Scoping review on Climate Change and Environmental Degradation Adaptation Frameworks, Guidelines and Literature in Humanitarian Organizations 2023

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Consultant: Tilly Alcayna

Contents

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Background

Acknowledging the challenges and the health consequences of climate change and environmental degradation, MSF Operational Centre Brussels (OCB) engagement in Climate, Environment, and Health encompasses three pillars:

1. Positioning, Analysis and Advocacy: Including the OCB and MSF position, reflections and debate, networking, to propose research on the medical humanitarian consequences of climate change and where appropriate use this for public positioning and advocacy.
2. Reducing our environmental footprint: adapting operational and institutional practices to reduce MSF's overall environmental footprint whilst maintaining and continually improving the quality of care for patients.
3. Adapting our operational response: increasing and adapting the humanitarian medical response to include/adapt to the intensified needs affected by climate change and environmental degradation.

Each of the three pillars is complimentary. The positioning, analysis and advocacy of the Pillar 1 is tightly linked to the findings and actions of Pillar 2 and 3. MSF has committed to reduce greenhouse gas emissions (its carbon footprint) by 50% by 2030 from a 2019 baseline (Pillar 2), as part of its 2020 Environmental Pact. Furthermore, MSF is a signatory to the Climate and Environment Charter for Humanitarian Organizations. Importantly, it must be remembered that mitigation (Pillar 2) and adaptation (Pillar 3) go hand in hand. They are not mutually exclusive, but mutually reinforcing. It is about doing both as best as possible at a moment in time and ratcheting to improve year after year. This Scoping Review specifically addresses adaptation (Pillar 3) and is accompanied by a Glossary on Climate Change and Health (Annex 1, see separate document).

1 Introduction

Anthropogenic driven climate change and environmental degradation are complicating existing humanitarian interventions as well as increasing humanitarian needs (IFRC 2020). Climate change exacerbates existing health challenges and inequities by acting as a threat multiplier, and by creating new challenges and threats (Ebi 2020). The observed changes from 1.2C of warming are already stretching humanitarian services at the frontlines (ALNAP 2023). Natural hazards, such as flooding or heatwave events in certain countries, are now bigger in scale (IPCC 2021). Two or more hazards are occurring simultaneously, for example hot and dry conditions, compounding the impacts of each other (IPCC 2021). Hazards are occurring in quick succession giving communities and humanitarian organisations little chance to recover (IFRC 2020). In addition, climate change is bringing new risks to parts of the world where such events have not yet been experienced (IFRC 2020).

These are the observed changes being felt now. Climate projections indicate worse is yet to come if greenhouse gas emissions are not drastically curbed. The frequency and intensity of heatwaves and heat extremes are projected to keep increasing (IPCC 2021). The frequency of intense tropical cyclones (category 3-5) is likely to increase globally (IPCC 2021). With increased global warming, the frequency and intensity of strong rainfall events is generally expected to increase globally, though trends will vary significantly between regions (IPCC 2021). Pluvial flooding is generally expected to increase in frequency and magnitude, though this is highly regional dependent (IPCC 2021). River flooding is highly dependent on catchment and region, but generally this is expected to increase also (IPCC 2021). Droughts have increased because of increased evapotranspiration (IPCC 2021).

Climate change is and will have direct and indirect health impacts, which will not be felt equally across societies (Lancet Countdown 2023; WHO 2020; Ebi 2020). Destroyed or damaged infrastructure (health facilities, roads, bridges, water and sanitation systems) from extreme weather events will affect patient access to timely and effective healthcare and disrupt supply chains (WHO 2015). Heat extremes will increase community cases of heat-related illnesses (heat stroke, asthma, cardio-vascular diseases) which may overwhelm health facilities' capacity (IFRC & OCHA 2022). Heat extremes will also worsen working conditions for staff, straining mental and physical health of the workforce. Declining water supplies or intermittently energy access/power cuts will affect the functioning of health facilities and ability of staff to carry out activities safely (WHO 2015). Unexpected outbreaks of vector, water or foodborne diseases may increase hospital admissions (Semenza 2022). Undernutrition exacerbates disease and may also increase the need for hospital admissions. In increasingly harsh environments, it may be difficult to retain and recruit staff (HACE, 2023). Climate change is and will continue to have significant impacts on the populations MSF serves, as well as MSF staff and operations.

Environmental degradation is a general term for deterioration of the natural environment and pollution due to unsustainable human activities and hazardous waste management. It includes "reduced air, water, and soil quality, the destruction of ecosystems and habitats, and the extinction of wildlife." (HACE 2023) The reduction in quality and pollution of natural resources can affect environmental determinants of health. Many of the processes of environmental degradation are drivers of hazard and risk. (UNDRR, n.d) For example, the expansion of socieites into natural environments, causing habitat fragmentation and destruction, can

increase the risk of zoonotic disease spillovers and exposure to new pathogens. (Barbier 2021) The Environmental Pact 2020 – which was unanimously endorsed by the MSF Movement in 2020 - and products such as the Environmental Impact Toolkit: futureproofing MSF through measurement and mitigation demonstrate MSF's commitment to environmental health.

Humanitarian organisations such as MSF will need to review their operations, strategic planning, training, and protocols to meet and adapt to these growing challenges. For MSF, climate change and environmental health **adaptation** has been defined as "the capacity to anticipate and respond to emerging climate-related factors that can impact operational decisions" (OCB 2023) and "adaptation entails more proactive and long-term measures to adjust and modify systems and practices in order to reduce vulnerability and increase resilience to climate change" (HACE, 2023). Ultimately, climate change adaptation for emergency medical humanitarian organisations such as MSF is about ensuring that operations remain effective over time for the communities they serve.

