

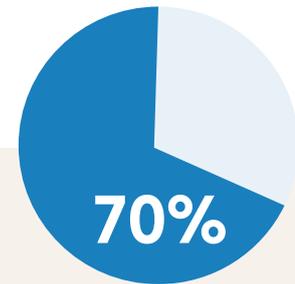
A call to action:

Flooding and early childhood development

Flooding is one of the most destructive consequences of climate change, harming both families and children, while negatively affecting all the components of nurturing care.

As climate change intensifies, flooding has emerged as a significant health and environmental hazard. The impact of flooding disproportionately affects people living in poverty, with 89% of the world's flood-exposed people living in low- and middle-income countries.¹ Between 2000 and 2015, there was an estimated 24% increase in the proportion of people exposed to floods.²

Today, 1.81 billion people—23% of the world's population—are directly exposed to the risk of intense flooding, with 1.24 billion living in South and East Asia.³ In the coming years, the proportion of people exposed to floods will increase due to land subsistence, coastal development and climate change, affecting years of progress in poverty reduction and development.



Globally, ~70% of people exposed to flooding are located in South and East Asia

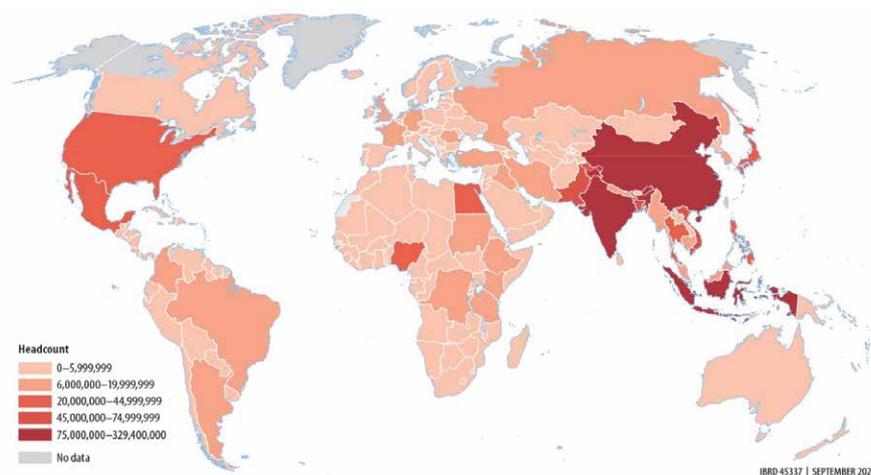


Figure 1: Absolute population exposure to risk of 15 cm or more of flood inundation at the country level (millions). South and Southeast Asia is one of the most flood-vulnerable regions in the world. Image Source: World Bank 2020.³

1. Rentschler, J., Salhab, M., & Jafino, B. A. (2022, June 28). Flood exposure and poverty in 188 countries. Nature News. <https://www.nature.com/articles/s41467-022-30727-4>

2. Tellman, B., Sullivan, J.A., Kuhn, C. et al. Satellite imaging reveals increased proportion of population exposed to floods. Nature 596, 80–86 (2021). <https://doi.org/10.1038/s41586-021-03695-w>

3. Rentschler, Jun; Salhab, Melda. 2020. People in Harm's Way: Flood Exposure and Poverty in 189 Countries. Policy Research Working Paper; No. 9447. © World Bank, Washington, DC. <http://hdl.handle.net/10986/34655> License: CC BY 3.0 IGO. World Bank, Washington, DC. <http://hdl.handle.net/10986/34655> License: CC BY 3.0 IGO.

