MSF and Environmental Health – time for a new approach

Few people have the imagination for reality but ""*Around the year 2030, we will be in a position where we set off an irreversible chain reaction beyond human control that will most likely lead to the end of our civilization as we know it. That is unless in that time, permanent and unprecedented changes in all aspects of society have taken place, including a reduction of CO2 emissions by at least 45%." Greta Thunberg, 23 April 2019*

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2. Executive summary

Climate change is currently on track to have a devastating effect on the environment, on health and is likely to lead to massive displacement. Climate change alone threatens to undermine the past 50 years of gains in public health and is considered "the biggest health threat of the 21st century. The impact of climate change is disproportionately affecting the health of vulnerable populations in low- and middle-income countries.

Dramatic changes to our environment are on the horizon and require that MSF adapts to these new challenges. Environmental health issues can be framed within the broader context of climate change. Over the past decade the WatSan teams in MSF have implemented projects and activities in most major branches listed by WHO as key components of Environmental Health. But to face the future challenges and respond to the profound changes happening, WatSan in MSF needs to be reframed as part of Environmental Health which is a branch of Public Health. This reframing should provide a solid base to guarantee the inclusion of Environmental Health - including the effects of climate change - within the programmatic medical discussions in MSF.

The Lancet Countdown Report showed changes in outbreak patterns. The disease burden linked to the environment is expected to change significantly especially in medium to low income countries which are the settings in which MSF focuses the bulk of its interventions. Heatwave events are increasing and in more than 90% of cities people breathe polluted air that is toxic to their cardiovascular and respiratory health. In 2017 more people were internally displaced by environmental hazards (disasters) than by conflicts.

A fundamental principle for MSF in addition to independence, neutrality and impartiality is the medical ethic of do no-harm. As such the health sector needs to lead by example when it comes limiting its footprint, adjusting its procurement policies and services, hazardous waste management and energy-related choices in order to limit any negative direct impact on human health, the environment and climate.

MSF thinks of itself as a short, to medium term emergency responder while environmental health seems to be about long- term development projects. The reality is that Environmental Health risks and interventions are acutely present in most of the MSF settings. Decide to address environmental health issues adequately at their roots requires a longer-term commitment in some contexts. Choosing solutions based solely on immediate efficacy and speed of deployment is completely short-sighted and inefficient. Very often they need to be at least complemented with an approach that other actors are interested in to take over.

The tendency of working in silos limits the benefits of interdisciplinary collaboration in MSF. The frame of Environmental Health might be a natural catalyser for more interdisciplinary working groups, resulting in more appropriate, holistic and thus higher impact interventions.

MSF is exceptionally well placed to link up with academics and activists to help address the urgent need to document the medical consequences of climate change. Through our action we can obtain a wealth of data that can contribute to research and advocacy and help raise awareness on the unfolding crisis. But MSF is mostly silent on this subject with an advocacy strategy almost exclusively focused on pure medical-treatment approaches and issues. Instead MSF should denounce abuses to the environment, primarily affecting our beneficiaries' health, in the same way as we advocate for new treatment protocols for TB, HIV or Malaria. In order to address the current environmental issues MSF should therefore define clear advocacy objectives with clear and solid health consequences in populations that are high priority for MSF. To be able to speak out on Environmental issues MSF also needs to build more on the knowledge and its links with academic partners (e.g. the lancet initiative).

Finally, the document concludes with a set of recommendations for MSF to implement in the short and longer term.

- Acknowledge that environmental health is a key component of public health
- Develop and adopt an OCB Vision in the face of climate change with support of associative level and partners
- Take a political stand and translate the vision into a Policy for operations
- Integrate an environmental health perspective in all MSF interventions,
- Do no harm to the environment. Look at MSF's responsibility in terms of reducing the operational footprint where possible (HQ, supply, field)
- Learn by doing: MSF should lead by example and therefore learn to apply an Environmental Health lens (vulnerability indicators, affected hotspots, trends, OR, etc.) to better tailor:
    - assessment and/or selection of new innovative catalytic projects by choice
    - adaptation of current interventions
- Speak out!

