen, 2019; Rashid & Michaud, 2000). One study also highlights how immobility can lead to domestic or severe forms of children's abuse and neglect. After a flood in Fiji, it was observed that children were kept home from school either to take care of younger siblings or to earn money at night through sex work (UN Women Fiji, 2014).

Populations 'trapped' in environmental degradation

Involuntary immobility can also make people more susceptible to the harms of CC and ED. In other words, people who are unable to escape from climate-related hazards or ED, are increasingly vulnerable to them (Foresight, 2011). There are several ways in which this might influence VAC. On the one hand, involuntary immobility has been related to child abuse and injuries, due to overcrowding in slum areas, parental stress or precarious living and working conditions (Ayeb-Karlsson et al., 2020; Biswas et al., 2015; Hayward & Ayeb-Karlsson, 2021). But there are also subtler forms of VAC in relation to immobility and ED. A photovoice research project with young people in Nevada, USA found evidence of 'slow' (or structural) violence caused by human-induced ED. Young people described environmental damage, including dumping and forest fires, as being compounded by inequitable service provision and infrastructure and disproportionately experienced by disadvantaged groups (Willett et al., 2021).

A person's decision or ability to migrate is influenced by several interlocking factors (such as social, economic, political or health related factors), and these factors may serve as barriers for people to leave harmful situations caused by CC and ED.



Mobility

- Literature points to three risks of VAC in relation to ED and climate-induced mobility, namely: within families, in camps and shelters and because of separation from caretakers.

Violence within families

- Some case studies found evidence of increased domestic violence within displaced families due to multiple pressures and psychological stress after an extreme weather event.

- Grey literature on SSA shows that children can be placed at higher risk of neglect following displacement due to additional economic pressures on their families.

Violence in camps and shelters

- Children living in refugee camps or emergency shelters have generally a much higher risk of experiencing violence, but comparable and rigorous data is missing to better understand the magnitude of the issue.

- Case studies (such as the Benue Region of Nigeria) show why more comprehensive data collection and analysis is required to gain better insights, understand regional and contextual differences, and to inform context-specific preventative measures.

Violence due to separation from families

- Research has generally shown that children who are separated from their immediate families, including those living with relatives, are extremely vulnerable to abuse and violence in the context of migration.

Immobility

- There is little definitive evidence about the relationship between ED and climate-induced immobility and VAC but some initial findings are emerging in the literature.

Immobility during humanitarian crisis

- Research in the Asia Pacific Region found that fear of violence in shelters leads women and children to stay at home and not evacuate when natural hazards occur. This not only heightens the risk from the natural hazard but also the risk of other forms of violence.

- A few studies point to immobility and domestic, or severe forms of, children's abuse and neglect after a natural hazard, due to parental stress, precarious living conditions, or being forced into child labour including sex work, among others. However, more research and data are needed from different contexts.

Populations 'trapped' in environmental degradation

- Involuntary immobility has been also related to child abuse and injuries due to overcrowding in slum areas, parental stress or precarious living and working conditions, with studies mostly conducted in Bangladesh.

04 Child Labour

According to a recent joint report by the ILO (International Labour Organization) and UNICEF, child labour remains a persistent problem. Latest global estimates indicate that 160 million children, 63 million girls and 97 million boys, were in child labour globally at the beginning of 2020, thus affecting almost one in 10 children worldwide (ILO and UNICEF, 2021). There has been an increase in child labour in four years, reversing a previous downward trend before the pandemic hit, that had seen child labour numbers shrink between 2000 and 2016 (ILO and UNICEF, 2021). SSA is the region with the highest prevalence and largest number of children in child labour, due to population growth, recurrent crises, extreme poverty and inadequate social protection measures, all of which have pushed an additional 16.6 million children into child labour since 2016 (ILO and UNICEF, 2021). Whether and how CC and/or ED further accelerated this trend remains unclear. However, as we will showcase in this section, there is some emerging evidence from academic and grey literature on how **CC and ED can fuel and intersect with child labour in various ways.**

The relationship between child labour and VAC is not always straightforward. What kind of labour is considered harmful for children remains subject to debate in the literature (Maconachie et al., 2022). It is argued that some forms of child labour (e.g. helping on the family farm or household chores) can contribute to child wellbeing by providing skills, fostering competence and self-esteem, and enabling their transition into adulthood. In many LLMICs, especially in SSA,[7] children are expected to 'work' as part of their upbringing to become respected and valuable members of a community alongside the economic necessity to make ends meet. For this reason, conceptualizations of harm need to be relative, contextual, and relational (Collins & Wright, 2022; Maconachie et al., 2022), which can pose many dilemmas in policy and practice, as we show in the case of Bangladesh (Delap, 2000).

7 In the context of SSA, Gatsinzi and Hilson (2022) argue that the realities of child work are not reflected in reductionist definitions of child labour, commonly held by governments, international NGOs, and donor organizations, that focus on binary conceptualizations of age, time spent working and work environment, and moreover that many children engage with work because of necessity – due to their wider sociocultural context.

The ILO states that child labour constitutes work that deprives children of their childhood, their potential, and their dignity, and that is mentally, physically, socially, and morally dangerous or harmful to children (ILO, 2023b). The ILO Minimum Age Convention (1973), broadly states that the minimum age of work should be age 13 for 'light' work, age 15 for admission to employment and 18 for hazardous work (ILO, 2023a). The distinction by the ILO between 'light' and 'worst' forms of child labour is to an extent useful but has also been contested by scholars for not acknowledging cultural context. So-called light work involves tasks such as fetching water, carrying light items, or preparing food. The worst forms of child labour include all forms of slavery or practices similar to slavery, such as the sale and trafficking of children, debt bondage and serfdom and forced or compulsory labour, including forced or compulsory recruitment of children for use in armed conflict; child prostitution and pornography; using children for illicit activities, in particular for the production and trafficking of drugs; and work which is likely to harm the health, safety or morals of children (ILO, 2023a). Against this backdrop we consider worst forms of child labour as directly related to VAC and light forms of child labour as being potentially or indirectly related to VAC, depending on context and individual accounts.

Our review of the literature revealed that not all studies clearly distinguish between light and worst forms of child labour, which made it difficult to arrive at general conclusions. Data on what kind of child labour increases in the context of CC and ED, and how this may entail violence, is available in small scale qualitative research but not evident in large-scale, comparable and generalizable quantitative studies. This is in part due to the hidden nature and contextual specificity of child labour.

4.1 Child labour due to extreme weather events and natural hazards

There is some evidence in the literature that child labour increases after natural hazards and environmental shocks, though studies vary in quality and typology. As mentioned in Section 3 (Im/mobility), natural hazards can lead to displacement, rendering children more vulnerable to the worst forms of child labour such as debt bondage and trafficking. Besides, children who remain in post-disaster settings may be drawn into dangerous forms of labour, such as heavy reconstruction work following extreme weather events (FAO, 2017).

In some (but not all) contexts, **climate variability** has been found to have an effect on child labour. Data from Ethiopia, collected in 2004 and 2009, showed that climate variability meant children spent significantly more time on farming activities, and less time on domestic chores (Colmer, 2013), though it is not clear from the data whether the type of work related to 'light' or 'worst' forms of child labour. Another study in Guatemala also found that child labour increased following environmental shocks, but the paper does not clearly define types of hazards, making it hard to establish links between VAC, CC and/or ED (Vásquez & Bohara, 2010). By contrast, research from Malawi did not establish a correlation between climate vulnerability and an increase in child labour (Boutin, 2014). All of this suggests that more research is needed in this area, as existing studies are not generalizable, results vary by context, typologies and indicators.

There is some scholarship associating **droughts** with an increase in child labour. Research conducted by the ILO in Sri Lanka found that droughts augmented rates of child labour and school dropout (Moonesinghe, 2018). A quantitative study from Cambodia also found that following droughts, more households put their children into the labour force (T.-T. Nguyen et al., 2020).