A recent MSF report found that MSF is "behind the curve" on "how it plans to adapt operations using a 'climate and environmental lens'" (HACE 2023). Staff surveys suggest there is less knowledge and awareness on climate change adaptation in MSF than there is on mitigation options (HACE, 2023). To date, there is no common definition and understanding across the MSF movement of what Climate, Environment and Health (CEH) operational adaptation could encompass.

This scoping review seeks to fill that gap by reviewing other humanitarian organizations' publicly available guidelines on how to implement and integrate adaptation to climate change and environmental degradation within operations. Numerous frameworks and guidance documents exist; however, many remain high-level, with a focus on health systems strengthening or calls for greater research. The aim of this study is to identify operationally relevant adaptation suggestions. Therefore, the specific objectives of this study are to collate and analyse existing guidance on operational adaptation to (1) identify and analyse the resources, tools, and methodologies of relevance to medical humanitarian activities that other humanitarian organisations are using to adapt their operations, and (2) provide a menu of possible adaptations to facilitate discussions within MSF on operational adaptation. Ultimately, this scoping study should be used as a springboard for discussion within MSF. It is a resource within the pillar on 'Adapting our Operational Response' within the OCB Programme on Climate, Environment and Health (CEH), but is not a prescription of what MSF should do.

2 Methods

2.1 Search strategy

Searches for literature were carried out in Google Scholar, Google, and PubMed to capture grey and published literature. In addition, searches of specific organisational websites (e.g. IFRC, WHO, ClimaHealth.org, ALNAP, GCHA, ATACH, ReliefWeb) were carried out. Finally, the reference lists of identified frameworks were reviewed to identify further relevant documents. Titles and abstracts/executive summaries/tables of content were screened to determine relevance.

2.2 Search terms

The following search terms were combined and used:

Adapt* AND
Clima* OR "Environmental degradation"AND
Guide OR Guidance OR Framework OR Tool OR Checklist OR Journey OR Assessment OR Operations OR Program* AND
Health OR Medical OR Humanitarian

2.3 Inclusion criteria

A shortlist of relevant literature was identified that was: 1) highly practical and guidance oriented; 2) with a focus on humanitarian or low-income settings; and 3) published within the past 15 years. The prioritisation of identified literature and inclusion in this scoping study was done in collaboration with OCB Adaptation Working Group.

2.4 Analysis

A coding framework was designed in collaboration with OCB Adaptation Working Group in advance of data extraction. The coding framework focused on extracting information on specific areas of interest to MSF OCB (for example, climate-related disasters and climate sensitive infectious diseases). During the review process it was agreed that additional codes could be added if new themes emerged during the review. Coding was carried out using MAXQDA Analytics Pro 24 (Version 24.1.0) software. When multiple sources suggested the same adaptation activity, these were combined to avoid repetition. Suggested adaptation activities have been kept as close to the original text as possible.

2.5 Limitations

The search was not exhaustive, and it is possible that adaptation frameworks from organisations that did not include the search terms may have been missed. A limited number of priority frameworks were reviewed due to time constraints, however, these were deemed as most relevant by OCB Adaptation Working Group members. The number of frameworks specific to environmental degradation were limited and recommendations or suggestions remained high level, and thus were not included (e.g. Making Adaptation Work: Addressing the compounding impacts of climate change, environmental degradation and conflict in the Near and Middle East, IFRC & Norwegian Red Cross, 2023)

3 Results

A total of 23 guidance documents were identified as potentially relevant, and 4 academic articles (see Annex 2 for full list). All 4 academic articles were included for review, and the full texts of 13 priority guidance documents were reviewed. This included guidance from the Red Cross Red Crescent, WHO, World Bank, UNICEF, ALNAP, UNOCHA, UNHABITAT. Over 381 sections with relevant adaptation information were coded and then synthesised in the following thematic tables. These tables cover adaptation suggestions for: programmes in general, partnerships (including via community engagement), assessments, climate-related disasters, climate sensitive infectious diseases, health facilities, staff, nutrition, and WASH. Each table contains the adaptation suggestion and the type of change this requires (training of staff, investment in assets, update to e-prep or protocol, specific partnerships, improved risk knowledge). The text was quoted as close to the original wording of the guidance as possible.

Figure 1. Documents included in the final analysis

3.1 Operations

Theme	Adaptation suggestion	Type of change
Operations	Review (or "screen") the activities in existing projects or strategies, as well as the draft activities proposed in the initial stages of a new project or strategy process to ensure (current and likely future) climatic risks are factored into all aspects of programming, protocols, e-prep (IFRC & RCCC 2023; Schwerdtle et al 2020) Climate and environmental risk are examined as part of a duty of care responsibility to the workforce, an ethical duty to 'first do no harm', and to improve safety and quality of care for patients. (Schwerdtle et al 2020)	Updates to guidance for project planning and assessments.
	Integrate climate and weather information (e.g. hazard maps) for more accurate situational analysis and planning (Schwerdtle et al 2020)	Updates to guidance for project planning and assessments
	Regularly update climate-related disaster plans as new information becomes available on environmental degradation or climate change, including reflection and adjustment to operations in the aftermath of events (would anything have been done differently, should protocols be adapted, is this likely to happen again?) (IFRC & RCCC 2023; WHO 2020). Ensure the workforce is regularly trained on how to implement updated plans (WHO 2020).	Updates to guidance for emergency response and staff training
	Implement integrated risk monitoring and early warning systems to inform preparedness, surveillance and response in a timely manner. Key risks to monitor include extreme weather events, temperatures, UV radiation, seasonal allergen loads and occurrences, and water availability and quality (WHO 2022). ➢ Indicators on climate change impacts, vulnerability, response capacity and emergency preparedness capacity, as well as climate and environmental variables are included in relevant monitoring systems and reported over time. ➢ Periodic reviews for improvements or deterioration of capacities are identified in vulnerability and adaptation assessments.	Updates to planning and monitoring
	Conduct regular scenario planning exercises based on climate forecasts and hold discussions on available/required sums of emergency financing (IFRC & RCCC 2023).	Updates to planning
	Ensure plans are in place for operating and maintaining critical systems in climate-emergencies and disasters with sufficient resources to last 3 days minimum and regular checking of emergency stocks (WHO 2020). *(Note this is good disaster preparedness and not necessary climate change adaptation. The climate change adaptation entails tailoring the planning based on climate risk assessments)*	Updates to e-prep
	Foster a culture of climate-aware leadership wherein managers (or equivalent role) are empowered to make decisions in the context of uncertainty; with low or no regrets early actions when uncertainty is high (de Geoffroy et al 2021; World Bank 2017; OCHA 2022).	Organisational behaviour change and integration of the concept of 'low regret early actions' into E-prep guidance
	Encourage climate-aware leadership and governance that considers climate risks in strategic planning over the short, medium and long-term. (Schwerdtle et al 2020).	Organisational behaviour change