Top 10 Countries Vulnerable to Floods

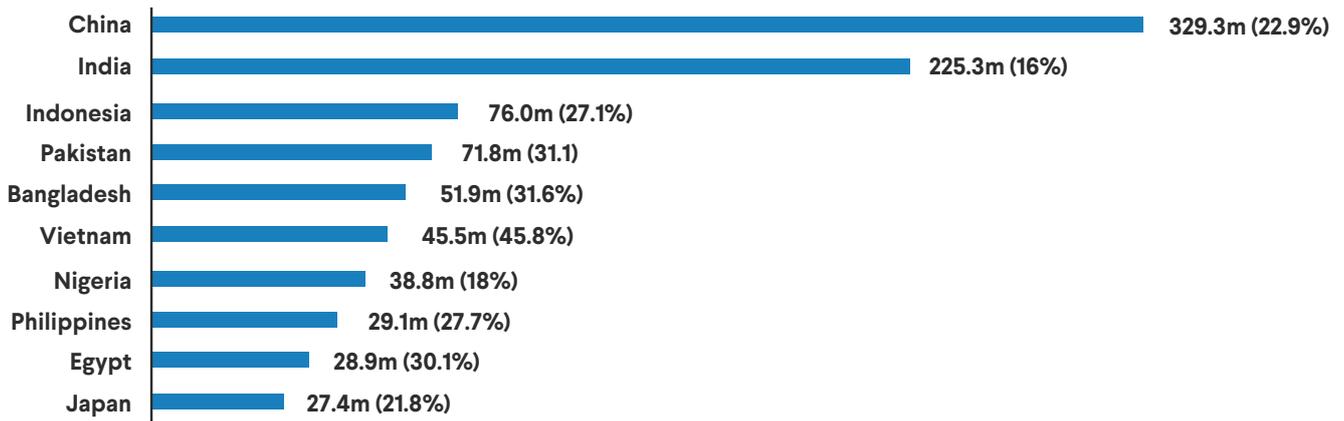


Figure 2: Top 10 countries with the number of people exposed to significant flood risk (as a share of total flood population). As can be seen from the chart, most of these countries are in Asia. Image Source: World Bank 2020.³

In a joint scoping study⁴ by ARNEC and partners across the region, extreme flooding emerged as the biggest concern of survey and focus group respondents. Similarly, the ISEAS 2023 climate survey⁵ identified flooding as a top concern among its citizens in Southeast Asia.

Some people are disproportionately affected by floods. Children, elderly people, people with disabilities and people living in poor communities often suffer the most. Children, with their special physiological, psychological and social needs, are particularly vulnerable during and after flooding events.⁶ With more than 400 million children living in areas with extremely high flood risk in the Asia-Pacific region,³ protecting children from flood events and its consequences is a vital priority for early childhood development.



Figure 3: Floods in Kampung Melayu, Jakarta, Indonesia in January 2014. Floods are a recurring threat to the city due to both land subsidence and sea level rise. Image Source: Shutterstock

4. Most vulnerable to most valuable: A scoping study to put young children at the heart of Climate Actions and Environmental Protection. ARNEC. (2022, December).

<https://arnec.net/resources/arnec-resources/most-vulnerable-most-valuable-scoping-study-put-young-children-heart-0>

5. Seah, S., Martinus, M., Huda, M. S., Ludher, E. K., & Jiahui, Q. (2023, September 21). The Southeast Asia Climate Outlook: 2023 Survey Report. ISEAS – Yusof Ishak Institute.

<https://www.iseas.edu.sg/articles-commentaries/southeast-asia-climate-outlook/southeast-asia-climate-outlook-2023-survey-report/>

6. UNICEF, 2015, Unless We Act Now: The Impact of climate change on Children. ISBN: 978-92-806-4826-3

Flooding is closely linked to climate change

Many factors contribute to flooding. Weather such as heavy or prolonged rains, storm surge or sudden snowmelt can directly trigger flood events. However, human-driven elements, including how we manage our waterways (via dams, levees and reservoirs) and the alterations we make to land can also have a significant role. Increased urbanization, for example, adds pavement and other impermeable surfaces, alters natural drainage systems, and often leads to more homes being built on floodplains. Furthermore, under-maintained infrastructure within cities can increase the risk of urban flooding.

Increasingly, flooding is being linked to climate change. Climate change can alter meteorological factors, such as precipitation patterns and temperature, therefore increasing the likelihood of flood events. Warmer oceans evaporate more water, and warmer air can hold more water vapor: With every 1 degree Celsius of warming, there is a 7% increase in water vapor. In addition, rising sea levels due to warming waters and glacier melting increases the vulnerability of coastal areas to flooding. The Intergovernmental Panel on Climate Change (IPCC) noted in its special report on climate extreme events and disasters that climate change “has detectably influenced” several of the water-related variables that contribute to floods, such as rainfall and snowmelt.⁷ Asia and the Pacific region suffer from the highest increase in extreme precipitation, which leads to flash floods and river flooding.