There is a small body of literature relating **cyclones and floods** to higher incidences of child labour, with studies conducted in Bangladesh (Delap, 2000; Islam et al., 2021) and Pakistan (Q. Khan & Hussain, 2023). In making use of quantitative data, Q. Khan & Hussain (2023) demonstrate sharp rises in school dropout rates after the floods in Pakistan in 2010, concomitant with a drastic decrease in household income and expenditure on children's education. This in turn, led families to withdraw children from school and put them into child labour. A quantitative study following floods in Bangladesh in 1998 highlights that child labour increases with the magnitude of the climate-induced shocks (Alvi & Dendir, 2011). However, one mixed-methods study conducted by Delap (2000) brings to light the many dilemmas and fundamental contradictions that arise in regard to appropriate policy responses to children's work after floods in Bangladesh. Her research highlights both the beneficial and harmful nature of child labour during 'shock' periods such as floods. Families from lower socio-economic backgrounds relied on their children's work and income, and children themselves also felt a responsibility to support their households. On the other hand, children found working in and around the floodwaters problematic and Delap (2000) highlights how work can be harmful to many children, causing physical and mental distress. She calls for policies and interventions that address both dilemmas: families' reliance on child work alongside strategies to eliminate child labour entirely.

As shown in this section, research on the relationship between child labour, CC and/or ED is not only complex and highly depends on context, but also at a very early stage. There is clearly not enough data from a much wider range of contexts and environmental scenarios to draw any context-specific or general conclusions.

4.2 Child labour in industries harming the climate and environment

We further reviewed literature on sectors that significantly harm the environment and have been associated with CC. These included: agriculture; fisheries; mining and quarries; fashion industry and tourism. All these sectors also have multiple and severe effects on children's health (see Section 5 for more details).

Agriculture

Agriculture contributes to and is impacted by CC and ED (Calzadilla et al., 2013; Zinyengere et al., 2017). It also accounts for 70% of child labour globally, 112 million children in total, with younger children under-represented in the statistics, underscoring that agriculture may serve as an entry point to other forms of child labour (ILO and UNICEF, 2021).

Although there are significant gaps in our understanding about the relationship between child labour, child health and agriculture (Greenfield, 2022), there are some trends emerging from the literature. For example, the links between rising land surface temperatures and heat stress reveal that CC can cause agricultural work to become more hazardous, even if children are only working in agriculture for short hours outside of school (Greenfield, 2022). Similarly, a report from the FAO (2017) states that food chain crises due to climate variability both increase the likelihood of children entering child labour in agriculture, and compound the risks involved in child labour. Food chain crises make it more likely that children enter child labour in response to the loss of livestock and harvest, and increase children's exposure to toxic chemicals or infection from outbreaks of diseases in animals. The IPCC also notes that CC is likely to increase the frequency and severity of droughts, floods, and other extreme weather events, which can have significant impacts on food production and food security (IPCC, 2022), likely to increase the pressures on child labour in this sector.

Besides, there are several reports in the grey literature on child labour in agricultural sectors that severely harm the environment and the climate, such as the palm oil sector or cocoa plantations. Research in Indonesia by Amnesty International (2016) highlights how children are used as cheap or free labourers in the palm oil industry, officially only 'helping' their parents. Some of these children are as young as eight years, others dropped out of school because of their work in the plantations. Children in this context are required to carry heavy loads, are at high risk of injuries from repetitive movements and are exposed to chemicals (Amnesty International, 2016b). Wahab & Dollah (2022) conducted research on child labour in palm oil production in East Malaysia, and found that while not all children's participation in palm oil production constitutes child labour, unfree and unacceptable labour relations do exist in this context. They found that children are compelled to enter this area of work due to poverty, and that their vulnerability to exploitation is compounded by a lack of recognition of children's identities (lack of identity documents) and barriers for children to enrol in formal education (Wahab & Dollah, 2022).

Other examples can be found in the cocoa industry. Ninety percent of the world's cocoa beans are harvested on small family farms with less than two hectares of land (Ungoed-Thomas, 2022). Child labour is a common practice during harvest season, and during the 2013-14 growing season, an estimated 2 million children were used for hazardous labour throughout Ghana and Ivory Coast (World Wildlife Magazine, 2017). According to the World Wildlife Fund (WWF), cocoa farming is leading to widespread deforestation, and cocoa trees are sensitive to heat and drought that will lead to further environmental and social precarity in these regions.

Fisheries

In 2017 fish consumption accounted for 17% of the global population's intake of animal protein, and 7% of all protein consumed. Marine fishery resources have been rapidly declining since the 1950s, and the percentage of fish stocks which are fished at biologically unsustainable levels increased from 10% in 1974 to 34.2% in 2017 (FAO 2020). This rapid increase in fishing and overfishing has several impacts on the environment, such as: the destruction of fish habitats, the fishing down of marine food webs, ecological disruption, and by-catch problems. These impacts on marine ecosystems and the health of oceans have further impacts on food security, employment and income among other factors (Sumaila et al., 2016).

Child labour is common in fisheries and aquaculture, and children are involved in all stages including farming or harvesting, processing, selling and distribution (FAO, 2018a). Risks related to fishing include those due to handling machinery, being at sea for long periods of time, and cleaning and handling fish (FAO, 2018a). There is evidence that children are trafficked from their home villages, taken away from their parents and put to work in fisheries. A study about the maltreatment of trafficked children fishing on Lake Volta shows how children are exposed to dangerous working conditions, and physical, sexual and verbal abuse (Hamenoo & Sottie, 2015). Child labour is increasingly common in fisheries operating more sustainably, including processes and measures overseen by the MSC (Marine Stewardship Council) Fisheries Standard (Tindall et al., 2022).

It is worth noting that not all the activities children take part in are necessarily harmful. Boys and girls engage in different tasks, and so may be exposed to different risks, depending on the nature of the work and the time of day when it is undertaken. A study by Jariego et al., (2023) about minors participating in fishing in the mangroves in Honduras found that, when children collaborate with family members, their work is considered to improve their understanding about nature in general and the ecosystem in particular, and can preserve local traditional knowledge.

Mining and quarries

Mines and quarries affect the environment and climate in various ways. They release greenhouse gases, use large amounts of water, pollute the water, source non-renewable materials, have a high carbon footprint in transport and contribute to dust pollution. In LLMICs in particular, quarries have a negative effect on children's health and the environment, but are also found to worsen socio-economic conditions (Amnesty International, 2016b; Hilson, 2008; Opondo et al., 2023; Sovacool, 2021). One main challenge is the lack of regulation and policy in mining and extraction – both on the part of governments and in companies not doing enough to verify supply chains, affecting predominantly SSA (Amnesty International, 2018; Opondo et al., 2023).

There is a vast body of literature on child labour in artisanal and small-scale mining (ASM) and quarries, highlighting how the negative impacts of mining and quarries on socio-economic conditions outweigh any positive impact, in addition to the severe negative effects on the environment and climate (Gatsinzi & Hilson, 2022; Hilson, 2008, 2009; Landrigan et al., 2022; Potter & Lupilya, 2016; Sovacool, 2021). Research covering quarrying activities in Kenya found that apart from land degradation, vegetation loss and dust pollution, quarrying also led to an increase in child labour in the area, school dropout, and broader health problems in the population (Opondo et al., 2023). A qualitative study about artisanal and small-scale mining in Ghana also found that it led to higher levels of truancy, child labour and teenage pregnancy as well as broader environmental degradation (Bansah et al., 2018). In some cases, children also used money from mining activities to pay for their school fees, or to cover the costs of clothing or food. This led to a broad lack of motivation or interest in schooling, with some children working in mining activities earning a higher income than their teachers (Bansah et al., 2018).