3.2 Partnerships & Networking

Theme	Adaptation suggestion	Type of change
Partnerships & Networking	Propose or advocate for multi-agency collaboration around seasonal planning sessions with a wider set of partners, including national weather service (where they exist). Such dialogue sessions can support organisations to advance preparedness activities and discuss implications of forecasted impacts on communities to help reach the scale needed (IFRC & RCCC 2023).	Planning and advocacy
	Dialogues between national meteorological services (where they exist) and humanitarians can help enhance the provision of targeted and actionable climate information and operational early warnings for specific health applications. Note that meteorological and hydrological services are sometimes separated into two institutions (Schwerdtle et al 2020; IFRC & RCCC 2023)	External workshops or involvement in existing task forces/ committees
	Ensure that climate science technical staff, disaster risk managers, public health specialists, epidemiologists and doctors are brought together in internal working groups to discuss operational adaptation options, and promote multi-agency transdisciplinary meetings of these specialities (IFRC & RCCC 2023)	Internal workshops or new working groups
	Connect with specialist organizations (academia or climate service providers) that might strengthen the validity and reliability of monitoring tools that integrate weather and climate data into early warning systems or disease surveillance indicators (Schwerdtle et al 2020)	External partnership
	Identify applied research questions that would help strengthen knowledge on the links between climate and health outcomes and partner with research institutions who may have more capacity to conduct the analysis (Schwerdtle et al 2020)	External partnerships
	Consider non-traditional partnerships (i.e. beyond academic research groups) with environmental organisations, structural engineers or architectural planners to undertake joint analyses on risk (Schwerdtle et al 2020; de Geoffroy et al 2021);	External partnerships
	Establish MoU/contingency agreements with vendors of supplies ahead of disasters (WHO 2020);	External partnerships
	Health workforce participates in community educational programmes to assist the local community in reducing climate risks (WHO 2020)	Community engagement
	Health workforce involved in community or local disaster risk planning committees (WHO 2020)	Community engagement

3.3 Assessments

Theme	Adaptation suggestion	Type of change
Assessments	Conduct a climate risk assessment (national and project level) to understand the existing and changing climatic hazards, population vulnerability, and exposure of people and assets, to identify relevant entry points for adaptation. ➢ Identify historic, current and future climate trends and weather conditions (IFRC & RCCC 2023). Specifically, map the intensity and probability of extreme weather events across the Mission/health care facility (present and future). Classify climate related hazards (current and potential) as **high** (indicating a high probability of hazards taking place or high-magnitude hazards, or both), **medium** (a high probability of moderate hazards) and **low** (a low probability or hazards of low magnitude) to help inform contingency planning and staff training (WHO 2020) ➢ Conduct assessments and mapping of climate change risks to the infrastructure of health care facilities in place to identify where services could be disrupted from floods, water scarcity, landslides, sea-level rise (WHO 2020) ➢ Focus on the timescale of relevance (e.g. next 5-10 years) and on likely climate impacts on disease dynamics or population movement and the implication this will have on the health catchment area in which MSF operates. For example, the current and expected changing levels of vulnerability and exposure, with a focus on vulnerable groups that are likely to be disproportionately affected by climate change, especially women and girls, children, the elderly, marginalized groups, indigenous groups, migrant workers etc. (IFRC & RCCC 2023; World Bank 2017) ➢ Assess the Mission (staffing, beds, supplies) capacities to deal with increasing risks IFRC & RCCC 2023) ➢ Provide an overview of key stakeholders in-country working on climate and health and highlight gaps in which MSF's support would be most needed (IFRC & RCCC 2023)	Improve risk knowledge
	Improve Mission knowledge on the following to improve contingency planning and staff awareness 1. 'Known disasters' – those of which we already have extensive experience and understanding but with new characteristics 2. 'Imperfectly understood disasters' – those that in some respects develop along familiar lines while in others present new, unexpected features that are difficult to predict 3. 'The unknowns' – Unprecedented, cascading or 'new' disasters, of which we have little or no understanding (de Geoffroy et al 2021)	Training of staff (updates in the Emergency Response Awareness training) and further research