The Main Types of Floods

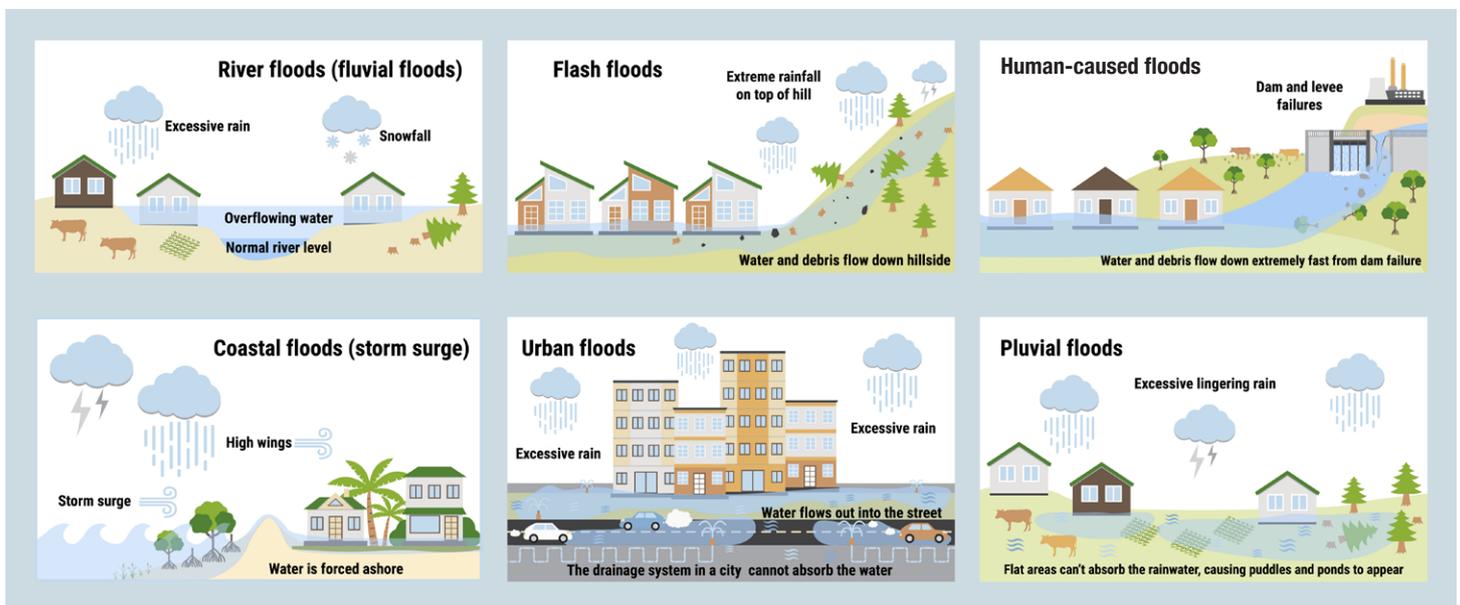


Figure 4: Six main types of floods. Of these, river floods pose the biggest future risk and could displace almost 96 million children over the next 30 years. Image source: Adobe Stock

7. Seneviratne, S.I., N. Nicholls, D. Easterling, C.M. Goodess, S. Kanae, J. Kossin, Y. Luo, J. Marengo, K. McInnes, M. Rahimi, M. Reichstein, A. Sorteberg, C. Vera, and X. Zhang, 2012: Changes in climate extremes and their impacts on the natural physical environment. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 109-230. ipcc.ch/site/assets/uploads/2018/03/SREX-Chap3_FINAL-1.pdf



Figure 5: Components of the nurturing care framework. Source: <https://nurturing-care.org>

Impacts of Flooding

In this section, we describe how flooding affects the lives of young children through the five components of the nurturing care framework.



Compromised **Safety and Security**

The most immediate influence of flooding on young children is that it endangers their security and safety. Homes and schools may be destroyed and essential services such as water and electricity may be interrupted. Floods can also pose a direct danger to young children through drowning. Many young children lack sufficient strength to stay on their feet when currents are fast, including in shallow water. Even for those who know how to swim, strong currents and debris in the water increase the likelihood of injuries and drowning. There may also be more child abuse, exploitation⁸ and trafficking⁹ during and after the chaotic time of flood events. Young children, especially infants and toddlers, often lack the ability to protect themselves.

