Research brief

Mapping refugees' and IDPs' exposure to climate-related hazards

Red Cross Red Crescent Climate Centre

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Most internally displaced people in Colombia migrate to large cities. In the Ciudad Bolívar area of Bogotá, new families arrive every day hoping to find safety and start a new life.
(Photo: Christoph von Toggenburg/ICRC)

Climate Centre

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Introduction

Global displacement is rising, and the trend is projected to continue. Currently over 122.6 million people are forcibly displaced worldwide—within countries and across international borders—due to violence, persecution and conflict.[1] 76 per cent of refugees and 75 per cent of conflict-generated internally displaced people (IDPs)[2] are hosted in low and middle-income countries, many of which are exposed to the most severe impacts of the climate crisis, including extreme weather events such as cyclones, floods, extreme heat, and drought.[3]

Within these countries, the camps, formal settlements, and informal settlements[4] where refugees[5] and IDPs[6] live are often located in particularly hazard-prone areas. In urban settings, refugees and IDPs are often more likely to live in poorer, informal areas of cities and towns that are highly exposed to hazards, as people are driven to these locations due to a combination of poverty and social and legal exclusion.[7] Such challenges are compounded by the limited access to services faced by many forcibly displaced people, as well as the highly dispersed nature of refugee camps and the wider social, economic, cultural and language barriers that both refugees and IDPs face. These and other factors make forcibly displaced people specifically vulnerable to climate-related hazards.

This brief seeks to fill a gap in publicly available research on the extent to which refugees[8] and IDPs (hereafter termed *forcibly displaced people*)[9] are vulnerable to specific climate-related hazards.[10] It is one of a few pieces of publicly available research providing large-scale data on the number of refugees and IDPs living in climate-related hazard-prone areas, disaggregated by hazard.[11] Its primary focus is on capturing the exposure of conflict-generated forcibly displaced people; however it was not always possible to capture the causes of displacement for IDPs,[12] meaning that climate-induced IDPs were in some cases also captured. However, these figures

1 This number captures people displaced in 2024. UNHCR (2024) Mid-Year Trends 2024. Webpage, available at: https://www.unhcr.org/mid-year-trends

2 Note this figure does not include IDPs displaced due to climate-related hazards. As the UNHCR Refugee Data Finder website states in its methodology page, 'UNHCR compiles data only on conflict-generated IDPs to whom the organization extends protection and/or assistance. As such, UNHCR statistics do not provide a complete overview of global internal displacement.' Available at: https://www.unhcr.org/refugee-statistics/methodology

3 Strikingly, these figures do not include people displaced by natural hazards and other impacts of climate change, meaning that the actual scale of both displacement and exposure to climate-related hazards is higher than these figures represent. An overview of the top hosting countries for refugees and IDPs can be found here: UNHCR (2024) Refugee Data Finder. Webpage, available at: https://www.unhcr.org/refugee-statistics/download/?url=plHnv8 These countries can be cross-referenced with the ND-Gain Country Index (available here: https://gain.nd.edu/our-work/country-index/rankings/), which summarizes how vulnerable a country is to climate change and other challenges, combined with its ability to adapt and increase resilience. As of 2023, almost 75 per cent of IDPs were hosted in just ten countries (all of which are analysed here – see methods), and 80 per cent of which were in low or lower middle-income countries with ND-Gain rankings of 154 of higher, indicating a very high level of climate vulnerability and low adaptive capacities. The map shared in this article provides a visual overview of this information: UNHCR (n.d.) Displaced on the frontlines of the climate emergency. https://storymaps.arcgis.com/stories/065d18218b654c798ae9f360a626d903 Please note that for some sites IDP figures include those displaced by both conflict and climate hazards as data sources used did not disaggregate. However the primary focus was to capture the locations of IDPs displaced due to persecution, violence, and/or conflict.

4 This research follows the established UN definitions relating to camps and informal settlements. See for example: CCCM/UNHCR (2017) CCCM Guidance on definitions for camps, available at: https://reliefweb.int/report/syrian-arab-republic/cccm-guidance-definitions-camps-enar

5 Fransen, S., Werntges, A., Hunns, A., Sirenko, M., & Comes, T. (2024). Refugee settlements are highly exposed to extreme weather conditions. Proceedings of the National Academy of Sciences, 121(3), e2206189120. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10801877/

6 Please note these figures are harder to track for IDPs given significant data gaps. To learn more, see: Platform on Disaster Displacement (2020) Submission to the High-Level Panel on Internal Displacement by the Envoy of the Chair of the Platform on Disaster Displacement. Available at: https://www.un.org/internal-displacement-panel/sites/www.un.org.internal-displacement-panel/files/27052020_hlp_submission_screen_compressed.pdf

7 See for example Hambati, H., & Gaston, G. (2015). Revealing the vulnerability of urban communities to flood hazard in Tanzania: a case of the Dar es Salaam city ecosystem. *International Journal of Geospatial and Environmental Research*, 2(1), 3. https://dc.uwm.edu/cgi/viewcontent.cgi?article=1027&context=ijger; Easton-Calabria, E. (2022) Raising the profile of climate-induced displaced people in cities. The Fletcher Forum of World Affairs, Tufts University. https://www.fletcherforum.org/home/2022/9/13/raising-the-profile-of-climate-induced-displaced-people-in-cities

8 The figures we analyse include refugees under UNRWA's mandate in Jordan and Lebanon.

9 The authors acknowledge that the term 'forcibly displaced people' can also encompass other populations, including stateless people and other people in need of international protection. However, these populations were not included in this analysis.

10 Important work providing some data on this topic includes: UNHCR (2024) No Escape – On the frontlines of climate change, conflict and forced displacement. https://www.unhcr.org/media/no-escape-frontlines-climate-change-conflict-and-forced-displacement; UNHCR (n.d.) Displaced on the frontlines of the climate emergency. https://storymaps.arcgis.com/stories/065d18218b654c798ae9f360a626d903; CGIAR/UNHCR (2024) Sahel Climate Exposure in Displacement Settings.

11 Other work providing some data on this topic includes: UNHCR (n.d.) Displaced on the frontlines of the climate emergency. https://storymaps.arcgis.com/stories/065d18218b654c798ae9f360a626d903; CGIAR/UNHCR (2024) Sahel Climate Exposure in Displacement Settings.