3.4 Climate-related disasters

Theme	Adaptation suggestion	Type of change
Climate related disasters general	Mainstream the monitoring of climate and weather forecasts. ➢ Designate a role at HQ and the local level to monitor weather forecasts to ensure operation teams are not taken by surprise in operational areas (IFRC & RCCC 2023) ➢ This may require some extra training on interpreting weather forecasts and understanding the skill in different contexts. ➢ Long term climate forecasts (e.g. seasonal forecasts) give an overall picture of the likelihood of various future risks for advanced preparation. Weather forecasts on shorter timescales can be used to anticipate impacts more precisely (van aalst 2010).	Investment at MSF Movement level to ensure buy-in to update the roles and responsibilities and training of staff.
	Build in accessing emergency financing pre-emptively via anticipatory action initiatives (IFRC & RCCC 2023)	Investments buy-in on anticipatory action and related pre-emptive funding into running operations
	Review early warning systems and monitoring of forecasts after disaster events to continuously evaluate and improve systems (de Geoffroy et al 2021)	Investment at MSF Movement level to ensure buy-in
	Agree on a strategy for addressing 'false positives' (when forecasts wrongly suggest a significant weather event or disaster will occur) and 'false negatives' (when the early warning system fails to predict a significant event) (de Geoffroy et al 2021). This may include low or no regrets early actions depending on the level of uncertainty of different triggers used.	Update to guidance
Extreme rainfall	Storm water safely managed to avoid standing water near health facilities or staff accommodation, and activities to reduce standing water in communities (WHO 2020)	Update to guidance
	Roof drainage system well maintained and able to withstand expected future extreme rainfall volumes (WHO 2020)	Update to guidance
Flooding	Participate in existing, or promote the establishment of, flood-preparedness meetings with climate scientists, hydrologists, disaster managers and health authorities, so climate scientists can understand what forecast information is needed to help operations (Braman et al 2010)	Partnerships
	Have a plan in place for relocating hospital equipment, medicines and medical devices prior to floods or permanent relocation of equipment to higher floors in flood-prone areas. Ideally MSF health facilities are not located in flood-prone areas. (WHO 2020) This should be based on or include an actual trigger that is defined for that area i.e. the threshold indicator of a weather forecast or river level monitoring that will form the trigger to begin the relocation.	Update to guidance
	Review and revise flood risk plans to ensure they are appropriate for increasing risk of more intense flooding (IFRC & RCCC 2023), for example: ➢ Ensure water storage tanks not in areas prone to flooding to reduce risk of contamination; ➢ Ensure vents on septic tanks are above expected (not historic) flood line levels; ➢ Ensure patient medical records are stored safely away from flood risk; ➢ Ensure rapid clean-up and recovery from floor water to prevent mold growth associated with floods (WHO 2020)	Update to E-prep
	If facilities or stocks are located within a range of flood risk, build partnerships with communities and municipal authorities to install and monitor river level	Asset investment and partnerships

	gauge/sensor (IFRC & RCCC 2023) to receive advanced warning of increases in river levels in order to carry out preventative action (e.g. sandbagging)	
Tropical storm	In locations where tropical storms have historically been infrequent but there is evidence that this may change ➢ Ensure staff receive new/updated training on keeping patients safe and appropriate behaviour at staff accommodation e.g. securing any possessions or materials that could be moved with strong winds or floods. (de Geoffroy et al 2021; WHO 2020) ➢ There may be an increased need for pre-emergency preposition of supplies, relief items and personnel (RCCC 2023)	Training of staff and update to E-prep protocols
Drought	Developed a long-term drought management plan, including the identification of available alternative safe water sources (WHO 2020)	Update to E-prep
	In places that experience periods of water scarcity and water availability introduce rainwater harvesting (with safe storage). ➢ When rainfall is sufficient and regular (e.g. during rainy or monsoon season) rainwater can be collected and stored for periods of low rainfall to be used to flush toilets, water surrounding plants used to cool health facilities, or to clean outdoor pavement areas (WHO 2020) ➢ Regularly inspect storage tank for damage (WHO 2020)	Investment in assets that will last many years.
	Reinforced messaging about water uses (water conservation) through signs and notices to promote saving in staff accommodation and health facilities (WHO 2020)	Training of staff and community engagement
Heatwave	Improve public awareness and to inform at-risk groups (e.g. outdoor labourers) about heatwaves and heat stress as part of health promotion activities during hotter seasons to help communities change behaviour (de Geoffroy et al 2021)	Change to HP messaging
	Implement relatively low cost interventions to cool health facilities: ➢ Paint roofs of health facilities white to reflect light and reduce heat absorption; ➢ Plant trees or climbing plants around the facility to create shade and lower ambient temperature; ➢ Improve night-time ventilation (whilst maintaining good vector control); ➢ Design ventilation to increase air flow through buildings (de Geoffroy et al 2021; WHO 2020)	Investment
	Install devices to monitor indoor temperatures and develop: ➢ Contingency plans on how to cool rooms if a temperature threshold is exceeded; ➢ A plan on where to safely move patients to cooler temperatures (WHO 2020)	Asset investment and update to guidance
	Develop a heatwave action plan for staff, the facility, and communication with communities (IFRC & RCCC 2023)	Update to guidance
	Systematic monitoring of the indoor temperature in maternal health units and establish guidelines to maintain temperatures below pre-identified safe thresholds (World Bank 2017)	Investment, research and planning

3.5 Health facility

Theme	Adaptation suggestion	Type of change
Health Facility	Conduct a climate change and health vulnerability and adaptation (V&A) assessment using WHO suggested methodology To better understand the baseline conditions and current and future vulnerabilities of health care facilities to climate change (suggested in WHO 2020, see resource list provided in the discussion for more up to date methodology)	Assessment
	Develop energy management plan to deal with intermittent energy supply or risk of power cuts during climate-related disasters: ➢ Invest in solar power as back up to unpredictable energy cuts or risk of power cuts from extreme weather events. (WHO 2020)	Investment
	Reduce mechanical cooling demands through passive technologies, such as: ➢ Thick masonry walls with extensive insulation ➢ Deep overhangs ➢ Painting roofs white. ➢ To alleviate the significant dust infiltration from dust storms, a thermal labyrinth filters and precools outdoor air, reducing the demand on the solar-powered water heating and chilling equipment (World Bank 2017)	Investment
	Use permeable paving in wet climatic zones to reduce change of flooding (WHO 2020)	Investment
	Any new infrastructure construction (e.g. a new ward) considers a range of climate related risk scenarios, such as drought, flood, prolonged rainfall, storms, strong winds, heat waves and sea-level rise (WHO 2020)	Planning
	The facility has sufficient supplies, energy, and water to last up to 3 days of being totally cut off (WHO 2020)	Investment in E-prep stocks and resources