A study conducted in Bangladesh revealed an increase in parental violence against children following the 2007 floods.¹⁰ One proposed reason is that parents, both mothers and fathers, become frustrated by the economic loss and hardship and misdirect their anger toward the children. Increased violence toward children is not limited to flooding events; it can occur during other natural disasters.¹¹



Lack of **Adequate Nutrition**

Food shortages often occur during and after floods. Even when food is available, the situation can make it hard to prepare safe and hygienic food for children. In emergency situations, it is vital to continue feeding infants and toddlers with breastmilk, but displacement and child-mother separations can make it difficult to continue breastfeeding. All these circumstances increase the risk of malnutrition.

8. Thurston, A. M., Stöckl, H., & Ranganathan, M. (2021). Natural hazards, disasters and violence against women and girls: a global mixed-methods systematic review. *BMJ global health*, 6(4), e004377. <https://doi.org/10.1136/bmjgh-2020-004377>

9. Stoklosa, H., Burns, C. J., Karan, A., Lyman, M., Morley, N., Tadee, R., & Goodwin, E. (2021). Mitigating trafficking of Migrants and children through disaster risk reduction: Insights from the Thailand Flood. *International Journal of Disaster Risk Reduction*, 60, 102268. <https://doi.org/10.1016/j.ijdrr.2021.102268>

10. Biswas, A., Rahman, A., Mashreky, S., Rahman, F., & Dalal, K. (2010). Unintentional injuries and parental violence against children during flood: a study in rural Bangladesh. *Rural and remote health*, 10(1), 1199.

11. Cerna-Turoff, I., Fischer, H. T., Mansourian, H., & Mayhew, S. (2021). The pathways between natural disasters and violence against children: a systematic review. *BMC public health*, 21(1), 1249. <https://doi.org/10.1186/s12889-021-11252-3>

A study¹² conducted in the Jagatsinghpur district of Odisha, India, one year after the heavy floods in 2008, found that among repeatedly flooded communities, cases of severe wasting in children aged 6-59 months were 3.37 times more prevalent than for children in non-flooded communities and nearly twice more prevalent relative to those flooded only once. Particularly striking was the difference among children under 1 year of age during previous floods in 2006, who exhibited the largest difference in wasting prevalence compared to their non-flooded counterparts.



Impacts on Good Health

Besides the direct risk of drowning and injury from debris, flood events can affect young children's health in multiple ways. They can cause damage to water and sanitation facilities including the release of or exposure to infectious agents and to toxic substances, which subsequently increases the risk of infections, allergies and respiratory diseases among children. For example, floodwater can become contaminated with sewage and other pollutants, and can also damage water, sanitation and hygiene (WASH) systems, increasing the risks of waterborne diseases such as diarrhea, cholera and hepatitis A. Young children's immune systems are less developed, making them more susceptible to infections and waterborne diseases. This can also create a vicious cycle: A child deprived of adequate water and sanitation before a crisis will be more affected by a flood or severe storm, less likely to recover quickly, and at even greater risk when faced with a subsequent crisis.¹³ Diarrheal infections and fever are the two of the most commonly found waterborne diseases¹⁴ in young children detected during and after a flood. Other common waterborne diseases include skin infections and upper respiratory infections caused by the growth of mold. Receding floodwater can provide ideal breeding sites for mosquitoes transmitting diseases such as malaria and dengue.

Flooding can also have a profound impact on children's mental health. Children may lack safe spaces to play during or after floods, and also in flood relief camps. The trauma and distress associated with displacement, loss of homes, and disruption of routines can lead to anxiety, depression, and post-traumatic stress disorder (PTSD). Floods and other catastrophic events can lead to disturbed sleep patterns, regressive behaviors, hostility and pessimistic thoughts.¹⁵

12. Rodriguez-Llanes JM, Ranjan-Dash S, Mukhopadhyay A, Guha-Sapir D. Flood-Exposure is Associated with Higher Prevalence of Child Undernutrition in Rural Eastern India. *Int J Environ Res Public Health*. 2016;13(2):210. Published 2016 Feb 6. doi:10.3390/ijerph13020210

13. Collins TW, Jimenez AM, Grineski SE. Hispanic health disparities after a flood disaster: results of a population-based survey of individuals experiencing home site damage in El Paso (Texas, USA). *J Immigr Minor Health*. 2013;15(2):415-426. doi:10.1007/s10903-012-9626-2