12 IDP data is largely derived from the Internal Displacement Monitoring Centre (IDMC), and some national datasets did not disaggregate between displacement types.

on climate-related displacement are in the minority: of the 75.9 million IDPs in existence at the end of 2023 (the last date for which comprehensive global data on IDP figures is publicly available), the vast majority (68.3 million) were displaced by conflict and violence, and 7.7 million by climate-related hazards.[13]

The data shows that even though people may have been forced to flee due to persecution, armed conflict, violence, and climate-related hazards, they are often vulnerable to other hazards, particularly climate-related ones. In turn, these hazards may impede refugees and IDPs from reaching durable solutions. The findings from this project sit alongside a larger body of qualitative research and case studies documenting the impact of climate change on forcibly displaced people,[14] as well as the role of anticipatory action in refugee and IDP camps[15] and in reducing the humanitarian impacts of so-called disaster displacement,[16] including the challenges in doing so.[17]

> ***The data from this study reinforces and adds to current knowledge on the high vulnerability of forcibly displaced people to climate-related hazards. It provides the added value of offering localized data at camp and settlement level whenever possible along site-specific numbers of exposed displaced populations. This study offers important data to accompany broader evidence on forcibly displaced people and extreme weather events and provides critical information for practitioners and policymakers to inform urgently needed climate action investments for forcibly severely exposed to climate-related hazards.***

Methods

This brief comes out of a research project identifying the exposure of refugees and IDPs to climate-related hazards: flooding, wildfire, extreme heat, and strong winds and tropical cyclones[18]. Whenever possible, the exposure and locations of forcibly displaced people at end or mid-year 2024 was captured; however in some cases the most comprehensive data sets available for population location were for 2023.[19] The historic exposure to drought was analysed as was projected increases or decreases in precipitation. The data of the identified refugee and IDP sites was mapped through GIS coordinates. Hazard data was then collected to overlay the data points on forcibly displaced people's locations to capture current and projected areas of high exposure to hazards. Hazard data is accurate as of end 2024.

13 IDMC (2024) 2024 Global Report on Internal Displacement. Geneva: IDMC. Available at: https://www.internal-displacement.org/global-report/grid2024/

14 See for example: Ahmed, A., Mohamed, N. S., Siddig, E. E., Algaily, T., Sulaiman, S., & Ali, Y. (2021). The impacts of climate change on displaced populations: a call for action. *The Journal of Climate Change and Health*, 3, 100057.; Chowdhury, M. A., Hasan, M. K., Hasan, M. R., & Younos, T. B. (2020). Climate change impacts and adaptations on health of Internally Displaced People (IDP): An exploratory study on coastal areas of Bangladesh. *Heliyon*, 6(9).; Fransen, S., Werntges, A., Hunns, A., Sirenko, M., & Comes, T. (2024). Refugee settlements are highly exposed to extreme weather conditions. *Proceedings of the National Academy of Sciences*, 121(3), e2206189120.

15 Easton-Calabria, E., Jaime, C., Shenouda, B. (2022) Anticipatory Action in Refugee Camps: Challenges, opportunities, and considerations. Red Cross Climate Centre. Available at: https://www.climatecentre.org/wp-content/uploads/Anticipatory_Action_in_Refugee_and_IDP_Camps.pdf

16 IFRC/RCCC (2020) Forecast-based Financing and Disaster Displacement: Acting Early to Reduce the Humanitarian Impacts of Displacement. IFRC and RCCC Issue Brief: August. Available at: https://www.anticipation-hub.org/Documents/Briefing_Sheets_and_Fact_Sheets/RCRC_IFRC-FbF-and-Displacement-Issue-Brief.pdf

17 Schneider, S.; Radtke, K.; and Weller, D. (2021) Climate Change, Disaster Displacement and (Anticipatory) Humanitarian Action: Challenges ahead. Blog, *Anticipation hub*. https://www.anticipation-hub.org/news/climate-change-disaster-displacement-and-anticipatory-humanitarian-action-challenges-ahead

18 The term 'climate-related hazards' refers to both climate hazards as well as the secondary impacts they can produce, such as a flood inducing a mudslide.

19 Information on data sources, including year, for particular locations is available on the webmap, available at: [to come once made public]

Altogether, the exposure of 64 million forcibly displaced people in 864 sites was analysed.[20] Populations were documented in many of the countries hosting the most refugees and/or IDPs by number or per capita (hereafter referred to as major refugee- or IDP-hosting countries) as of 2024, based on UNHCR data (see footnote 21). Countries included are (alphabetically): Afghanistan, Bangladesh, Colombia, the Democratic Republic of the Congo, Ethiopia, Iran, Iraq, Jordan, Kenya, Lebanon, Mozambique, Nigeria, Pakistan, Somalia, Sudan, Syria, Türkiye, Uganda, Ukraine, and Yemen (see footnote for disaggregation by refugees or IDPs).[21] Mozambique and Kenya, which also host some of the highest numbers of IDPs and refugees respectively, were later added to the list when the analysis revealed a high level of exposure faced by these populations in these countries; however these countries were not initially included based on high displacement figures by number or per capita. While many of these countries host significant numbers of both refugees and IDPs, only Sudan is counted as both a major refugee- and IDP-hosting country, based on the figures used.

All populations in all sites were exposed to at least one hazard, and 92 per cent of sites were exposed to at least two hazards, illustrating the scale of exposure.