3.6 Staff

Theme	Adaptation suggestion	Type of change
Staff	All staff are knowledgeable about the links between climate, environment, and health: ➢ Climate-health literacy improved and staff aware of changing disease profiles in response to changes in climate; ➢ Education and training provided to health care facility staff and the community on environmental factors that contribute to the burden of disease; ➢ Staff are briefed with the latest knowledge of climate change impacts on health in Missions; ➢ Staff are effectively able to communicate with communities about changing health risks as a result of climate change (IFRC & RCCC 2023, Schwerdtle et al 2020; WHO 2020; WHO 2022)	Training of staff and risk knowledge
	Reduce physically demanding work during the hottest part of hot days (WHO 2020)	Update to guidance
	Consider the need to alter staffing requirements during different parts of the year to account for changing seasonal risk pattern (WHO 2020; WHO 2022a)	Strategic planning and organisational capacity development
	Health workforce trained to detect post-traumatic stress disorder from climate-related disasters among staff to take prompt action. Mental health and psychosocial support initiatives are in place to support staff and families (WHO 2020)	Training of staff
	Training for specific roles (Team Leads) on monitoring and translating rainfall forecasts and temperature and humidity forecasts (IFRC & RCCC 2023)	Training of staff
	Internal and external communication plans (including the development of knowledge products) are developed and implemented to raise awareness of health and climate change, and response options targeting key audiences, such as health professionals and decision-makers, communities, the media and other sectors (WHO 2022a)	Training of staff

3.7 Climate sensitive infectious diseases

Theme	Adaptation	Type of change
Climate sensitive infectious diseases	Typical interventions on infectious disease prevention and control are not likely to change, but where and when they are needed can be informed using climate services e.g. weather forecasts, seasonal forecasts and risk assessments (World Bank 2017) in combination with disease surveillance systems. Currently, the initiation of most interventions relies on routine disease surveillance systems, which may be weak in certain locations or data may arrive too late for preventative response. Therefore there is need to invest in strengthening disease surveillance capacity, early detection and integrating this with weather information. (IFRC & RCCC 2023)	Changes to guidance and increased investment in disease surveillance capacity
	Conduct operational research and provide training to the workforce on links between climate variability and extreme weather events and climate-sensitive infectious disease outbreak risk in the specific locations of operations (IFRC & RCCC 2023)	Training of staff
	Develop early warning systems and anticipatory action programmes for climate-sensitive infectious diseases, to improve early detection, reduce transmission and the number of cases (IFRC & RCCC 2023).	Develop new guidance on anticipatory action
	Identify areas in the country where climate-sensitive infectious diseases are likely to become more widespread due to increasing climate or environmental risks: ➢ Scale up of awareness-raising within Missions and communities; ➢ Scale up hygiene promotion, WASH or vector control interventions where appropriate in these new locations (IFRC & RCCC 2023)	Research, community engagement
	Ensure there is community engagement and action to reduce disease transmission, e.g. removal of debris before rains to prevent mosquito breeding sites (WHO 2020)	Community engagement
	Regular inspection of window screens to prevent vector-borne diseases especially after extreme weather events which could have caused damage (Moreira 2022)	Training of staff and update to staff task lists
	Re-align programmes so that staff are equipped to address multiple vectors and diseases and integrate efforts for greater efficiency and effectiveness: ➢ Combine different vector control methods and interventions and integrate vector control efforts for different vectors and diseases in an appropriate and evidence-based way (WHO 2022a)	Update to programmes and staff training
	Vector control strategies are planned and regularly reviewed to be carried out at the optimal timing. In general and where feasible, environmental management (habitat modification and manipulation) should be the primary strategy to reduce the availability of larval habitats. Environmental management includes: frequent emptying, cleaning or mosquito-proof covering of water containers, removal or filling of non-essential water containers, improved solid waste management, and screening of construction sites, open drains, and water bodies with stagnant water (WHO 2022a). In addition, chemical interventions should be based on properly selected and safe/validated insecticides and consider insecticide resistance management.	Update to programme
	WHO has specific technical guidance on conducting an Vulnerability and Adaptation (V&A) assessment for diarrheal diseases including the following steps: planning the assessment; describe the current burden of diarrhoeal diseases and vulnerabilities to climate variability and recent climate change (including vulnerable groups; assessing health and WASH capacities; future risk assessment: qualitatively or quantitatively project climate change-related risk of diarrhoeal diseases; adaptation assessment) ➢ For solutions to be locally and culturally appropriate and effective, communities must be involved in the design and implementation. Women in particular should be consulted to understand household water and sanitation behaviours, feeding habits, nutritional needs, and food preparation and hygiene habits. It is important to remember that urban and rural areas differ in the available options at the household	Assessments

	level, and that adequate and environmentally sustainable energy and water are necessary requirements for food preparation and hygiene (WHO 2022b)	

3.8 Nutrition

Theme	Adaptation	Type of change
Nutrition	Consider linking weather forecasts and climate data with local knowledge (from farmers and communities) to estimate and project food insecurity. (IFRC & RCCC 2023)	Risk knowledge
	Conduct nutritional assessments integrating climate and weather information, provide pre-emptive supplementary feeding when indicated whilst considering vaccination and prophylactic health care interventions to vulnerable groups (Schwerdtle et al 2020)	Update to assessment and guidance
	Support national commitment to shift towards healthy, sustainable diets (where appropriate) (WHO 2022a)	Advocacy
	WHO has specific technical guidance on conducting an Vulnerability and Adaptation (V&A) assessment for Undernutrition. ➢ Refine the understanding of potential impacts of climate variability and change on national nutrition, including for high-risk populations and areas, and seasonal/acute nutrition risks. ➢ Conduct participatory, nutrition-focused risk assessments and risk reduction plans. ➢ Improve the use of nutrition early warning/early response systems (including sentinel and community nutrition surveillance) by the health sector. ➢ Ensure use of seasonal calendars for sentinel targeting. ➢ Identify potential regional and local hotspots for undernutrition in 2020, 2030, 2040, and so forth. ➢ Develop nutrition early warning and early response systems; and improve contingency planning (e.g. prior to the onset of an emergency, most vulnerable populations should be readily identifiable and response protocols should be in place).	Assessment