14. Timothy J. Wade, Sukhminder K. Sandhu, Deborah Levy, Sherline Lee, Mark W. LeChevallier, Louis Katz, John M. Colford, Did a Severe Flood in the Midwest Cause an Increase in the Incidence of Gastrointestinal Symptoms?, *American Journal of Epidemiology*, Volume 159, Issue 4, 15 February 2004, Pages 398-405, <https://doi.org/10.1093/aje/kwh050>

15. Kousky C, Impacts of natural disasters on children. *Future Child*. 2016; 26: 73-92

How Floods Affect Birth Outcomes

Floods can have a significant impact on birth outcomes, posing risks to both pregnant women and newborns. These impacts can be both direct and indirect and vary depending on the severity of the flood and the quality of health care infrastructure in the affected area. Floods can interrupt access to pre- and post-natal care, medical supplies, clean water and sanitation, resulting in unsafe labor and delivery conditions. Moreover, disruptions to the food supply can lead to malnutrition, which increases the risk of adverse birth outcomes, such as stillbirth and low birthweight.

A 2024 study revealed that floods have heightened the risk of pregnancy loss in 33 developing countries. It is estimated that between 2010 and 2020, approximately 107,888 excess pregnancy losses occurred across these countries each year due to floods.¹⁵



Decline in Responsive Caregiving

During and after flooding events, parents will be less able to care for their children as normal during and post flood events. The loss of their homes and livelihoods can cause immense stress to parents, who are struggling with food, shelter and other basic needs.¹⁷ Responsive care will become more difficult or even impossible. There will also be cases when a child may lose their parent(s) or caregivers because of flooding, leaving them without care. Childcare facilities and service providers may also not be able to provide usual services to complement childcare during this most needed time. The lack of responsive caregiving has a detrimental effect on children's brain development as it causes a dangerous neuro-biological “toxic stress” response. This can result in long-term poor health and developmental outcomes.¹⁸



Figure 6: Depok, Indonesia – July 16, 2022: Rescue officers on patrol to evacuate flood victims at Villa Pamulang, Pondok Petir Subdistrict. Image Source: Shutterstock



Figure 7: Bajali, India, June 16, 2022. National Disaster Response Force personnel rescue residents from flood-affected areas, at a village in Bajali district of Assam. Image Source: Shutterstock

16. He, C., Zhu, Y., Zhou, L. et al. Flood exposure and pregnancy loss in 33 developing countries. *Nat Commun* 15, 20 (2024). <https://doi.org/10.1038/s41467-023-44508-0>

17. Hrabok, M., Delorme, A., & Agyapong, V. I. O. (2020). Threats to mental health and well-being associated with climate change. *Journal of Anxiety Disorders*, 76, 102295. <https://doi.org/10.1016/j.janxdis.2020.102295>

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Reduced Opportunities for Early Learning

Flood events can affect a child's learning and education in different ways. Poorer households are less resilient to financial hardships when climate shocks hit, which can increase the risk of interrupted education. Reduced household income (e.g., due to crop failures) has a direct impact on the amount of time children spend in school. Hunger can also affect a child's ability to concentrate. Families without savings or access to affordable credit spend less on their children's education during periods of crisis, for example, on school fees, learning materials or transportation. Families are also more likely to temporarily withdraw children from school, with less learning time available at home, leading to significant interruptions in education and loss of opportunities in early learning. Disruption in education along with displacement can result in long-lasting mental and cognitive effects.¹⁹

The closure of schools and early childhood care and development centers due to floods is also a significant factor, with school buildings and materials destroyed, and other services being disrupted. In addition, many early childhood teachers are ill-equipped to handle the crisis and subsequent recovery process.