Broader, secondary impacts of large-scale mining on child labour have been noted in Latin America, for example when large movements of workers into remote, and often illegal, mining areas generate a demand for sexual exploitation of children. As mines are often close to rural and indigenous communities, affected communities are particularly vulnerable due to their lack of political power, limited law enforcement, and high levels of complicity between mine workers and brothel owners (Castañeda Carney et al., 2020).

Fashion industry

The fashion industry is responsible for an estimated 10% of global carbon emissions, which is projected to rise by 2050 to a quarter of the global carbon footprint (UNFCCC, 2018). The fashion industry has harmful environmental impacts at multiple points in the value chain, related to water use, chemical pollution, CO_2 emissions and textile waste (Niinimäki et al., 2020). Child labour is a particular issue in the fashion industry, because some elements of the supply chain require low-skilled labour, and some tasks are better suited to children than adults. For example, children are often hired to pick cotton as their small fingers are less damaging to the crops. The fashion and textiles industries are also hard to regulate due to their complexity, making it difficult for fashion brands to control every stage of production (Moulds, 2017). Because child labour is illegal, employers may go to extreme lengths to hide it, and children may lie about their age, or have no identity papers (Pereznieto et al., 2020).

Children are involved in all stages of the supply chain, from working in fields, to working in factories (Overeem & Theuws, 2014). In Uzbekistan there is evidence of children working in cotton fields suffering exhaustion and heat stroke as well as physical and sexual abuse (Pereznieto et al., 2020). One study on Egypt revealed that children working in cotton production are exposed to pesticides (Overeem & Theuws, 2014). Research in textile factories in South India found that 60% of workers were girls below the age of 18, and the youngest workers were 15 years old when they started work. There was evidence of forced and bonded labour, limited freedom of movement, and cramped living conditions (Theuws & Overeem, 2014).

There is a significant lack of good quality academic literature on this topic, and most of the papers published are quite old and do not include rigorous primary data collection and analysis. Furthermore, campaigns to change patterns in the industry or consumer behaviours often focus on either the environmental or the labour rights aspects, and fail to draw them together (Pereznieto et al., 2020). Despite this lack of evidence, it is clear from grey literature and investigative journalism that child labour prevails in the fashion and textiles industry, which is one of the most polluting and unsustainable industries globally.

Tourism

The tourism industry accounts for about 8% of global greenhouse gas emissions, mostly from HICs, and that number is constantly rising (Lenzen et al., 2018). The carbon footprint of tourism includes carbon emitted directly from tourism activities and carbon emitted in producing commodities purchased by tourists (Ibid). In the last 25 years, worldwide tourism has more than doubled (World Bank, 2023), and after a short hiatus during the Covid-19 pandemic, the tourism industry is expanding again (Leal Filho et al., 2023). Alongside its negative impact on the environment, over-tourism also has an impact on the well-being of local people in tourist destinations, leading to an increase in child labour (Leal Filho et al., 2023; Peters et al., 2018). Given the economic benefits of tourism, national governments often turn a blind eye to child labour in this sector (Pereznieto et al., 2020), and so regulation and data on the issue can be hard to come by.

Child labour in the tourism sector is often exacerbated by poverty and is associated with long hours and low pay, which increase pressures in the household and likelihood of parental stress and anger-related violence (Pereznieto et al., 2020). Ethnographic research in Jordan has shown

that the growth in tourism has been met by an increase in the number of children taking part in child labour, due to limitations of the education sector, inequities within the country and a rise in levels of poverty (Magablih & Naamneh, 2010). Recent qualitative research in Mexico found that poverty was a central driver of child labour in tourism, and that family breakdown and domestic violence were common among children in this group (Cruz Jiménez et al., 2022).

Global over-tourism is also related to a rise in child prostitution and sexual exploitation (Peters et al., 2018). A global study on the sexual exploitation of children in travel and tourism found the problem to be worldwide, although the specifics vary by region. For example, in East Asia domestic travellers outnumber foreign tourists, and business travel is associated with men engaging in after-hours 'meetings', while in Latin America many households have come to depend on tourism, making the reporting of sexual exploitation of children in travel and tourism and enforcement of relevant law more challenging (ECPAT, 2016). The harms of sex abuse following tourism are many, including effects on mental (ECPAT, 2016) and physical health, for example increased exposure to sexually transmitted infections (STIs) (Lu et al., 2020; McClure et al., 2015).

4.3 Child labour and schooling

Education is often portrayed as a panacea to end child labour. However, the relationship between child labour and school attendance is complex and access to education does not necessarily prevent or reduce child labour. Poor quality schooling, discrimination in access to schooling, or low value placed on education can serve as 'push factors' for children to drop out of school and enter work (Terre des Hommes, International Federation, 2017). In other cases, participating in work can help children pay for their school fees or cover the costs for school books and uniforms (Hilson, 2009, 2010, 2012; Maconachie & Hilson, 2016). For instance, qualitative research conducted with children involved in small-scale mining in Ghana and Sierra Leone, shows that participation in paid work makes their continued education possible (Jonah & Abebe, 2019; Maconachie & Hilson, 2016).

Research on whether CC and ED lead to school dropout and declines in enrolment arrives at very mixed results. A study from the World Bank broadly suggests that CC and ED can be related to leaving school prematurely or not enrolling in school (Hallegatte, 2016). In some cases, this occurs to help households manage economic shocks, in the case of responses to droughts in Cote D'Ivoire and Zimbabwe (ibid). Climate related weather events and ED can also damage school facilities and wider infrastructure in education. Research from Pakistan following the 2010 floods, showed an increase in school dropouts, due to damage to schools as well as economic costs on children's families. Children were also slightly more likely to enter child labour as a mitigation strategy for families (Q. Khan & Hussain, 2023).

However, research from other contexts such as Ethiopia (Colmer, 2013) did not find an association between environmental shocks, school enrolment, drop out and child labour. A quantitative study about the impact of Hurricane Matthew (2016) in rural Haiti established that income constraints caused children to leave school, but there is limited evidence that students left school to help their families with agricultural labour (Cook & Beachy, 2018). Similarly, a study analysing household survey data exploring school dropout following extreme snow events in Mongolia does not appear to show a relationship with child labour (Kraehnert & Groppo, 2018). A quantitative study from Burkina Faso also shows that the impact might be different for girls and boys, finding that the expansion of the cotton industry increased school enrolment among girls and reduced their participation in child labour, whereas little effect was seen for boys (Kazianga & Makamu, 2017).

Child Labour

- Child labour is considered to be on a spectrum from 'light' to the 'worst' forms, the latter including trafficking, child prostitution and pornography, and recruitment of children for armed conflict. Not all studies clearly distinguish between light and worst forms of child labour which makes it difficult to arrive at general conclusions.

- Data on what kind of child labour increases in the context of CC and ED, and how this may entail violence, is available in small scale qualitative research but not evident in large-scale, comparable and generalizable quantitative studies. This is in part due to the hidden nature and contextual specificity of child labour.

Child labour due to extreme weather events and natural hazards

- The few studies that are available vary widely in quality and typology. Taken together they point to child labour increases after natural hazards (such as climate variability, droughts, cyclones or flooding).

- It is hard to draw broad conclusions on the relationship between child labour and ED due to contextual factors. For example, children in rural areas may be more likely to enter child labour due to drought conditions, compared to children experiencing drought conditions in urban areas.

- The case of Bangladesh shows the need for policies and interventions that address two dilemmas: families' post-disaster reliance on child work alongside strategies to eliminate child labour entirely.

- There is a significant lack of rigorous research about the relationship between child labour and natural hazards or extreme weather events.

Child labour in industries harming the environment

Agriculture

While there are significant gaps in our understanding about the relationship between child labour, CC and agriculture, studies point to a number of pathways, such as:

- Rising land surface temperatures and heat stress are causing agricultural work to become more hazardousfor children, even if children are only working in agriculture for short hours outside of school.

- Food chain crises due to climate variability both increase the likelihood of children entering child labour in agriculture, and compound the risks involved in child labour.