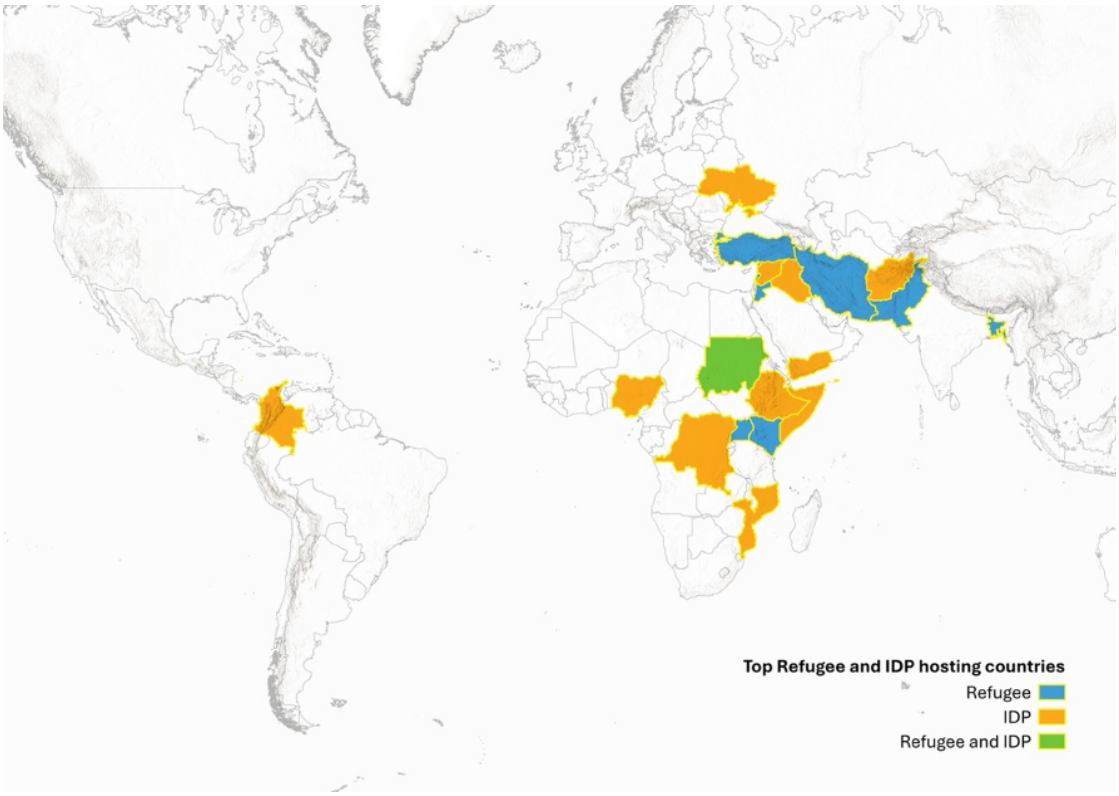

Figure 1. Top Refugee and IDP hosting countries analysed.

20 For on methodology see Annexes 1 and 2.

21 Source: UNHCR Refugee Data Finder, 2024. Available at: https://www.unhcr.org/refugee-statistics/download/ The countries are divided between top refugee and IDP hosting countries as follows: Refugee-hosting countries (nine countries): Bangladesh, Iran, Jordan, Kenya,* Lebanon, Pakistan, Sudan, Türkiye, Uganda. Caveat: Other large refugee-hosting countries such as Poland are not yet mapped. IDP-hosting countries (12 countries): Afghanistan, Colombia, DRC, Ethiopia, Iraq, Mozambique,* Nigeria, Somalia, Sudan, Syria, Ukraine, Yemen. Note: * denotes countries added due to displaced people's hazard exposure after the initial analysis. Sudan is both a major refugee and IDP-hosting country, meaning that the total number of countries examined was 20.

Findings

1. Which displaced communities are most at risk?

Refugees and IDPs are highly exposed to hazards

- Of the more than 64 million refugees and IDPs analysed in this study across 860 sites, every site was exposed to at least one hazard.

- Ninety-three per cent of sites mapped where forcibly displaced people live are exposed to at least two hazards, posing risks to at least 49.8 million forcibly displaced people. This illustrates the importance of multi-hazard early warning systems for displaced populations.

- Seventy-six per cent of forcibly displaced people mapped – over 45.8 million people – were exposed to three or more hazards. Countries with the largest populations exposed to at least four hazards are: Syria (5,550,000), Yemen (3,360,000) and DRC (2.1 million). Democratic Republic of Congo (3.1 million people living in locations at risk of flood, wildfire, and extreme heat) and Yemen (over 2 million people at risk of flood, extreme heat, and cyclones and some sites also at risk of projected drought and flash flooding).

- Over 50 per cent of the analysed populations, equal to 32.7 million people across 384 sites in Afghanistan, Colombia, DRC, Ethiopia, Iran, Iraq, Jordan, Kenya, Mozambique, Nigeria, Pakistan, Somalia, Sudan, Syria, Türkiye, Uganda, Ukraine, and Yemen are exposed to both flood and heat stress, with many of these sites also exposed to fire, cyclone, and drought. The combination of flood and heat can have disastrous health consequences including increasing the risk of infectious and waterborne diseases due to contaminated water, particularly in areas with inadequate WASH infrastructure. Of populations exposed to both flood and heat, 7.9 million live in sites (142) that are expected to become wetter in the future, increasing the risk of flooding, and 10.5 million are in sites (76) that are expected to become drier, suggesting a risk of future drought.

In the back of a truck made into a temporary paddling-pool, Syrian IDP children cool down from the deadly heatwave aggravated by climate change. In 2021, drought was a growing concern in the country, with poor rainfall and the Euphrates at a historic low. The UN was trucking millions of litres of water to families, as well as other measures. (File photo: Ali Haj Suleiman/OCHA)

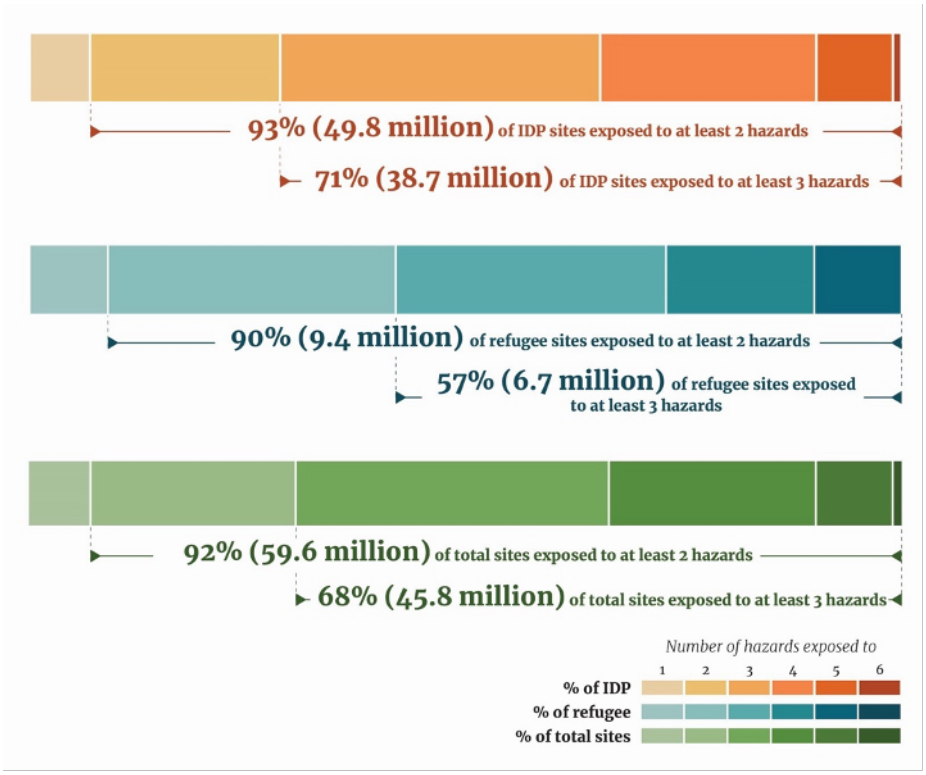

Figure 2. IDP, Refugee and total multi-risk exposure.