3.9 WASH

Theme	Adaptation	Type of change
WASH	Health workforce can implement safe water management (including rationing) for all operations, especially for those in at-risk areas for water scarcity and weather-related emergencies and disasters, according to local conditions and disaster magnitude, codify this in a water safety plan (WHO 2020; WHO 2022a) ➢ Details on how to develop can be found in: Water safety plan manual: step-by-step risk management for drinking-water suppliers and specific guidance on the systematic consideration of women and disadvantaged groups through the WSP process in order to ensure equitable benefit is also available: A guide to equitable water safety planning: Ensuring no one is left behind (WHO 2019). ➢ This should also include proper borehole/source design and protection and investing in borehole/source maintenance, repair and rehabilitation over drilling new boreholes where possible (OCB)	Update to guidance
	Raise awareness amongst communities, Mission staff and other partners, about climate adaptation options for sanitation systems, such as selecting sites less prone to floods, taking measures during/after extreme weather events, constructing simplified sewer networks to withstand flooding and flotation (WHO 2022b)	Knowledge and advocacy
	Community mobilization for safe (hazardous) waste management and vector control activities (WHO 2022b)	Community engagement
	Plan in place for water system supplies (such as chlorine, filters or other water treatment technology, rapid water testing kit), during an emergency and disaster response (WHO 2020)	Update to guidance
	Identifying current or historical climate related hazardous events known to pose significant health risks to the collection, treatment, reuse and/or disposal of sanitation wastes (such as overflowing of pit latrines contaminating drinking water sources) (WHO 2020)	Update to guidance
	Safe water storage available, avoiding mosquito breeding sites, with appropriate covers to avoid contamination (WHO 2020)	Update to guidance
	Sanitation technologies designed to be more resistant to climate hazards and able to operate under a range of climate conditions, ensuring that failure in one part of the service chain does not cause the entire service to fail (WHO 2020)	Update to guidance
	Water supply system has sufficient reserves, with backup arrangement, to satisfy the facility's demand for at least three days, at all times (WHO 2020)	Update to guidance

4 Discussion

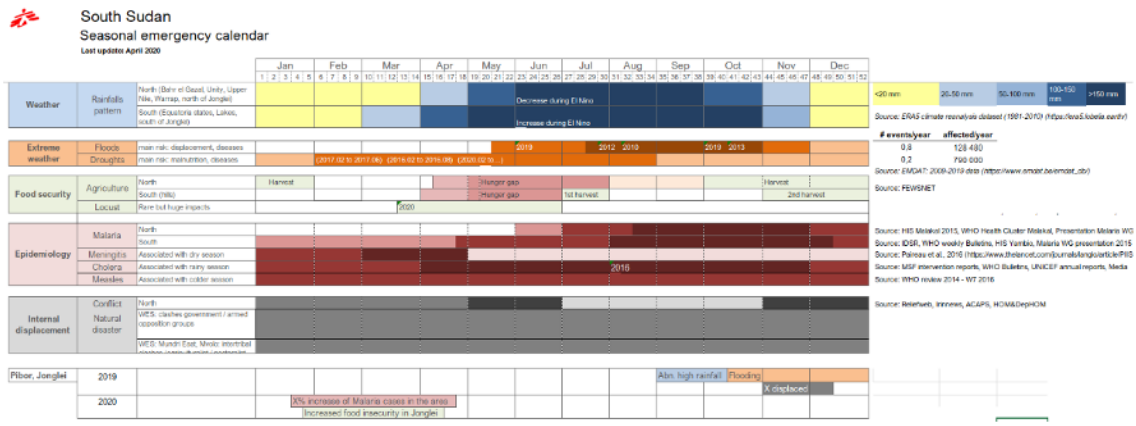
This scoping review has collated and analysed existing guidance on operational adaptation that other humanitarian organisations are using to adapt their operations. Many of the adaptation suggestions across the different themes relate to 1) incorporating new sources of information (such as weather and climate information at different time scales) to support decision making; 2) updating protocols to reflect a changing risk landscape; 3) changing the timing of existing activities (e.g. vector control activities or vaccination campaigns) so they are optimally effective given changes in the mean and variability of climate; 4) implementing more proactive anticipatory action initiatives where appropriate; and 5) identifying new areas or populations at increased vulnerability and/or risk.

It is possible that the adaptation suggestions in the results are already being implemented by MSF Missions to varying extents. Yet, staff may not recognise these activities as contributing towards climate change adaptation, as found in a staff survey (HACE, 2023). One of the main arguments of this review, is that climate change adaptation does not require MSF to fundamentally change its core functioning as an emergency medical humanitarian organisation. Rather, it is about adapting operations so they consider new and changing climate risks in order to remain effective over time and fit for purpose for the communities MSF serves.

This means that considerations for a changing climate risk profile (of rapid onset disasters and slow onset disasters) are incorporated into decision-making processes. It is about adopting technologies and practices that are better suited to changing conditions. This may include establishing early warning systems (such as anticipatory action programmes) or incorporating forecasts and other climate services into decision-making to improving disaster preparedness and response protocols. It is about improving the awareness of staff on the links between climate and health, as well as improving understanding of the difference in fundamental terms used in climate science (weather, climate, climate variability, risk). It may involve fostering a more pro-active, anticipatory mindset across the organisation.