Fisheries

- There has been a rapid increase in fishing and child labour is common in fisheries and aquaculture. Children are involved in all stages including farming or harvesting, processing, selling and distribution.

- Literature (especially grey literature) points to both light and worst forms of child labour in the fishing industry.

Mining and quarries

- In LLMICs in particular, quarries have a negative effect on the environment, are found to worsen socio-economic conditions, increase child labour (light and worst forms), and harm children's health.

- There is a vast body of literature on child labour in ASM and quarries, providing evidence on how the negative impacts of mining and quarries on socio-economic conditions outweigh any positive impact.

Fashion industry

- Not only does the fashion industry have harmful environmental impacts, but child labour is a particular issue at all levels of the supply chain.

- One main challenge is that the fashion and textiles industries are hard to regulate due to their complexity, making it difficult for fashion brands to control every stage of production.

- Academic research on this topic is challenging to find, and most of the papers published are either dated or do not comprise rigorous primary data collection and analysis.

- Despite this lack of evidence, it is clear from grey literature and investigative journalism that child labour is extensive in the fashion and textiles industries.

Tourism

- Over-tourism has an impact on the well-being of local people in tourist destinations and has also been associated in the literature with an increase in child labour.

- In view of the economic benefits of tourism, local authorities often turn a blind eye to child labour in this sector, and so regulation and reliable data on the issue can be hard to come by.

- The few studies that are available highlight poverty in LLMICs as a central driver of child labour in tourism, as well as an increase in child prostitution and sexual exploitation linked to over-tourism.

Child labour and schooling

- The interaction between child labour and school attendance is extremely complex, and schooling is not a panacea to prevent and reduce child labour in LLMICs.

- Research on whether CC and ED lead to school dropout and increases in child labour arrives at very mixed results, depending on context and region.

05 Health

There is widespread agreement among scholars and experts that CC threatens human health in multiple exposure pathways, posing enormous public health risks (Levy & Patz, 2015). In 2016, the WHO estimated that 24% of all deaths worldwide are linked to environmental factors such as air pollution, water and sanitation, increasing heat waves and extreme weather events, harmful exposure to chemicals and more (Prüss-Üstün et al., 2016). Children under the age of five years are considered most vulnerable to diseases (Ahdoot et al., 2015; Pronczuk & Surdu, 2008), with 28% of all global deaths from environmental factors affecting that age group (Prüss-Üstün et al., 2016). Compared to adults, children are physically, mentally and physiologically more vulnerable to the effects of natural hazards, shocks and stresses and have a much greater risk of death from diseases that are believed to be exacerbated by CC, such as malaria, zika virus or dengue (UNICEF, 2021c).

Children's vulnerabilities to climate and environmental hazards are deeply entrenched in global injustices. Prevailing inequalities between countries largely determine how CC and ED impact children's health (Helldén et al., 2021; Patz et al., 2007). Compared to HICs, children in LLMICs suffer from a disproportionally high and truly unjust health burden from CC (UNICEF, 2021b). This is due to geographical reasons and meteorological patterns (IPCC, 1998; The World Bank, 2013), and global hegemonies that are firmly rooted in history (Chakrabarty, 2012; Chakraborty, 2017). Against this backdrop, and in view of ongoing debates around 'climate justice', we argue that CC, ED and children's health is not just a question of their wellbeing. In several respects the damage to children's health is also a form of structural violence in depriving them of their most basic human right to 'health', both for the present and the future, with children born in LLMICs being most disadvantaged.

The sheer magnitude of evidence available on the effects of CC and ED on children's health is indicative of the severity of the issue (see for instance: Garcia & Sheehan, 2016; Helldén et al., 2021; Sheffield & Landrigan, 2011; UNICEF, 2021a). This is accompanied by various position statements from experts and institutions around the globe, calling for emergency actions to limit global temperature increases, restore biodiversity and protect health (e.g. Atwoli et al., 2021; RCPCH, 2021). It is all the more important to acknowledge again, that the relationship between adverse

health outcomes among children and CC or ED is not one-dimensional. Scholars argue for a systems approach to better understand and address the complex pathways of natural/human-induced hazards and health (see for instance, Orievulu et al., 2022). Children's health is thus not compromised just because of CC and ED, but rather due to many interacting influences, such as economic, political, and social structures. For instance, children from densely populated areas (coastal settlements or urban slums) in LLMICs have a much higher probability of injuries, diseases or death after a natural and/or human-induced hazard (Mehrotra et al., 2011). But there is also evidence of adverse health effects among children in rural areas, relating to environmental factors and insufficient infrastructure. Water resources that have been contaminated with cooking oil during periods of flooding in rural India have had severe impacts on children's health and their nutrition (Parikh et al., 2021).

Despite the large body of studies and evidence available, it is important to acknowledge that there are some crucial gaps in the literature, as shown in a scoping review by Helldén et al., (2021) on CC and child health. These are:

- Most studies only include children as a subpopulation of analysis, with only a very few disaggregating the analysis by sex and age group. This limits insights, generalizability, and usability of results.
- Most studies are conducted in HICs or upper-middle income countries and not in low-income settings.
- Health outcomes that are the basis for assessing CC impact on children vary to such a large degree that it is almost impossible to compare results across studies.
- There is a clear lack of qualitative and longitudinal studies to provide a fuller understanding of how CC and ED affect child health.
- Evidence is lacking on the effect of social, political and commercial (i.e. 'systemic') determinants on CC impacts on the physical and mental health of children and different scenario projections taking these and different CC scenarios into account.

With that in mind, we broadly synthesise data available from aid agencies, international organisations as well as academic and grey literature. Our focus in this section is on illnesses and health conditions (such as malnutrition or depression). Physical injuries caused by hazards or the lack of medical care following an extreme weather event have been discussed by Kousky (2016) and will not be covered in this section. Reliable data and estimates on how many children are injured globally due to natural or human-induced hazards are missing. It is also difficult to estimate an exact number of children injured by industries that harm the environment. However, from a climate justice perspective, both, physical injuries, and lack of medical care in the context of CC and ED, can be seen as a result of structural VAC.

5.1 Physical health

Experts agree that the health of many children is already compromised before they are even born, as natural and human-induced hazards can affect parents' diets or other environmental factors, such as air pollution. **In-utero exposure** to climate and environmental stresses has been associated with an increased risk of preterm birth (Carolan-Olah & Frankowska, 2014), miscarriages and stillbirth (Asamoah et al., 2018; Ha et al., 2017), lower birth weight (Grace et al., 2015), or higher prevalence of birth defects (Poursafa et al., 2015). A telling example of how children are impacted during all stages of development is provided by Sheffield & Landrigan (2011) in Table 1 below.

Table 1: The influence of climate and environmental stressors at all stages of child development, adapted from Sheffield & Landrigan (2011), p.292.

Preconception	Embryo / foetus	Newborn	Juvenile	Adolescence
Maternal nutrition can influence lifetime risk of many chronic diseases	Extreme heat during pregnancy can lead to lower birth weight	Extreme events can affect breast-feeding practices	Diarrheal illnesses are a leading cause of death in young children	Air quality and ozone levels influence lung development

During their lifetime children around the globe are exposed to many threats to their health from climate and environmental hazards – in varying degrees. Research in public health points to risks caused by natural hazards such as droughts, water scarcity and floods; heatwaves and increased prevalence of vector-borne diseases. Human-induced hazards that harm children and infants' health in multiple ways include air pollution and the increased use of pesticides or are related to industries harming the environment and climate.

Natural hazards and children's health

Extreme weather events or natural hazards exacerbated by CC, such as **droughts, water scarcity or coastal and riverine floods** impact children's health in multiple ways. These events frequently influence local food production, resulting in food insecurity, price spikes and malnutrition. Globally, in 2020 an estimated 22% of children under five years were stunted, and 6.7% wasted (FAO, 2022, p. xiv). It is unclear from these data, though, how many of these children experienced food shortages because of natural hazards or because of political and economic shocks – or both. In the context of SSA, studies have found an associated link between undernutrition among young children in drought-prone areas and deficient rainfall (e.g.: Chotard et al., 2010; Cooper et al., 2019; Rabassa et al., 2014).