In Vietnam, children in households that are affected by flooding do significantly less well in mathematics and vocabulary tests, are less likely to complete grades, and less likely to be enrolled in school.²⁰



Figure 8 : June 2022, Heavy rains in Bangladesh have caused floods and landslides that left entire communities devastated. In in Kurigram district, the situation has been exacerbated after major rivers broke their banks, leaving low-lying areas of the district completely under water. Due to the floods, 200,000 people in nine regions of Kurigram district were made homeless. Photo credit: Plan International

19. UNICEF, 2021: The Climate Crisis is a Child Rights Crisis: Introducing the Children's Climate Risk Index.

20. Young Lives Policy Brief 54 (September 2022): Protecting the Most Vulnerable People in Vietnam from Climate Shocks

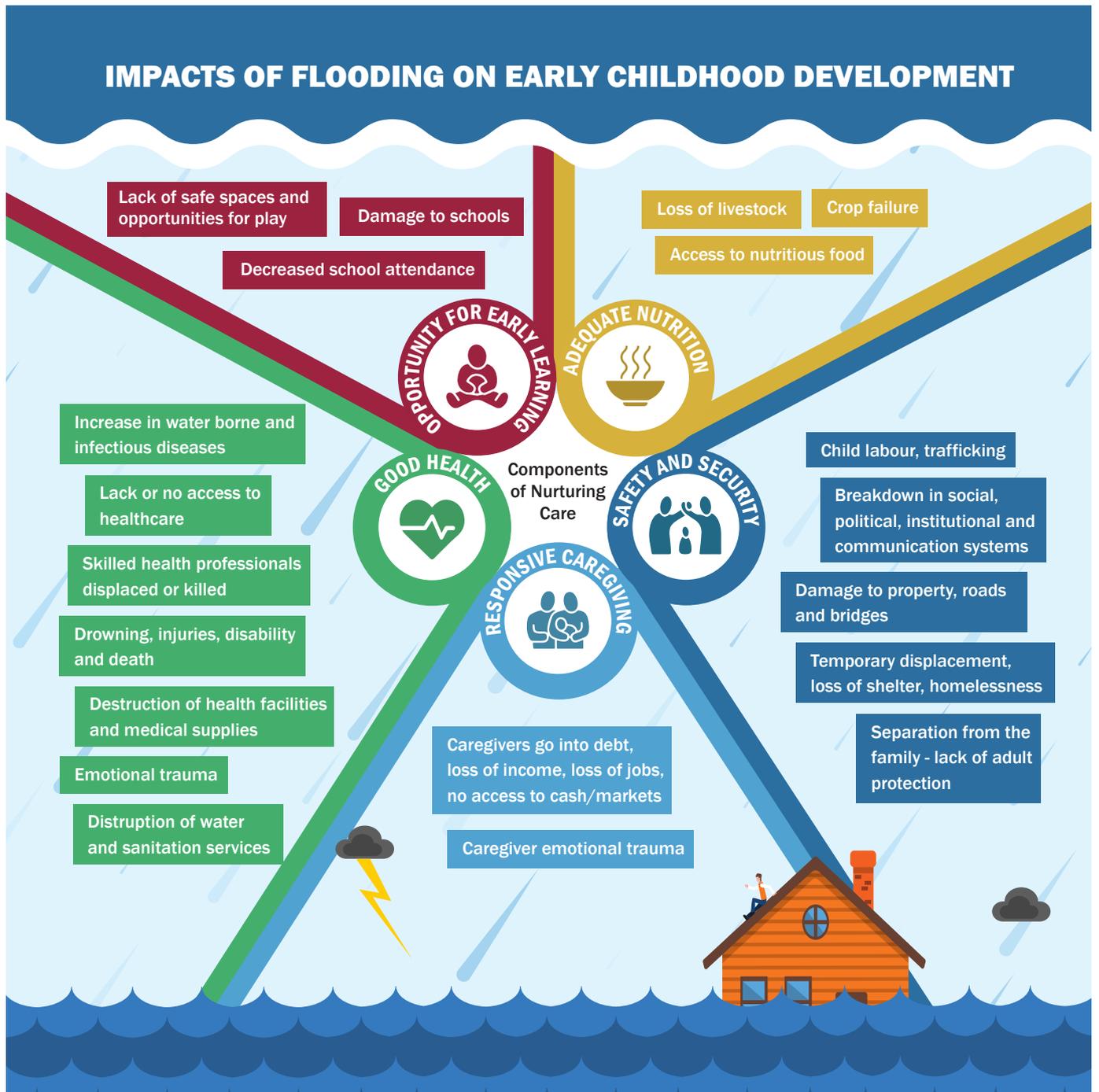


Figure 9: An infographic that summarizes how floods can impact early childhood development, as laid out through the five components of the nurturing care framework. This infographic as well as other resources are available for use by ARNEC members. Image Source: Vital Strategies and ARNEC