Countries experiencing fragility and/or conflict host forcibly displaced people in areas highly vulnerable to climate-related hazards

- Eleven out of the 12 major IDP-hosting countries included in this research are on the World Bank's fragile and conflict-affected situations (FCAS) list.[22] Countries affected by fragility, conflict and violence (FCV)[23] generally have very limited climate change adaptation funds and plans,[24] under-developed early warning systems and few anticipatory action interventions targeting forcibly displaced people, illustrating the high risk these and non-displaced populations in these countries face from climate-related hazards. While ongoing work is being undertaken to develop or improve early warning systems and implement anticipatory action in these countries,[25] much more work is needed to extend these to displaced people.

22 World Bank (2024) FY25 List of Fragile and Conflict-affected Situations. The major IDP-hosting countries that are also FCAS are: Afghanistan, DRC, Ethiopia, Iraq, Mozambique, Nigeria, Somalia, Sudan, Syria, Ukraine, Yemen.

23 While definitions of fragility, conflict, and violence vary, for the purposes of this brief the acronyms FCAS and FCV can be considered synonymously.

24 Sitati, A., Joe, E., Pentz, B., Grayson, C., Jaime, C., Gilmore, E., ... & de Perez, E. C. (2021). Climate change adaptation in conflict-affected countries: A systematic assessment of evidence. *Discover Sustainability*, 2(1), 42.

25 See for example: British Red Cross (2024) Weather and Climate Information Services (WISER) Middle East and North Africa (MENA): Istibak. London: BRC.; United Nations Office for Disaster Risk Reduction and World Meteorological Organization (2024). *Global Status of Multi-Hazard Early Warning Systems*. Geneva, Switzerland.

- Refugee and IDP sites experiencing the most hazards are in conflict-affected countries least equipped to adapt or respond to them.

    - As of January 2025, Sudan and Syria currently host the largest numbers of forcibly displaced people (11.6 million IDPs in Sudan and 7.4 million IDPs in Syria), the majority of whom are living in areas already exposed to heat stress and flood, with many of these sites also exposed to other hazards. In Syria, for example, all analysed IDP sites are exposed to extreme heat and all but one are projected to experience decreased precipitation, increasing drought risk. In total, these hazards risk affecting nearly 6.75 million people. Furthermore, the vast majority of these populations are also exposed to fire risk, illustrating the extent of this multi-hazard exposure.

    - The only sites exposed to all analysed hazards (fire, flood, high wind, cyclone, historical and projected drought, and projected flooding) – currently, in the historical analysis, and in climate projections – are IDP sites in Afghanistan and DRC. Most of the other countries with sites experiencing five hazards are also FCAS countries, including Ethiopia, Iraq, Mozambique, Syria, and Yemen. Altogether, over 6.6 million refugees and IDPs have been recorded as being at high risk of five hazards in their current location as of January 2025. However, many of these countries are estimated to have high numbers of undocumented IDPs and refugees and informal settlements, meaning that the actual number of exposed forcibly displaced people is likely much higher.

Flooding in IDP camps in Syria

Syria is affected by various hazards, including floods, droughts, extreme temperatures, landslides, storms and wildfires. In 2008, for example, a drought in Syria affected around 1.3 million people. In 2020 a wildfire affected more than 140,000 people. Extreme flooding has reoccurred since 2021 in the country; in 2019 Syria experienced a strong flood with more than 200,000 people affected and in December 2024, OCHA reported that almost 730,000 Syrians living in camps in northwestern Idlib and around Aleppo had been affected by rain, flood, and wind events throughout the year. Thousands of households were forced to seek shelter in schools, mosques, and open spaces.

While these hazards affected people living both in and outside of IDP camps, IDPs living in camps are often at greater risk of flooding than those living elsewhere and have generally suffered more severe impacts for several reasons. First, IDPs frequently live on land that is close to or within areas that are prone to flooding. Secondly, overcrowded conditions limit movement from flooded areas and shelters like tents are not made to withstand extreme weather. Poor sanitation infrastructure can lead to health problems after such an event has taken place as many water and sanitation needs remain unmet for IDPs. This was the case in January 2021, when the Dana sub-district, a region in the Idleb Governorate hosting a large number of IDPs in camps, saw a higher incidence of waterborne diseases compared to the months before and after. IDP camps in other regions of the world face similar incidences of waterborne diseases due to a combination of intense flooding and inadequate WASH, illustrating the cascading nature of many climate-related hazards affecting forcibly displaced people.

IDPs in Syria are currently benefiting from the Istibak ('Anticipate' in Arabic) project, a regional project aiming to strengthen the climate resilience of IDPs, refugee populations, and host communities in Iraq, Yemen, and Syria, by enhancing and promoting the co-production of forecast-based early action with local, national, and regional coordination mechanisms. This strengthening of early warning systems, in turn, provides the foundation to design

and implement anticipatory action for displaced people and helps address the wider need for large-scale work to increase early warning systems and AA in the Middle East and Northern Africa. Istibak is implemented through a consortium comprised of the British Red Cross (BRC), Red Cross Red Crescent Climate Centre (Climate Centre), International Federation of Red Cross and Red Crescent Societies (IFRC), World Food Program (WFP), and UK Met Office (UKMO). The project is implemented with the support of WISER MENA Grants and funded by the Foreign, Commonwealth & Development Office (FCDO).

Adapted from:

Easton-Calabria, E., *Jaime, C., Shenouda, B. (2022) Anticipatory Action in Refugee Camps: Challenges, opportunities, and considerations. Red Cross Red Crescent Climate Centre. Available at: https://www.climatecentre.org/wp-content/uploads/Anticipatory_Action_in_Refugee_and_IDP_Camps.pdf*

British Red *Cross (2024) Weather and Climate Information Services (WISER) Middle East and North Africa (MENA): Istibak. London: BRC. Available at: https://www.anticipation-hub.org/Documents/Other/BRC24-100_WISER_report_WIP2_1_.pdf*

Drought, cyclones, flooding and IDPs in Mozambique

Mozambique, with a population of more than 33 million pe ople, has a history of armed conflict, intercommunal violence and displacement, particularly in Cabo Delgado province. In 2019, the country faced further challenges when its central and northern regions were devastated by Cyclones Idai and Kenneth, followed by extensive floods. This was the first time in Mozambique's recorded history that a drought and a series of severe cyclones and floods occurred consecutively, illustrating the need to better understand the potential relationship between conflict, hydrometeorological hazards and climate change.