Empirical evidence that specifically links natural hazard exposure (such as droughts or floods) and childhood undernutrition is still limited. There are a few case studies that provide small-scale and context-specific insights, but we cannot generalize or draw robust conclusions from these data (e.g.: outcomes by age or gender). In Ethiopia exposure to droughts has been found to be particularly detrimental to child health because of poverty, conflict and poor governance, which reduce the capacity to cope with drought impacts (Dimitrova, 2021). In Brazil, researchers found that fluctuations in rainfall, resulting in water scarcity, are robustly correlated with higher infant mortality, lower birth weight and shorter gestation periods (Rocha & Soares, 2015). In the case of Eastern India, the prevalence of wasting among children in flooded areas (2006 and 2008) was significantly higher compared to children living in non-flooded regions (Rodriguez-Llanes et al., 2016). In Kenya, Nigeria and Uganda, it was found that poor vegetation resulting from CC, and variabilities in precipitation and temperature, were associated with acute malnutrition in children aged 24-59 months (Grace et al., 2022).

Apart from malnutrition, other health effects related to floods include gastrointestinal and respiratory infections, which are major causes of disease and death in people displaced by natural hazards (Yavarian et al., 2019). As shown in the case of Bangladesh, lack of access to health-care services, crowding, damaged supply systems and water sources, in addition to poor waste-disposal systems and sewerage, augment the risk of death and infections (Milojevic et al., 2012). Other health effects connected with droughts in the literature include water-related disease (including E coli, cholera and algal bloom); airborne and dust-related disease; vector borne disease; and poor mental health (Stanke et al., 2013). Young children are most affected due to their physiological vulnerabilities (ibid).

Helldén et al. (2021) show that the effects of **heatwaves** have been associated with an increased overall mortality risk for children, particularly infants, in recent research. There is evidence of higher mortality rates during heatwaves in HICs such as Canada or South Korea (Auger et al., 2015; Son et al., 2017), but also in SSA (Azongo et al., 2012; Diboulo et al., 2012; Egondi et al., 2012). Notably, the context of Bangladesh has shown the opposite (Babalola et al., 2018). Studies also highlight an increase in emergency department visits by children in urban areas during heatwaves (Ghirardi et al., 2015; Sheffield et al., 2018; van der Linden et al., 2019). Asthma and other respiratory diseases are the most common associated health conditions among children and infants. At the same time Helldén et al. (2021) also found that literature points to a greater mortality from cold temperatures among children in Spain and China, where a rapid change in temperature and humidity levels can increase the risk of respiratory and infectious diseases in children. Higher temperatures also lead to increased transmission and spreading of vector-borne diseases (Rocklöv & Dubrow, 2020) such as malaria, dengue fever, or Lyme disease. Children under the age of five are far more prone to the risks posed by these diseases than adults (Rocklöv & Dubrow, 2020; WHO, 2020).

Human-induced hazards and children's health

Air pollution is one of the leading threats to child health, accounting for almost one in 10 deaths in children under five years of age (WHO, 2018) – see Box 6. Increased air pollution can cause respiratory problems such as asthma, bronchitis and lung diseases, and affect a child's neurological development. Children are particularly vulnerable to the effects of air pollution because their lungs are still developing. In making use of a global atmospheric chemistry model to investigate the link between premature mortality and seven emission source categories in urban and rural environments, Lelieveld et al. (2015) calculated that air pollution led to 3.3 million premature deaths worldwide – predominantly in Asia.

Box 6: 'Air Pollution and Child Health' (WHO 2018)

The WHO summarizes the most recent scientific knowledge on the links between exposure to air pollution and adverse health effects in children. The report's key findings are:

- Globally, 93% of the world's children under 15 years of age are exposed to ambient fine particulate matter (PM2.5) levels above WHO air quality guidelines. This affects 630 million children under the age of five, and 1.8 billion children under the age of 15 years.
- Children in LLMICs are most affected, where 98% of all children under five are exposed to PM2.5 levels above WHO air quality guidelines. In HICs 52% of children under five are exposed to levels above WHO quality guidelines.
- One billion children under the age of 15 are exposed to high levels of household air pollution, mainly from cooking with polluting technologies and fuels.
- Together, household air pollution from cooking and ambient (outside) air pollution cause more than 50% of acute lower respiratory infections in children under five in LLMICs.
- About 600,000 deaths in children under 15 years were attributed to the joint effects of ambient and household air pollution in 2016.
- Air pollution affects neurodevelopment, leading to lower cognitive test outcomes, negatively affecting mental and motor development.
- Air pollution damages children's lung function, even at lower levels of exposure.

Another significant body of scientific work points to the adverse effects of **pesticides** on the health of children directly and through paternal exposure (Ali et al., 2021). The manufacture, transport and application of pesticides creates greenhouse gas emissions through energy use in production and the release into the atmosphere of active ingredients and 'inert' adjuvants. They are also a major threat to biodiversity and soil heath (Pesticide Action Network UK, 2021). Scientists estimate that about 385 million cases of unintentional acute pesticide poisoning (UAPP) occur annually world-wide including around 11,000 fatalities. Based on a worldwide farming population of approximately 860 million, this means that about 44% of farmers are poisoned by pesticides every year. The greatest estimated number of UAPP cases is in LLMICs in southern Asia, followed by south-eastern Asia and east Africa with regards to non-fatal UAPP (Boedeker et al., 2020). The effect of pesticides on children's health has been the subject of great concern globally since the early 1990s in regard to their diets (National Research Council, 1993), but also their indirect (from mother to foetus) and direct exposure (e.g.: growing up on or working on a farm) (Ding & Bao, 2014). Research by Boedeker et al. (2020) highlights the lack of comprehensive databases to better understand the effects of pesticides on human health, including how this might impact children. Currently, neither registers nor surveys are sufficient to base estimations on solid, high-quality data covering all countries and pesticide use patterns (ibid).

This is extremely worrisome, because studies suggest that low levels of pesticide exposure can already affect young children's neurological and behavioural development (Liu & Schelar, 2012). Evidence also shows a link between pesticides and neonatal reflexes, psychomotor and mental development, and attention-deficit hyperactivity disorder (ibid). Besides, children are suffering from parental suicide by pesticide ingestion. As one of the three most common global forms of suicide, it causes over 150,000 deaths each year, predominantly among small-scale farmers from poor under-resourced households (Utyasheva & Eddleston, 2021).

Overall, industries harming the environment and the climate (agriculture, fisheries, mining and quarries, fashion industry, tourism) have multiple and severe effects on children (see also Section 4 on child labour). Implicitly, they contribute to air pollution, biodiversity loss or environmental pollution, all of which have been shown to cause negative health outcomes in children the world over (Prüss-Üstün et al., 2016). Children working in these industries are not only at a higher risk of physical violence but also explicitly affected by heat stress and dehydration when working in agriculture (Greenfield, 2022); injuries from hazardous work (e.g. Castro & Hunting, 2013) or physical short- and long-term impairment due to chemical exposure.

5.2 Mental health

Academic literature highlights that the effects of CC and ED on children and young people's mental health are twofold. First, poor mental health can directly or indirectly result from the occurrence of an extreme weather event, a natural or human-induced hazard, environmental shock or stress. Direct effects are linked to PTSD, depression, anxiety, substance abuse or suicidal thoughts during or after these major life disruptions (Léger-Goodes et al., 2022). Besides, social, economic, and environmental disruptions (e.g.: famine, civil conflict, (im)mobility or child labour) as a consequence of CC and ED, have been indirectly linked to stress, grief, anxiety and depression (Hayes et al., 2018). Second, evidence is mounting on 'eco-anxiety' in children and youth because of their awareness and fear of the consequences of CC (Hickman et al., 2021; Léger-Goodes et al., 2022). Both strands of literature suggest that the climate crisis can be seen as an act of emotional violence against children, as also argued by End Violence Against Children.[8]

Mental health consequences from natural or human-induced hazards

Studies have established a robust link between **natural hazards and increased PTSD and other mental health issues** (e.g.: Rezayat et al., 2020). As with other themes covered in this review, studies vary significantly in quality, applied methods, sample sizes and definitions of core concepts and measurements of indicators. Below we highlight some of this research and summarize common arguments we identified across diverse articles.