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Design and Editing: Vital Strategies

Focus: The After-Effects of Floods in Pakistan



It was the middle of the night when 4-year-old Naila woke up screaming to the sound of gunshots. The shots had been fired to alert the village that the nearby dam had broken, unleashing floods that would ultimately destroy her home and her school. Together with other villagers, in a state of chaos and panic, Naila's family was forced to evacuate to the nearby city of Ghotki. This unexpected event was extremely traumatizing for young Naila, who had trouble sleeping for several nights afterward. Naila is not alone: Other parents reported that their children displayed signs of distress including unusual clinginess, disrupted sleep and appetite, reduced interest, and mood swings.



After a few weeks, Naila's family returned to the village and attempted to adjust back to daily life. Since Naila's school had been destroyed, a temporary learning center was established to provide educational and play-based activities for the children. Naila's teacher, Dost Mohammad, had survived the floods and remained dedicated to providing education, support and routine care for the children.

Even though all the schoolbooks and supplies were destroyed in the flood, Mohammad improvised with low- or no-cost materials and innovative teaching methods. However, the trauma lingered, as seen in the behavior of the children: Many were disturbed, fearful, cranky and unable to concentrate in the new makeshift school setting. As a result, many children, including Naila, ended up mostly absent from school.



This story was contributed by ARNEC member Idara-e-Taleem-o-Aagahi(ITA),

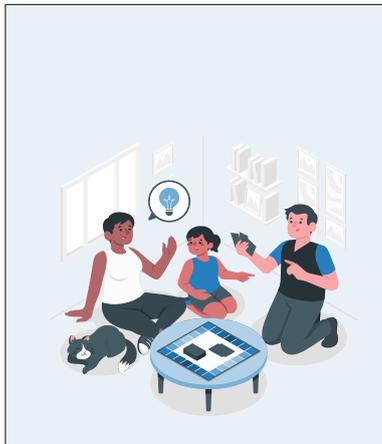
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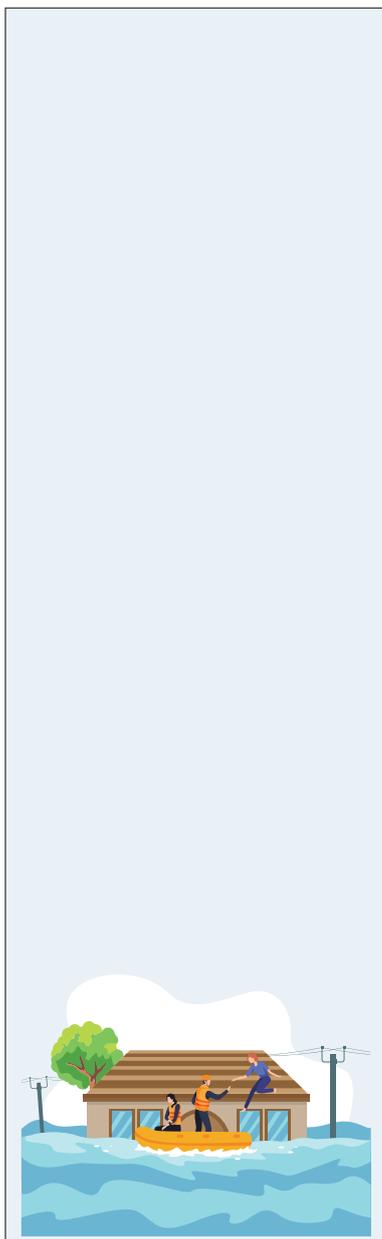
What can we do?

Parents, caregivers and supporters of early childhood development can:



- Talk about the issue** among your family, community, peers and networks. The more people know about the impact of flooding on children, the more we can work together to drive change. A simple way of doing this is by forwarding this factsheet or sharing our social media material with your contacts.
- Understand the risk of flooding** in the neighbourhood, community or city where you and your child live. If you live somewhere that has flooded before, it is likely that it can happen again. Even if you have not experienced a flood, you can pay attention to cues (e.g. increasing rainfall, changes in geographical features) that indicate the risk may be increasing in your area.