After Tropical Cyclone Idai hit, at least 146,000 IDPs sought refuge in 155 temporary sites throughout four provinces (Sofala, Manica, Zambezia and Tete). Many IDPs started returning home in the following weeks, while others were relocated to permanent sites allocated by the government. Then on 25 April, Tropical Cyclone Kenneth made landfall in Cabo Delgado, less than six weeks after Tropical Cyclone Idai.

An interactive story map by the Climate Centre mapped out the evolution and impacts of the cyclones and the conflict on internally displaced people, concluding that, "Cyclone Kenneth impacted the dynamics of conflict in Cabo Delgado in 2019–2022, including through the displacement of people, patterns of resettlement in high-risk flood zones, and economic dislocation. Subsequently, the number of IDP locations in the southern areas increased rapidly, and with it the number of vulnerable people exposed to flooding and future cyclone impacts in the south-east of the province." [26]

Adapted from: *Climate, Disasters, and Conflict in Cabo Delgado. Available at: https://storymaps.arcgis.com/stories/68a62d7d7ea4450595483e64fa0bc360 Source: Red Cross Red Crescent Climate Centre.*

Lebanon: helping Syrian refugees in the Bekaa Valley (Photo: N. Ismail/ICRC)

26 Red Cross Red Crescent Climate Centre. (2022) Climate, disasters and conflict in Cabo Delgado: The case of Cyclone Kenneth in 2019.

2. Which hazards are forcibly displaced people most exposed to?

- **Risk of extreme heat exposure is significant for forcibly displaced populations.** More than 54 million people across all analysed countries (86 per cent of the total analysed) are exposed to extreme heat, making it the most common hazard being experienced. This is particularly alarming given the inadequate shelter of many refugees and IDPs, who often find themselves in camps with prohibitions on durable material due to host country regulations or in poorly designed shelters in urban informal settlements.

- **Flooding is a key and ongoing risk for forcibly displaced people.** Over half (55 per cent) of IDPs and refugees identified (31.3 million) in the countries analysed are exposed to flooding.

- **Thirty million IDPs in major IDP-hosting countries are exposed to risk of wildfire, and over 40 per cent of these populations live in areas where decreased precipitation is projected, indicating increased fire risk and the risk of drought.**

  - The most IDPs facing a fire risk are in the Democratic Republic of Congo (6.75 million), Syria (6.75 million) and Colombia (4 million).

- **Further illustrating the scope of fire risk for forcibly displaced people, 88 per cent of refugees in main refugee-hosting countries are exposed to fire risk**[27] (15.6 million out of 17.7 million refugees mapped).

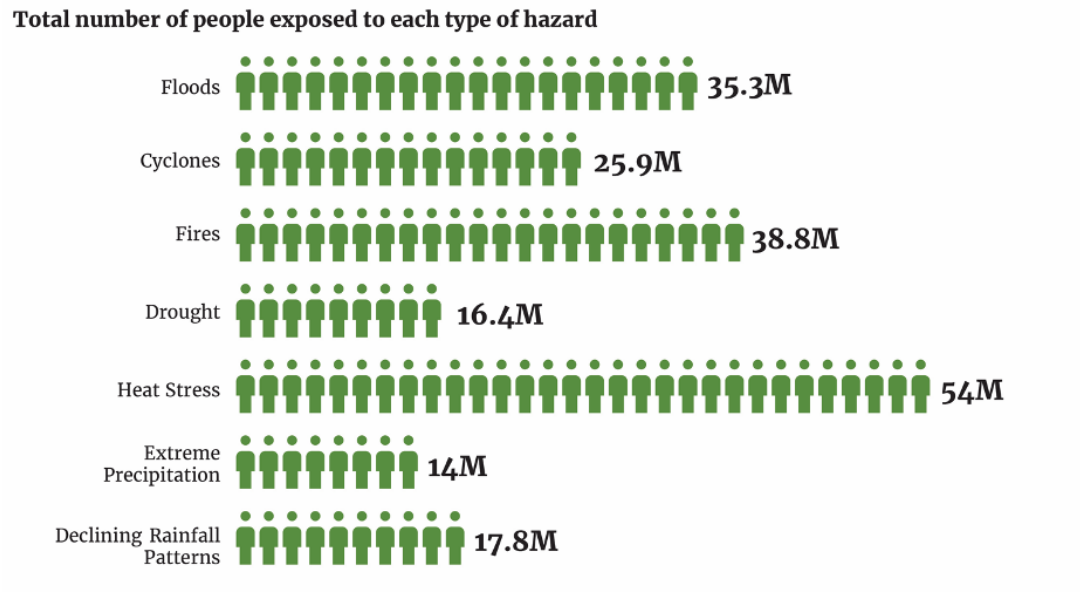

Figure 3. Combined number of refugees and IDPs identified exposed to different hazards (in 20 countries).

27 Decreased precipitation can dry out vegetation, increasing the risk of fire.

- **Many IDPs and refugees are already experiencing multiple hazards and living in areas that are projected to experience more.**
  - The top climate risks for refugee sites are fire (168) and heat stress (142), with 6.3 million refugees and 23.2 million IDPs exposed to both fire and heat risk. The largest populations facing both fire and heat risks simultaneously are IDPs in Syria (6.75 million), DRC (40.2 million), Colombia (3.3 million), Ukraine (2.68 million), and Afghanistan (2.3 million).
  - It is far more common for sites hosting refugees or IDPs to be exposed to multiple hazards rather than to just one: while only 64 sites face a single hazard exposure, 209 sites are exposed to just two hazards, 312 sites are exposed to three, and 194 are exposed to four.
  - The presence of multiple hazards increases the risk of compound/cascading events that risk further endangering forcibly displaced people and could in turn lead to further displacement.
- **These high figures of IDPs facing multiple hazards are particularly striking given a global lack of data on IDPs' precise locations,**[28] which limited this research. It can be assumed based on the research methodology that the number of IDPs in many of these locations is in fact an underestimate. Areas hosting IDPs are very often not well identified, as most settlements are informal, or because IDPs live with hosts rather than in camps. However, as the high number of people exposed to hazards such as heat stress indicate, it is important to take the climate-related hazards that IDPs face into account.
- **Significant numbers of IDPs (15 per cent) in the top IDP-hosting countries are living in areas that are already flood-exposed and projected to face increased extreme rainfall conditions, which in turn can lead to flash flooding.**
  - Flooding in already flood-prone areas hosting IDPs is expected to increase in at least five IDP-hosting countries: Nigeria (2.27 million), Sudan (2.2 million), Yemen (2 million), DRC (1.09 million), and DRC (1.1 million).
  - When the overlay of current flood areas and projected increases of extreme rainfall (one-day maximum precipitation variable) is considered, over 7.4 million IDPs in 135 sites who already live in existing flood areas are also projected to experience more extreme floods (e.g. geographic overlay of flood area and increase of extreme rainfall (one-day maximum precipitation variable).
  - Altogether, all 12 of the IDP-hosting countries analysed have IDPs living in flood-prone areas. Over 31.4 million people in 353 flood-exposed sites across the top IDP-hosting countries examined: Afghanistan, Colombia, DRC, Ethiopia, Iraq, Mozambique, Nigeria, Somalia, Sudan, Syria, Ukraine, and Yemen.