A range of types of change were identified. Many of the adaptation suggestions related to **improving climate and environmental risk knowledge**. Either via specific additional assessments on climatic and environmental risks in project locations (hazard risk assessments to health facilities and infrastructure). Or additional operational research on the current and projected burden of climatic hazards and climate-sensitive health outcomes (such as climate-sensitive infectious disease outbreaks). This information can practically be incorporated into tools such as a Mission-specific seasonal emergency calendar (see Figure 2). Seasonal emergency calendars can help Mission staff understand the changing risk landscape throughout the year, helping improve their climate-health knowledge. These calendars can also include timestamps of when different knowledge products (e.g. seasonal forecasts) are released throughout the year, to help planning and decision-making. Briefing packages should include the Climate and Health Glossary that accompanies this scoping study (Annex 1); climate, environment and health risk assessment country profiles (either conducted by MSF or drawn on from other organisations such as the Red Cross Red Crescent Climate Centre and WHO); and seasonal emergency calendars. As new information emerges or conditions change, these resources should be continually updated.

Figure 2. Seasonal Emergency Calendar example for South Sudan (source: MACA). Several seasonal emergency calendars have been developed by the Multi-Agency Anticipatory Action for Health Working Group of the Anticipation Hub, co-lead by the Red Cross Red Crescent Climate Centre, MSF, and UNOCHA. Currently these include: Niger, Mozambique, South Sudan, Somalia, Cox's Bazaar, and Nigeria.



Updates to emergency plans and protocols or the **development of new protocols on anticipatory action** will be needed. The mainstreaming of weather and climate information at different time scales into plans and protocols will be useful when deciding whether and when to implement given protocols. For example, seasonal forecasts can provide information to help Missions anticipate forthcoming health impacts, such an increased malnutrition or greater magnitude of climate-sensitive infectious disease caseloads, and the implications this may have on bed capacity or staffing needs. Whilst the certainty is low, this long lead time can help adjust the timing and scale of existing standard disease prevention campaigns or plan for surge capacity (Moreira et al 2022). Weather forecasts on shorter timescales (3-7 days) can be used to anticipate impacts more precisely (Braman et al 2010). Both seasonal and sub-seasonal information can be combined into multi-trigger anticipatory action protocols. Internal discussions should be held to outline low or no regrets early actions, both to safeguard MSF's operationality as well as ensuring more effective and timely action within communities. Where data is available and partnerships exist, epidemiological/mathematical modelling for climate sensitive infectious disease risk can help develop triggers for anticipatory action (Braman et al 2010; Moreira et al 2022, IFRC & RCCC 2023). Surveillance data will remain relevant for detecting disease trends and can also be used in combination with climate or weather information to develop triggers for anticipatory action. MSF is already piloting this via the Malaria Anticipation Project (MAP) in South Sudan which is currently in the stage of developing the Early Action Protocol (EAP). Once the EAP is developed and validated by the MSF Mission it will be a operational document which clearly defines what early actions should be taken according to which trigger (and threshold indicator) by whom. Guidance from WHO (2021) on the Quality Criteria for the Evaluation of Climate-Informed Early Warning Systems for Infectious Diseases can be used to evaluate MAP or further climate-informed early warning systems for infectious diseases.

Staff will likely need training on updated emergency plans and protocols, and specific roles may need additional training on interpreting climate and weather forecasts. A culture and mindset of anticipation will help strengthen adaptative management approaches as the

likelihood of unprecedented events increase. Staff may face harsher working conditions and should be trained to detect burn out and post-traumatic stress disorder from climate-related stresses and shocks amongst colleagues and communities, with plans in place on how to help people cope.

There may need to be changes in staff working conditions, including additional occupational health safeguards as part of organisational behaviour change. Specifically, adaptation suggestions focused on reducing the health risks associated with increasing hot humid conditions, recommending that plans be in place to reduce physically demanding work during the hottest part of hot days (WHO 2020). Extra plans, contingencies and safeguards will likely need to be written as the climate and environmental risk landscapes change in the locations in which MSF Missions are located.

Investments in new assets will be needed. These investments aim to improve the monitoring of local conditions, provide information on a changing risk landscape, and reduce climatic and environmental risks (e.g. river gauges, rainwater harvesting structures, painting roofs).

Finally, partnerships will be key. It will likely not be possible to carry out all the operational research and applied research needs in house. Partnerships with academics (internationally and within-country), joint research projects with other organisations, and partnerships (where appropriate) with local authorities will be important to ensuring coverage and effectiveness of activities (e.g. vector control activities). Partnerships with climate scientists or specialist service provides may be needed to ensure the provision of targeted and actionable climate information for specific health applications, or to strengthen the validity and reliability of climate-disease monitoring tools and indicators. There may be the need for the establishment of MoUs with National Hydrometeorological agencies, suppliers, and non-traditional actors (architects) for different adaptation activities. It will be critical to ensure the continued dialogue and partnerships with the communities to whom MSF serves. Finally, partnerships will be key for advocacy purposes to raise awareness on neglected issues, or join forces to scale up action on large impending health crises.

Some notable gaps exist in the available guidance retrieved as part of this scoping review. Specific adaptation suggestions for maternal health, mental health, forced migration or camp settings were lacking in the guidance reviewed. It may be that more specific adaptation suggestions exist in papers or reports not included here. Their titles may have lacked the search terms and so fallen outside of the search strategy for this scoping study. For forced migration, there may be need for more investment in ambulatory services to ensure that populations can still access emergency health care. The mental health of populations and staff had only limited mentions. The links between climate change and mental health are largely under-researched (though this is changing) and this lack of guidance may be a result of lack of existing knowledge. As working conditions may become harsher, staff culture may need to be encouraged to adopt healthy coping behaviours, staff may need to receive briefings on identifying burn out in themselves and colleagues. Safeguards for staff occupational health was mentioned in WHO guidance related to developing plans to reduce physically demanding work during the hottest part of hot days. More than this, MSF may need to consider staffing requirements, adapting working hours for shorter shifts and increase frequency of rotation for staff in particularly hot (dry or humid) contexts. Humid heat is known to be a major forthcoming issue, and yet it was

not explicitly mentioned in the adaptation guidance of the reviewed frameworks. Moreover, risks and adaptations needed in urban contexts did not feature (this may be a limitation in the search strategy). Specific consideration will need to be given to gender-based risk and vulnerability assessments and how patient access might be affected under different hazards or in different types of compounding or cascading crises.