Parents, caregivers and supporters who live in a flood-prone area can:



- Be prepared for a flooding emergency.** Develop an emergency plan, with evacuation routes, emergency contacts and a supply bag of essential items including identity documents, food, water and medication. This should include knowing where to look for reliable updates and announcements. During the flood, prioritize the safety of young children and be mindful of child traffickers immediately after the flooding. Seek higher ground or designated shelters as advised by authorities.
- Be alert to mold after a flood.** Moisture on walls, floors, furniture, curtains and other household items and surfaces can lead to mold growth. Exposure to mold can lead to allergies and other respiratory conditions. Thoroughly clean and dry all affected surfaces and discard items that cannot be cleaned or that are made of absorbent materials. These include stuffed toys, paper, carpets and clothes.
- Improve your knowledge about water, sanitation and hygiene** during and after a flood. Floodwater may contain high levels of raw sewage or other hazardous substances. Early symptoms from exposure to contaminated floodwater may include upset stomach, intestinal problems, headache and other flu-like discomfort. Do not allow children to play in floodwater. Wash hands frequently with soap, especially before drinking and eating. Know where you can get clean and safe drinking water after a flood and take precautions that may be needed, such as boiling water before drinking it.
- Eliminate standing water where mosquitos can breed.** Mosquito populations can sharply increase after a flood, due to the abundance of standing water. Mosquitoes can breed even in very small amounts of water. As floodwaters recede, be sure to drain or empty areas with water—no matter how small—to reduce mosquito breeding areas and help reduce the spread of mosquito-borne diseases.
- Observe signs of mental and emotional distress in your child** and provide emotional support by proactively engaging with your children through talking, singing and playing. Seek professional help if necessary.
- Manage your own stress during an emergency.** Seek professional help if necessary.²¹

Early childhood development advocates, such as parent advocacy groups, youth activists, managers in early childhood development settings, civil society and local governments can:



- Advocate for child-centered measures for flood preparation, response and mitigation.** Climate action planning and policies must prioritize the holistic needs of children throughout all stages of flood events. Climate-responsive planning needs to be child focused and child centered. Strengthening health systems and facilities will be crucial to managing and improving resilience to severe floods. Schools, early childhood development centers and other learning environments must ensure safety and continuity of education. Community infrastructure needs to prioritize safety, and relief and reconstruction interventions should aim to reduce both future and current risk. Robust child protection systems will also be necessary to prevent abuse, neglect, trafficking and other related harms exacerbated by floods and their impacts. In general, disaster preparedness systems need to be child-centered and create safe spaces for children considering their physical and emotional needs.
- Incorporate flood education in schools and communities.** Children experience fear and anxiety when they do not know what is happening. Provide resources to help children understand flood risk, learn about flood warnings, know how to make a flood plan and know how to cope with its consequences. Communities can be empowered to keep children safe during and after floods. Practice drills will also be useful.
- Provide training or programs** related to disaster preparedness, education in emergencies and mental health and psychosocial support in emergencies for parents and early childhood development teachers.

Influential stakeholders: Development partners, private sector funders, philanthropists and policymakers can:



- Reduce inequity among children to promote their future resilience to flooding and climate change.** Marginalized and vulnerable communities, already disadvantaged, will be the hardest hit by flood events. They also have fewer social and financial resources to help them cope with shocks. As climate change makes crises more common, these repeated shocks will make it increasingly harder to recover. Reducing these inequities now will give disadvantaged children a better basis for coping with the effects of climate change. This entails providing the poorest children with access to safe water, adequate sanitation, good hygiene, good nutrition and food security. Children also need strong and accessible health systems and well-functioning child and social protection systems. Addressing inequities now will also make it less likely that today's inequities are exacerbated by climate change.
- Advocate for greater financing and investments** toward flood prevention and recovery, including the development of infrastructure for disaster prevention and rapid government support systems for disaster recovery.
- Strategically collaborate** with civil society, government and the private sector to advance change, and to harness the reach and resources of all partners to maximize collective influence. This includes working with multiple actors working in health and nutrition and child development as well as city and town planners and climate change experts.
- Work to ensure that young children's rights** are considered during climate and environmental negotiations. This is in line with the U.N. Convention on the Rights of the Child's adoption of General Comment 26 affirming children's rights to a clean, healthy and sustainable environment. Climate and action plans should include children's priorities at all levels, local and national.