28 https://blogs.worldbank.org/en/opendata/when-it-comes-forced-displacement-there-more-data-there-microdata#:~:text=2.,with%20representative%20samples%20of%20them.

- The high flood exposure of IDPs is all the more notable given that the data does not yet include some countries where IDPs are already experiencing high flood exposure, such as South Sudan. This illustrates that global IDP flood exposure is likely much higher.

Figure 4. Total number of refugee and IDP sites exposed to multiple hazards.

Vulnerable people, completely cut-off by flood waters, received food, shelter, hygiene kits and other relief items delivered to them by the ICRC on the small islands they occupy. (Photo: ICRC)

3. Recommendations

1. **There is an urgent need to support displaced populations in the face of climate change, given extreme vulnerability and high levels of hazard exposure, and the often multiple hazards they face.** This is all the more pressing given that many forcibly displaced people are at high risk of further displacement due to living in hazard-prone areas. Ongoing advocacy to develop or expand national climate change adaptation and disaster risk management services to refugees and other forcibly displaced people is one important area of ongoing work.[29] Within adaptation, early warning systems and anticipatory action are critical components of ensuring that displaced people can access information, take action, and receive assistance in advance of extreme weather events. Currently, there are significant gaps in early warning systems in many countries hosting high numbers of displaced people, with much more work also needed to extend existing systems to refugees and IDPs.[30] Limited early warning systems, in turn, impede opportunities to design and implement anticipatory action to support non-displaced and forcibly displaced people alike. However, as the data in this brief illustrates, the high exposure of refugees and IDPs means that many people who have already fled persecution or conflict remain at risk of further harm and even secondary displacement.

2. **Scaling up early warning and early action that directly target forcibly displaced populations is imperative.** These findings reinforce the need for forcibly displaced people to have access to early warnings and early action to anticipate crisis in the face of often multiple climate-related hazards. Yet without targeted efforts to increase their access, forcibly displaced people are being left behind, particularly given the high number living in countries affected by FCV. The UN Secretary General's Action Agenda on Internal Displacement aims to reduce displacement risks posed by climate change and disasters. The agenda is supported by a call for early warning systems to protect every person globally within five years through the Early Warnings for All initiative, which aims to link early warning to early action globally. Anticipatory action frameworks should be specifically designed to reach refugees and IDPs in both urban areas and in camps should be developed.

3. **Funding for early warning and action for forcibly displaced people should be included in discussions on financing for FCV countries.** Given forcibly displaced people's high exposure to a variety of often overlapping hazards, there is an urgent need to integrate **funding pledges and commitments for early warning and early action** into ongoing policy processes focused on enhancing climate finance in FCV contexts. Financing should support refugees and IDPs, in addition to badly needed adaptation support to the local hosting communities and broader population in those countries.

29 See for example the work of UNHCR (2024) Climate change and displacement: Strengthening climate adaptation and resilience. Webpage, available at: https://www.unhcr.org/us/what-we-do/build-better-futures/climate-change-and-displacement/strengthening-climate-adaptation

30 Easton-Calabria, E.; Siffert, A.; Moore, J.; Jjemba, E. (2024) Anticipatory action to build displaced populations' resilience at the intersection of climate change, conflict, and displacement. Humanitarian Exchange Magazine, ODI. Available at: https://odihpn.org/publication/anticipatory-action-to-build-displaced-populations-resilience-at-the-intersection-of-climate-change-conflict-and-displacement/

4. **Awareness raising and anticipatory support for forcibly displaced people can mitigate the risk of secondary or multiple displacement due to climate-related hazards.** This research shows that many refugee and IDP camps and informal settlements of forcibly displaced populations are in hazard-prone areas, which increases the risk of people being displaced again. Supporting forcibly displaced people to preserve assets and prepare in advance of climate related disasters may mean the difference between adapting in situ and progressing towards a durable solution – or being forced yet again to move onwards or prematurely repatriate.

5. **Addressing multiple hazards must be at the forefront of risk assessments and climate action for refugees and IDPs.** The data clearly shows that most sites hosting forcibly displaced people face not just one but multiple independent hazards that may compound and cascade to become even larger, complex emergencies. This illustrates the need for robust climate risk analysis and site planning before new camps and settlements are created, including through the use of climate projections. The data also speak to the need to establish, implement, or extend multi-hazard early warning systems that are tailored to or inclusive of displaced populations.

6. **There is an urgent need to improve the reliability of the data regarding IDP numbers and locations to improve their protection, including against climate-related hazards.** Large gaps and inconsistencies in humanitarian data across agencies relating to methodologies and differing objects and scopes of study (e.g. documenting the number of internal displacements versus the number of total IDPs) means that significant numbers of IDPs cannot currently be accounted for in analyses and projections of climate impacts, with a high risk of adverse outcomes due to not being identified for early warnings or assistance. The UN Secretary-General's Action Agenda, which builds on the findings of the High-Level Panel on Internal Displacement, proposes several actions to tackle the data gap for IDPs. This includes the development of internal displacement data systems for Member States and for international actors to improve their data coordination efforts and help strengthen State's capacities to collect and manage data.[31] These and other actions are urgently needed, particularly given the disproportionate impact of extreme weather events in areas where IDPs reside. Initiatives such as the Complex Risk Analytics Fund (CRAF'd) are supporting the enhancement of displacement data by funding organizations such as UNHCR, the International Organization for Migration (IOM), and the Internal Displacement Monitoring Centre (IDMC) – and more donors must step in.