It may be possible to draw insights from guidance or case studies existing outside of the humanitarian sector. For example, templates developed in guidance for high income countries such as the Climate Change and Health Vulnerability and Adaptation Assessments: Workbook for the Canadian Health Sector could be amended to fit MSF needs. Health indicators developed by the UK Health and Security Agency (Climate change and public health indicators: a scoping review, UKHSA, 2023) may be useful to review and tailor according to relevance in different MSF Missions.

So, what next for MSF operational adaptation? The results and discussion of this scoping review should be used as a springboard for discussion on operational adaptation within MSF. A prioritisation process on which activities can and should be implemented first will be needed. It may be worth identifying adaptation activities for which cost implications are low and can be implement as quickly as possible. Discussions with HACE colleagues can help identify how best to mainstream the use of weather and climate information. The results of this scoping review as well as the below resources can be fed into larger plans to develop an operational adaptation roadmap (a Climate Action Plan) for the next 1-3 years, with tentative plans for the next 5 years.

- Checklists, assessments and guidance
  - Guide to Climate Smart Programmes (Red Cross Red Crescent Climate Centre & IFRC)
  - WHO Hospital Safety Index
  - WHO Guidance for climate resilient and environmentally sustainable health care facilities (WHO)
  - Checklists to Assess Vulnerabilities in Health Care Facilities in the Context of Climate Change (WHO)
  - Organisational adaptation: Map out necessary changes to your organisation (Humanitarian Innovation Guide, ELRHA)
  - WASH Climate Resilient Development Guidance Note (UNICEF and GWP)
  - Heatwaves and health: guidance on warning system development (WHO-WMO)
  - Using climate to predict infectious disease epidemics (WHO)
  - Quality Criteria for the Evaluation of Climate-Informed Early Warning Systems for Infectious Diseases (WHO 2021)
  - Developing Early Warning Systems: a checklist (UNDRR)
  - Forecast-based Financing Practitioners Manual (Red Cross Red Crescent)
  - PAHO health sector self-assessment tool for disaster risk reduction
  - Pacific Island Action Plan on Climate and Health

        - Alliance for Transformative Action on Climate and Health (ATACH) repository of resources https://www.atachcommunity.com/resources/resource-repository/
    - Data sources:
        - CHIRPS https://www.chc.ucsb.edu/data/chirps Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS) is a 35+ year quasi-global rainfall data set.
        - FAO Geonetwork https://www.fao.org/land-water/databases-and-software/geonetwork/en/
        - World Animal Health Information System WAHIS https://www.woah.org/en/what-we-do/animal-health-and-welfare/disease-data-collection/world-animal-health-information-system/
        - Emergency Prevention System for Animal Health (EMPRES-AH) https://www.fao.org/animal-health/our-programmes/emergency-prevention-system-for-animal-health-(empres-ah)/en
    - Country climate change and health risk assessment profiles
        - Red Cross Red Crescent Climate Centre: Climate Change Impacts on Health and Livelihoods Country Assessments
        - WHO Health and Climate Change Country Profiles

5 Conclusion

Operational adaption is not one single activity, it is a range of changes to decision-making, information use, knowledge, training, investments, partnerships, and a commitment to continually review and update processes and protocols as more evidence becomes available. Operational adaptation is about having a future oriented and pro-active approach to understanding and reducing risks (whether in the health sector, or other critical humanitarian sectors). It is informed with the best available evidence, and importantly includes meaningful community engagement. As new information arises on expected or unexpected climatic or health challenges, there is a responsiveness to include new knowledge and learning to ensure that MSF can cope, adapt to, and transform its systems so they remain fit for purpose for the communities MSF serves.

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Annex 2. Identified literature

Included in analysis

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Moreira et al (2022) Health Interventions for Preventing Climate-Sensitive Diseases: Scoping Review https://link.springer.com/article/10.1007/s11524-022-00631-9

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Not included in this analysis

City Heatwave Guide for RCRC NS https://www.ifrc.org/document/city-heat-wave-guide-red-cross-red-crescent-branches

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Climate change and health vulnerability and adaptation assessments: A knowledge to action resource guide https://www.canada.ca/en/health-canada/services/publications/healthy-living/climate-health-adapt-vulnerability-adaptation-assessments-resource-guide.html

Checklists to Assess Vulnerabilities in Health Care Facilities in the Context of Climate Change
apps.who.int/iris/rest/bitstreams/1341457/retrieve

Guidance, standards, and protocols in the humanitarian sector on reducing harm to the environment
https://assets.publishing.service.gov.uk/media/5d7f6032e5274a20376e1916/653_Guidance_in_the_Humanitarian_Sector_on_Reducing_Harm_to_the_Environment.pdf

Short brief on adaptation in health (quite practical) https://www.fph.org.uk/media/2532/a8-fph-sig-climate-change-adaptation-final.pdf

https://higuide.elrha.org/toolkits/adaptation/organisational-adaptation/

A SPHERE UNPACKED GUIDE Nature-based Solutions for Climate Resilience in Humanitarian Action https://friendsofeba.files.wordpress.com/2023/05/sphere-nbs-23-04-2023-english.pdf

WHO Climate change & Health Toolkit: https://www.who.int/teams/environment-climate-change-and-health/climate-change-and-health/capacity-building/toolkit-on-climate-change-and-health/monitoring

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