Existing scholarship points to an increase in PTSD after hurricanes, cyclones or floods. In Section 1 (Hazards and DDR), we showed that VAC is often perpetrated due to mental health stressors from human-induced or natural hazards. For instance, Biswas et al. (2010) found that flooding in Bangladesh not only led to increased cuts, falls and near drowning, but also parental child violence, particularly in households where parents had low occupational status. Cerna-Turoff et al. (2021) also highlighted negative coping with stress as a key pathway between natural hazards and VAC, such as substance abuse by adults leading to sexual and physical harm against children, and women who experienced violence due to such stresses were more likely to harm their children. Parents were also found to displace their anger with the situation on their children, for example beating children.

However, such hazards also directly impact children's mental health (Bermudez et al., 2019; Biswas et al., 2010; Sloand et al., 2017; Sriskandarajah et al., 2015). To give a few examples: after Hurricane Floyd in the Bahamas and United States, a study (Russoniello et al., 2002) conducted with a cohort of 218 children aged 9–12 years, found that 95% of the children experienced at least mild symptoms of PTSD, and 71% had symptoms that were moderate to very severe. Children whose homes were flooded were three times more likely to show symptoms of PTSD, compared to those whose homes remained intact (Russoniello et al., 2002). Similarly, in Bangladesh, cyclones appeared to have numerous psychosocial impacts on the population including acute stress disorder, sleep disorder, PTSD, generalized anxiety disorders, suicidal ideation and depression – affecting children, women and the elderly the most (Tasdik Hasan et al., 2020). There was also an observed increase in PTSD in children and youth after Hurricane Mitch in Nicaragua (Goenjian et al., 2001). Two studies also find that parental distress after natural hazards in low-income families increases PTSD among children. Kelley et al., (2010), establish a robust correlation between child exposure to Hurricane Katrina, parental distress and child PTSD. Another qualitative study found that financial strains and neighbourhood violence due to Katrina increased depression among very low-income mothers (n=47) of two-year-old toddlers, which was associated with a higher degree of child internalizing and externalizing problems (Scaramella et al., 2008).

Taken together, these studies suggest that children and youth from disadvantaged, low socio-economic and specific ethnic backgrounds (e.g.: black communities in the US) are more likely to suffer from PTSD after a natural hazard than children from wealthier backgrounds. One study also finds

8 See: https://www.end-violence.org/node/8154, last accessed 03.04.2023.

that PTSD was higher among children and youth if they had already been exposed to violence prior to the disastrous event (Salloum et al., 2011). Comparisons of data between HICs and LLMICs are difficult to find.

Some articles also highlight a surge in peer violence and aggressive behaviour among children, attributed to PTSD after a natural hazard (Lai et al., 2015; Scott et al., 2014; Self-Brown et al., 2013; Terranova et al., 2009), including higher levels of youth violence in general (Madkour et al., 2011). A quantitative study conducted 18 months after Hurricane Georges in Puerto Rico, interviewing 1,637 caregivers and children and youth, discovered that youth (aged 11–17 years), who witnessed community violence and poor teacher attitudes had an increased risk of psychopathology (Felix et al., 2013). Relatedly, Rubens et al. (2013) point to an interaction between exposure to Hurricane Georges and peer violence. Teen dating violence and substance abuse were also observed after Hurricane Ike in the US (Temple et al., 2011).

Global warming, in the form of **heatwaves or drought, has been associated with violent behaviour** in laboratory studies and cross-sectional and time-series studies using real-world heat and violence data (C. P. and C. A. Anderson, 2017). Generally, cities and regions with higher temperatures tend to experience more violent crimes than cooler regions, even after controlling for a dozen sociocultural factors such as age, race, poverty, and culture of honour (ibid.). While more research and evidence is needed in this area, those studies that are available indicate that higher temperatures affect adults' mental health, which can in turn increase VAC. At the same time, it can also have a negative effect on children's mental health. For instance, one quantitative study conducted in Australia provides evidence of an increased impact of higher temperature on children's mental health in poorer households, suggesting the need for more targeted children's mental health policies (Xu et al., 2018). A longitudinal study (Liu, 2004) conducted in Mauritius studied how malnutrition caused by drought in three-year-old children, affected their externalizing behaviour later in life (aged 8, 11 and 17). The study finds that malnutrition in young children predisposes them to neurocognitive deficits, which in turn predispose them to persistent externalizing behaviour problems throughout childhood and adolescence. The authors suggest that reducing early malnutrition may help reduce later antisocial and aggressive behaviour.

Finally, according to a systematic review of the literature, multiple studies found that **child labour has been significantly associated with poor mental health outcomes in LLMICs** (Sturrock & Hodes, 2016). As elaborated in Section 4, child labour is not only likely to increase after a natural hazard but is also used in industries harming the environment. A longitudinal study conducted in Indonesia by Jayawardana et al. (2023) suggests that child workers (in industries like footwear, gold, palm oil, tin and tobacco), are suffering from significantly poorer mental health and are likely to develop depression later in life.

Eco-anxiety among children and youth

The concept of 'eco-anxiety' is increasingly recognised in the media as well as in academic thought (Dodds, 2021; Panu, 2020). Eco-anxiety is the feeling of helplessness or depression that comes from experiencing gradual, long-term changes in climate (Albrecht, 2011). A scoping review of the literature on eco-anxiety in children and youth, conducted by Léger-Goodes et al. (2022), revealed experiences of a variety of emotions such as anger, sadness, guilt and hopelessness. The authors stress, however, that none of the articles they reviewed had child-specific measures of this concept, suggesting that future research should further investigate the phenomenon from a child-specific perspective. They further underline not to underestimate the important roles of parents, teachers/educators, mental health professionals, school systems and adults and people in power to mitigate the effects of CC on children and youth's mental health (ibid.).

Hickman et al. (2021) surveyed 10,000 children and young people (aged 10-25) in 10 countries (Australia, Brazil, Finland, France, India, Nigeria, Philippines, Portugal, the UK, and the US, 1000 participants per country), on their thoughts and feelings about CC and government responses to CC. The results of this survey are striking: respondents across all countries were worried about CC (59% were very or extremely worried and 84% were at least moderately worried). More than 50% reported each of the following emotions: sad, anxious, angry, powerless, helpless, and guilty. More than 45% of respondents said their feelings about CC negatively affected their daily life and functioning, and many reported a high number of negative thoughts about CC (e.g.: 75% said that they think the future is frightening and 83% said that they think people have failed to take care of the planet). Study participants expressing more worry and a greater impact on functioning tended to be from poorer countries, or from countries directly impacted by CC, such as Portugal (which has had dramatic increases in wildfires since 2017). Hickman et al. (2021) stress that climate anxiety and distress were also correlated with a perceived inadequate government response and associated feelings of betrayal.

Health

- Children's ill-health in relation to CC and ED is also a form of structural violence which deprives them of their most basic human right to health, with children born in LLMICs being most disadvantaged.

- Despite the vast number of studies available, there are some crucial gaps in the literature as existing data is not comparable, generalizable, lacks more evidence from LLMICs and does not often take intersecting factors (i.e. a systems approach) into account.

Physical health:

- Children are affected by CC and ED at all stages of their physical and mental development, starting from in-utero exposure.