Unity State, Leer. Sorting sorghum collected from broken bags from the ground after an airdrop conducted by the ICRC. (Photo: ICRC)

31 UN (2022) The United Nations Secretary-General's Action Agenda on Internal Displacement: Follow-Up to the Report of the UN Secretary-General's High-Level Panel on Internal Displacement. Geneva: UN.

8.

There are data and research gaps that should be addressed to better support forcibly displaced people in the face of climate-related hazards. Programming and assistance for forcibly displaced populations in the face of natural hazards will be most effective if the type, scale, and magnitude of the climate challenges displaced people face is understood in the first place. However, far too little research exists on how the climate crisis affects already forcibly displaced populations who have endured the impacts of persecution, violence, and/or conflict. Gaps in data and research include, for example, localised knowledge on where forcibly displaced people are covered by disaster risk reduction and adaptation measures including early warning systems. There is also a problematic lack of understanding of forcibly displaced people's exposure levels as disaggregated by age, gender, and other characteristics, including levels of vulnerability (e.g. health conditions, level of assets, shelter type, access to early warnings, and other indicators). Other future research areas for this project are summarized in the box below.

Areas for Future Research

1. Documentation and analysis of early warning systems and multi-hazard early warning systems in refugee-and IDP-hosting countries, and current and potential coverage for refugee and IDP populations.
2. Ongoing updating of populations (e.g. semi-annually) to capture most accurate statistics of where IDPs and refugees are located as well as their numbers. Identifying and capturing protracted situations of displacement expected to remain protracted should be a key area of focus.
3. The expansion of the current dataset to include other refugee and IDP-hosting countries.
4. The inclusion of different triggers of displacement into the analysis and map as well as other populations in refugee-like situations, such as stateless people, as the primary population of focus here was people displaced due to persecution, conflict, and violence.
5. The comparative mapping and analysis of hazard exposure of refugees and IDPs in relation to non-displaced host populations.

Burkina Faso: thousands of Malian refugees seek shelter (Photo: C. Bosson/ICRC)

4. Conclusion

As the impacts of climate change continue in parallel with ongoing persecution, conflict, violence, and state fragility, there is an urgent need to understand and address the climate risks faced by forcibly displaced populations. Increasing the knowledge base on the exposure of climate-related hazards on forcibly displaced people can advance critically needed assistance such as adaptation measures and anticipatory action, and in so doing can support people's lives, livelihoods, and durable solutions to improve the wellbeing and prosperity of populations at the crossroad of conflict and climate events. Yet research and evidence alone are not enough. Large-scale, consistent, and long-term action and investments informed by robust evidence are urgently needed to meet the current and projected needs of forcibly displaced people at risk of climate-related hazards.

Galgaduud, Somalia. The ICRC uses trucks to provide clean water to the population in immediate need, especially newly displaced populations. (Photo: C. Bosson/ICRC)

Annex 1.
Overview of sources and methodology for refugee and IDP locations and population sizes

Refugee and IDP population data

Data on refugees and IDPs (e.g. nationality, location) was collected through a variety of sources due to considerable gaps in current data for some countries, particularly for IDPs. Data was cross-checked across sources and the most recent data was used to inform refugee locations and population sizes to the most granular level possible. Whenever both figures were available, refugee and asylum seeker numbers were combined in country totals, and asylum seekers were included in mapped populations (aggregated with refugees).

The aim was to be as consistent as possible with data collection, so the following research flow was used to identify locations:

Refugees:

- UNHCR Refugee Data Finder
- UNHCR country webpages
- Refugee Response Plans (regional, by country)
- REACH
- IOM Displacement Matrix Tracker
- Other UN and other humanitarian agency reports (e.g. NRC, DRC).

IDPs:

- UNHCR Refugee Data Finder (also includes IDP figures)
- Internal Displacement Monitoring Centre
- REACH
- IOM Displacement Matrix Tracker
- Other UN and other humanitarian agency reports.

Location coordinates

Whenever possible, displaced people were mapped at the settlement (urban or camp) location. In instances where an exact location was provided, this was found in Google maps, where coordinates were copied and then compiled into an excel document for X/Y coordinates. In instances where an exact location was not possible to identify, larger areas were inputted, such as Admin 3 or Admin 4 level boundaries. In some cases, population figures were only available for larger geographic areas (e.g. district or county levels). When needed, administration boundaries with their names and PCODES were downloaded on HDX for all countries in excel form or shapefile (e.g. Nigeria Boundaries: https://data.humdata.org/dataset/cod-ab-nga). The spatial buffers to IDP/Refugee locations used are as follows:

- Admin 1: Buffer: 75km
- Admin 2: Buffer: 50km
- Admin 3: Buffer: 50km
- Settlement: 50km.

Together, this information was first inputted into an excel document, which then included hazard data as further described below. For the information provided in the brief, the numbers of forcibly displaced people exposed to different hazards was manually calculated using Excel and checked with a second reviewer using Python's Panda's data frame package.

Annex 2.
Overview of sources of data on hazards and methodology

For the exposure, seven indicators were analysed, as described. The following details share information related to the exposure map developed for the project.

Hazards

- Flood (20-year return period)
- Forest fire weather index (20-year return period)
- Strong winds and tropical cyclone wind (50-year return period)
- Heat stress (20-year return period).

Historic impact areas

- Historic drought frequency (1984–2022).

Climate change projections

- Maximum percentage one-day precipitation change, at least 10 per cent increase, CMIP6 SSP2-4.5 for near term (2021–2040)
- Standardized precipitation index (SPI-6), decrease of SPI-6 in percentage, CMIP6- SSP2-4.5 for near term (2021–2040).

NB Locations of refugees and IDPs were identified with three different levels of accuracy: exact location (settlement or city/town location), by administrative 1 boundary (admin 1), by administrative 2 boundary (admin 2), by administrative 3 boundary (admin 3). Please zoom in to the accompanying online map and view the label by location for accuracy information.

Layer details and sources

Flood hazard, 20-year return period

Description: This layer depicts flood-prone areas at global scale for flood events with 20-year return period. Resolution is 30 arcseconds (approximately 1km). Cell values indicate water depth (in metres). The map can be used to assess flood exposure and risk of population and assets.

Source: *European Commission, Joint Research Centre*

Link: *https://data.jrc.ec.europa.eu/dataset/jrc-floods-floodmapgl_rp20y-tif*

Filter: *Water depths from 0.5m to 10m were considered in the exposure analysis.*

Spatial buffers to IDP/refugee locations:

- Admin 1 buffer 75km
- Admin 2 buffer 50km
- Admin 3 buffer 20km
- Settlement 5km.

Forest fire weather index, 20-year return period

Description: This layer depicts areas with a high wildfire danger, based on areas where the 20-year return period of the Canadian Forest Fire Weather Index (FWI) exceeds 30. The FWI is calculated using the European Centre for Medium-Range Weather Forecasts ERA5 historical simulations for the years 1979–2020, with a spatial resolution of 0.28 degrees (ca. 31 km), masking barren land (no vegetation).

Source: *Vitolo, C., Di Giuseppe, F., Barnard, C., Coughlan, R., San-Miguel-Ayanz, J., Libertá, G. and Krzeminski, B., 2020. ERA5-based global meteorological wildfire danger maps. Scientific data, 7(1), p. 216.*

Link: *https://www.nature.com/articles/s41597-020-0554-z*

Filter: *The exposure analysis considers areas with a 20-year return period FWI above 30.*

Spatial buffers to IDP/Refugee locations:

- Admin 1 buffer 75km
- Admin 2 buffer 50km
- Admin 3 buffer 20km
- Settlement 5km.

Strong winds and tropical cyclone wind, 50-year return period

The tropical cyclonic strong wind and storm surge hazard model uses information from 2,594 historical tropical cyclones, besides data on topography, terrain roughness, and bathymetry. The historical tropical cyclones used in the cyclone wind and storm surge hazard model in the atlas of the Global Assessment Report cover the five different oceanic basins: north-east Pacific, north-west Pacific, South Pacific, north Indian, south Indian and North Atlantic. In all cases, the data associated to each track were obtained from the IBTrACS database (Knapp *et al.,* 2010). Topography data from the Shuttle Radar Topography Mission of NASA, which provides terrain elevation grids at a 90 meters resolution, delivered by quadrants over the world was used. In addition, to account for surface roughness, polygons of urban areas worldwide were obtained from the Socioeconomic Data and Applications Centre, SEDAC (CIESIN *et al.,* 2011). A digital bathymetry model, with a spatial resolution of 30 arcseconds, from the GEBCO_08 (General Bathymetric Chart of the Oceans) Grid Database of the British Oceanographic Data Centre (2009) was used.

Source: *UNEP/GRID-Geneva*

Link: *https://wesr.unepgrid.ch/?project=MX-XVK-HPH-OGN-HVE-GGN&language=en&theme=color_light*

Filter: *For the exposure analysis all wind speed areas (min: 10km/h – max: 371 km/h) were considered. It is noted that strong winds are classified to start at around 40km/h or higher. However, due to the wide and challenging to define spatial hazard areas for strong winds and cyclone impacts and the potential for subsequent events like extreme precipitation in wider areas, it was decided to consider the maximum extent of the potential reach and impact area of a potential extreme event.*

Spatial Buffers to IDP/refugee locations:

- Admin 1 buffer 75km
- Admin 2 buffer 50km
- Admin 3 buffer 50km
- Settlement 50km.

Heat stress 20-year return period

Heat stress is defined according to the Universal Thermal Climate Index (UTCI) based on the ERA5-HEAT dataset (1979-2020). High heat-stress areas are defined where there is at least one day in a year where UTCI exceeds "very strong" (UTCI>38), at least once every 20 years. UTCI is calculated for a spatial resolution of 0.25 x 0.25 degrees.

Source: *Di Napoli, C., Pappenberger, F. and Cloke, H.L., 2018. Assessing heat-related health risk in Europe via the Universal Thermal Climate Index (UTCI). International journal of biometeorology, 62, pp.1155-1165.*

Link: *https://link.springer.com/article/10.1007/S00484-018-1518-2*

Filter: *The exposure analysis considers areas where the 20-year return period of the annual count of daily maximum UTCI exceeding 38 is at least one.*

Spatial Buffers to IDP/Refugee locations:

- Admin 1 buffer 75km
- Admin 2 buffer 50km
- Admin 3 buffer 50km
- Settlement 50km.

Historic drought frequency

Historic Agricultural Drought Frequency layer depicts the frequency of severe drought in areas where at least 30 per cent of the cropland/grassland has been affected. The historical frequency of severe droughts (as defined by ASI) is based on the entire ASI times series (1984-2022).

Formula: *The number of years when land affected>30 percent occurred/(2022-1984+1) *100*

Source: *FAO - Agricultural Stress Index System (ASIS)*

Link: *https://data.apps.fao.org/catalog/iso/f8568e67-46e7-425d-b779-a8504971389b*

Filter: *For the exposure analysis only areas with >25% Drought Frequency were considered.*

Spatial Buffers to IDP/Refugee locations:

- Admin 1 buffer 75km
- Admin 2 buffer 50km
- Admin 3 buffer 50km
- Settlement 50km.

Global climate projections

Description: The climate variables were derived from the IPCC Atlas (www.interactive-atlas.ipcc.ch/) and were developed under the Coupled Model Intercomparison Project Phase 6 (CMIP6). The CMIP6 project is a collaborative international effort where climate models are used to simulate and project changes in the planet's climate, aiding in understanding future climate scenarios and impacts on a global scale. Variables for Near Term (2021-2040) under the scenario SSP2 Middle of the Road, were derived from the IPCC Atlas, referencing baseline conditions from 1995-2014.

Source: *IPCC Atlas*

Link: *www.interactive-atlas.ipcc.ch/*

Spatial Buffers to IDP/Refugee locations:

- Admin 1 buffer 75km
- Admin 2 buffer 50km
- Admin 3 buffer 50km
- Settlement 50km.

Climate projection variables:

Maximum 1 Day Precipitation

Projection dataset: *CMIP6 - Maximum 1-day precipitation (RX1day) Change % - Near Term (2021-2040) SSP2-4.5 (rel. to 1995-2014) - Annual (32 models)*

Filter: *For the exposure analysis areas with projected Maximum 1 Day Precipitation change of at least an increase of +10 per cent were considered.*

Standardized Precipitation Index (SPI-6)

Projection: *CMIP6 - Standardized Precip Index (SPI-6) Change % - Near Term (2021-2040) SSP2-4.5 (rel. to 1995-2014) - Annual (30 models)*

Filter: *For the exposure analysis only areas with a projected SSPI-6 change value below 0% and therefore indicating a projected increase in drought conditions were considered.*

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