- Natural hazards (such as: droughts, water scarcity, coastal and riverine floods, heatwaves or vector-borne diseases) have all been associated with poor health outcomes and death among children, affecting in particular children under the age of five.

- Human-induced hazards harm children and infants' health across the world and in multiple ways. Poor health effects in children have been associated with air pollution, increased use of pesticides or are related to industries harming the environment and climate.

- Studies that either provide an overview or outline and analyse the scale of specific industries that contribute to CC and ED and their relationship to children's health are still missing.

Mental health:

- Mental health problems resulting from CC and ED can lead to a rise in perpetration of VAC and domestic violence, with negative implications for children's physical and mental health in the long and short term.

- Scholarship points to an increase in PTSD after a natural hazard, affecting in particular disadvantaged children and youth in LLMICs, from poorer socio-economic backgrounds, or ethnic minorities.

- Child labour in the context after natural hazards or in industries harming the environment has been significantly associated with poor mental health outcomes in LLMICs.

- Evidence is mounting on 'eco-anxiety' in children and youth because of the awareness and fear of the consequences of CC.

Conclusion

At the time of writing, scientists presented a grim picture of how human-induced CC, more frequent extreme weather events and ED cause widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability (IPCC 2022). At the same time, the World Meteorological Organization (WMO) provides us with carefully calculated probabilities of breaching the 1.5C level on a temporary basis with increasing frequency. However, research has just begun to unravel how this will affect our children in the short and long term. Younger generations not only bear the brunt of the effects of human-induced CC and ED but, as this literature review shows, they will also suffer the most from its consequences.

Most studies we reviewed were not directly related to the relationship of CC, ED and VAC. They nonetheless helped us to build a persuasive picture of specific pathways, patterns and intersections between VAC and environmental shocks. The relationship between CC, ED and VAC is not linear, but context-dependent, with some thematic areas and regions more researched than others. The case studies we presented in this review illustrate why more comprehensive data collection and cross-disciplinary analysis is required to gain better insights, understand regional and contextual differences, and inform context-specific preventative measures. Besides, many studies do not take intersecting factors into account. We therefore join scholars who advocate for a systems approach to better understand and address the complex pathways of CC, environmental shocks and children's health. It is essential to acknowledge that children's wellbeing is not compromised just because of CC and ED, but rather due to many interacting influences, such as economic, political, and social structures.

Natural, human-induced and socionatural hazards in combination with large-scale humanitarian crises pose an immediate risk to health, life, property and the environment occurring over the course of days, months or years. Research from such settings has shown a disproportionate psychological, physical, and social impact on children. Studies have uncovered how increasing social, economic and emotional pressures in these situations expose children to higher risks of violence in their homes or in relief shelters; violence perpetrated by peers; or how children are pushed into child labour due to the sudden need to rebuild or help their caregivers make ends meet. VAC continues to be widely under-reported following all kinds of environmental shocks. The coping mechanisms in each country and region differ tremendously, generally disadvantaging children from LLMICs

and lower socio-economic backgrounds in HICs the most. An overemphasis on individual resilience in DDR can obscure the root causes of injustices intensified for children by ED or climate related catastrophes. More research is needed to inform integrated and culturally sensitive plans to respond to weakened child protection systems and preventative mechanisms prior to and following environmental hazards.

Across all sections we have seen that the effects of CC and ED are not **gender** neutral and can affect girls and boys differently. There is a growing body of work on GBV and VAWG in relation to CC and ED, which is useful to understand some of the pathways to violence exposure in the context of environmental shocks. Nevertheless, this body of work tends to be centred around issues affecting female adults, conflating the term 'gender' with 'women', without sufficient attention to the gendered effects of CC and ED on female and male children. Two emerging trends are still worth highlighting from this research: first, some studies observe a general increase in IPV during or shortly after extreme weather events, or due to shortages of resources (related to CC, ED or environmental exploitation). This is of relevance as research has shown that IPV can have severe long-term effects on children's development in various age groups. Second, existing research suggests that CC and ED can potentially worsen known drivers of child marriage in LLMICs, but findings vary significantly by region. Nuanced data about boys' exposure to various forms of VAC in the context of CC and ED is missing, as studies tend to focus on masculinities and males as perpetrators but not victims of violence. Finally, research is emerging on how the effects of CC and ED can disrupt education in multiple ways such as: damage to infrastructure and transport links, displacement, loss of livelihoods and poverty, or destruction of education facilities, or using schools as shelters – increasing VAC exposure. Girls are more likely than boys to drop out of school due to the impacts of CC and ED, though reliable and comprehensive data is missing, not allowing us to compare among regions and by type of hazard.

The influences of climate- and ED-related **im/mobility** on children are increasingly recognized in the literature. Research points to three risks of VAC in relation to ED and climate-induced mobility, namely: within families, in camps and shelters and because of separation from caretakers. There is a need for more rigorous research on children's exposure to violence in relief shelters or camps in the context of immediate and gradual effects of CC and ED. Correspondingly, as an emerging research area, there is little comparable data about the relationship between ED and climate-induced immobility and VAC, and evidence is based on a few case studies. Research in the Asia Pacific Region found that fear of violence in shelters leads women and children to stay at home and not evacuate when natural hazards occur. A few studies point to how immobility can lead to domestic, or severe forms of, children's abuse and neglect, in post-disaster settings. In a few qualitative studies, involuntary immobility in contexts of ED has also been related to child abuse and injuries due to overcrowding in slum areas, parental stress or precarious living and working conditions.

Reviewing literature on **child labour** and its intersections with CC and/or ED, we found it challenging that not all studies clearly distinguish between light and worst forms of child labour, which made it difficult to arrive at general conclusions. The few studies that are available on how CC and ED intersect with child labour vary widely in quality and typology. There is some evidence on rises in child labour after natural hazards (such as climate variability, droughts, cyclones or flooding) but data on what kind of child labour increases in the context of CC and ED is only available in small-scale qualitative research and not evident in large-scale, comparable and generalizable quantitative studies. This is in part due to the hidden nature and contextual specificity of child labour. The specific case of Bangladesh shows the need for policies and interventions that address two dilemmas: families' post-disaster reliance on child work alongside strategies to eliminate child labour entirely. Besides, it is worth stressing that child labour in industries that harm the environment (agriculture, fisheries, mining and quarries, fashion industry, and tourism) is widespread, but availability of rigorous research and data is mixed. Schooling is often portrayed as a panacea to end child labour, disregarding that poor-quality schooling, discrimination in access to schooling, or low value placed on education can serve as 'push factors' for children to drop out of school and enter work. In other cases, participating in work can help

children pay for their school fees or cover the hidden costs of education. Research on whether CC and ED lead to school dropout and declines in enrolment arrives at very mixed results, depending on context and region.

We included research on the impact of CC and ED on children's **health** in this review for two reasons. First, as we have shown throughout this review, environmental shocks can harm children physically and mentally in various ways. Second, the effects of CC and ED on children's health are also an expression of structural violence in depriving them of their most basic human right to 'health', with children born in LLMICs being most disadvantaged. There is strong scientific evidence that children's health is affected by CC and ED at all stages of their physical and mental development, starting from in-utero exposure. Natural hazards (such as: droughts, water scarcity, coastal and riverine floods, heatwaves or vector-borne diseases) have been associated with poor health outcomes and death among children, affecting in particular children under the age of five. Poor health effects in children have been related to air pollution and increased use of pesticides or are linked to industries harming the environment and climate. There are some studies pointing to an increase in PTSD or increased aggressive behaviour and peer violence after a natural hazard, affecting in particular disadvantaged children and youth in LLMICs, or from poorer socio-economic backgrounds or ethnic minorities in HICs. Evidence is also mounting on 'eco-anxiety' in children and youth because of their awareness and fear of the consequences of CC.

Taking **all five thematic areas** together, structural violence against children has emerged as a cross-cutting theme, creating and reinforcing the conditions for multiple forms of VAC in the context of CC and ED. VAC is thus not just a phenomenon that intensifies during environmental shocks, but is deeply rooted in history, global injustices, systems and structures and therefore disproportionately impacts those living in poverty. As we have shown in this review, children from LLMICs, as well as children from lower socio-economic backgrounds in HICs, are more likely to be exposed to the many negative impacts of CC and ED. Environmental shocks can affect girls and boys differently, depending on region and context. Children born in LLIMCs are more likely to suffer from the consequences of im/mobility; are at risk of being lured into the worst forms of child labour; are significantly more affected by industries that harm the environment and are more likely to be deprived of their most basic rights to health and education in the context of CC and ED. Structural and institutional factors (such as the absence of policies, laws and reliable implementation thereof) cause additional vulnerabilities for children to the damaging effects of CC and ED.

Implications for future research

To understand how CC, ED and VAC intersect, we rely on evidence emerging from multiple fields of study, disciplines and case studies presented in scholarly and in grey literature. Current knowledge on VAC, CC and ED is challenged by the following weaknesses in research:

- Lack of consistent, generalizable, transnational and comparable data due to different methodologies, indicators, timeframes and quality standards in research. This, in part, impedes advocacy, policy action and agenda setting on how CC and ED can intensify VAC.
- Definitional inconsistencies across disciplines, alongside definitional unclarity of climate-related and environmental hazards (e.g.: a large number of studies still use the term natural disaster, a term that is not only contested but often also includes natural hazards that have not been linked to CC).
- Literature on VAC revolves around westernized ideals of childhood or children's wellbeing, prioritizing individual over communal children's rights, which can be ill-suited (and at times even damaging) for children in non-western contexts. This critique and call to decolonize research and work, frequently made by Southern scholars, is hardly reflected in the literature we reviewed.
- Regional bias of available data, with most studies conducted in the US, followed by a few well-researched case studies in LLMICs (e.g.: Bangladesh) with solid and comparable data missing from most LLMICs – especially SSA.
- Most studies do not take structural violence into account.
- Children and young people's voices continue to be under-represented in existing research, which in part is due to the sensitive nature of researching VAC, with several methodological and ethical implications and barriers to research.

Annex

Search terms used in Scopus, Google Scholar and PubMED:

Overview literature search

Sections / Chapters	Search terms
01: Hazards and Disaster Risk Reduction	
1.1 Natural hazards	'violence' 'children' 'natural disasters' 'violence' 'children' 'natural hazards' 'violence' 'children' 'floods' 'violence' 'children' 'cyclone' 'violence' 'children' 'hurricane' 'violence' 'children' 'drought' 'violence' 'children' 'wildfires' 'violence' 'children' 'bushfires' 'violence' 'children' 'vector-borne diseases'
1.2 Human-induced hazards	'violence' 'children' 'environmental degradation' 'violence' 'children' 'pollution' 'violence' 'children' 'oil spills' 'violence' 'children' 'deforestation' 'violence' 'children' 'landslides' 'violence' 'children' 'conflict' 'climate change'
1.3 Socionatural hazards	Same as above
1.4 DDR	'disaster risk reduction' 'violence' 'children' 'disaster risk reduction' 'resilience' 'children' 'disaster risk reduction' 'children' 'participation'
02: Gender	
2.1 Disproportionate impact of CC and ED on women and girls	'Gender-based Violence' 'climate change' (natural disasters) (natural hazards) (environmental degradation) 'Violence against Women and Girls' 'climate change' (natural disasters) (natural hazards) (environmental degradation)
2.2 Child marriage	'child marriage' 'climate change' 'child marriage' 'natural disasters' 'child marriage' 'natural hazards' 'child marriage' 'floods' ('flooding') ('cyclones') 'child marriage' 'drought'
2.3 Violence against boys	'violence' 'boys' 'climate change' 'violence' 'boys' 'natural disasters' 'violence' 'boys' 'environmental degradation' 'violence' 'boys' 'environmental exploitation' 'boys' 'climate change' 'boys' 'environmental degradation' 'boys' 'environmental exploitation' 'masculinities' 'climate change'
2.4 Gender and schooling	'school' 'drop out' 'negative' 'effects' 'gender' 'girls' 'boys' 'school' 'drop out' 'climate change' 'gender' 'girls' 'boys' 'school' 'drop out' 'natural disasters' 'gender' 'girls' 'boys' 'school' 'enrolment' 'girls' 'boys' 'gender' 'climate change' 'natural disasters'

03: Im/mobility

3.1. Mobility	‘refugees’ ‘climate change’ ‘children’ ‘violence’ ‘migration’ ‘climate change’ ‘children’ ‘violence’ ‘migration’ ‘natural disasters’ ‘children’ ‘violence’ ‘migration’ ‘natural hazards’ ‘children’ ‘violence’
3.2. Immobility	‘shelters’ ‘children’ ‘violence’ (‘climate change’) (‘natural disaster’ ‘refugee camps’ ‘children’ ‘violence’ (‘climate change’) (‘natural disaster’) ‘trapped populations’ ‘climate change’ ‘natural disasters’ ‘natural hazards’ ‘children’ ‘violence’
3.3. (Im-)mobility and schooling	‘migration’ ‘refugee’ ‘mobile’ ‘education’ ‘school’ ‘enrolment’

04: Child Labour

4.1. Child labour due to extreme weather events and ED	‘child labour’ ‘climate change’ ‘child labour’ ‘natural disasters’ ‘child labour’ ‘flood’ ‘child labour’ ‘cyclone’ ‘hurricane’ ‘child labour’ ‘drought’ ‘child labour’ ‘bushfire’ ‘wildfire’ ‘child labour’ ‘water scarcity’
4.2. Child labour in industries harming the climate and environment	‘child labour’ ‘environmental degradation’ ‘child labour’ ‘mining’ ‘slavery’ ‘child labour’ ‘quarry’ ‘slavery’ ‘child labour’ ‘textile industry’ ‘textiles’ ‘slavery’ ‘fashion’ ‘child labour’ ‘cotton’ ‘slavery’ ‘child labour’ ‘pollution’ ‘slavery’ ‘child labour’ ‘fisheries’ ‘fishing Industry’ ‘slavery’ ‘child labour’ ‘sustainable’ ‘fisheries’
4.3. Child labour and schooling	‘child labour’ ‘education’ ‘school’ ‘enrolment’

05: Health

5.1. Physical health	‘climate change’ ‘children’ ‘health’ (‘mental’) ‘natural hazards’ ‘children’ ‘health’ ‘extreme weather events’ ‘children ‘health’ ‘natural disasters’ ‘children’ ‘health’ ‘pollution’ ‘children’ ‘health’ (‘air’) ‘pesticides’ ‘children’ ‘health’ (‘suicide’) ‘drought’ ‘children’ ‘health’ (‘malnutrition’) ‘water scarcity’ ‘children’ ‘health’ (‘malnutrition’) ‘floods’ ‘children’ ‘health’ (‘malnutrition’) ‘physical injury’ ‘children’ ‘natural disaster’ or ‘natural hazard’ or ‘extreme weather events’ ‘PTSD’ ‘children’ ‘natural disaster’ or ‘natural hazard’ or ‘extreme weather events’
5.2. Mental health	‘PTSD’ ‘children’ ‘climate change’ or ‘natural disaster’ or ‘natural hazard’ or ‘extreme weather events’ ‘anxiety’ ‘children’ ‘climate change’ or ‘natural disaster’ or ‘natural hazard’ or ‘extreme weather events’ ‘mental health’ ‘children’ ‘climate change’ or ‘natural disaster’ or ‘natural hazard’ or ‘extreme weather events’ ‘flood’ ‘mental health’ ‘children’ ‘hurricane’ or ‘cyclone’ ‘mental health’ ‘children’ ‘child labour’ ‘mental health’ ‘children’ ‘eco-anxiety’ ‘children’

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