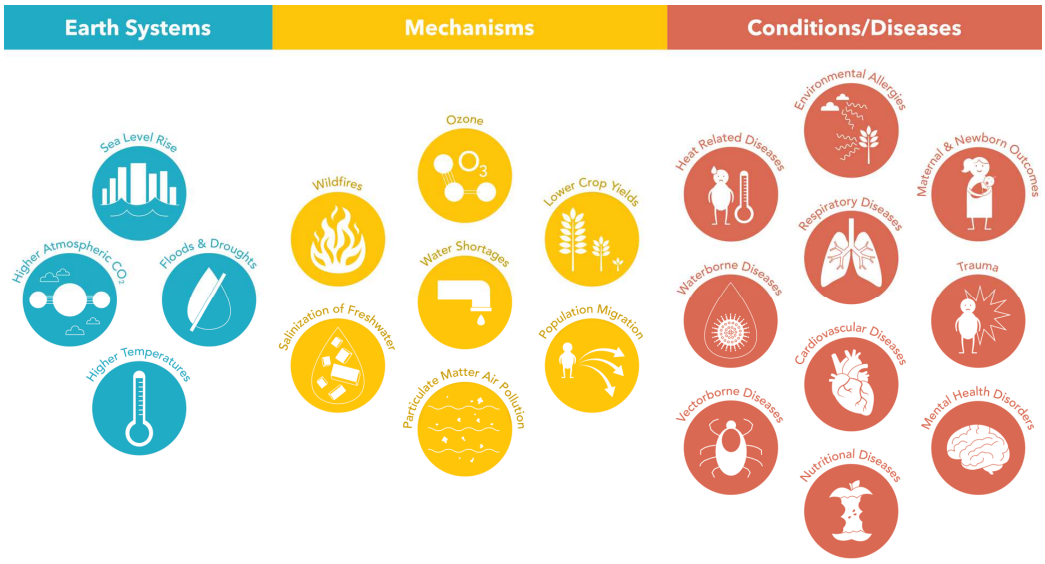
3. The context: dramatic changes to our environment are on the horizon

Climate change[1] is currently on track to have a devastating effect on the environment, on health and is likely to lead to massive displacement. According to the UN Intergovernmental Panel on Climate Change (IPCC) the world has until 2030 to make the drastic but necessary changes if global warming is to be restricted to 1.5°C which means that emissions have to be reduced by 45% before 2030, which is currently not matching reality.[2] Climate change alone threatens to undermine the past 50 years of gains in public health, and is considered "the biggest health threat of the 21st century.[3]

As underlined in the Lancet Countdown report (2018)[4] the impact of climate change is disproportionately affecting the health of vulnerable populations in low-income and middle-income countries. The Climate Change vulnerability hotspots include South East Asia and the Pacific, the Middle East, Sahel, Central Africa and Central America.

While environmental degradation has impacted populations for decades, climate change is considered a threat-multiplier that will drastically affect for the worst already existing challenges. The UN estimates that more than 140 million people in sub-Saharan Africa, Latin America and South Asia will be forced to migrate within national borders by 2050.[5] These massive displacements to 'climate change safe places' will increase competition for resources and will lead to new conflicts.

In their 2018 Global Risks Report the World Economic Forum (a conservative, pro-business organisation) places climate change, including the risk for extreme weather events, and environmental threats in the highest category of likelihood and impact.[6] Extreme weather accounted for 76% of all internal displacements in 2016 (23.5 million people), making it an established risk factor.[7] Air pollution, a result of urbanisation and rapid economic growth is at record levels, with nearly 95% of the world's population now living in areas where air pollution that exceeds WHO guideline limits.[8]



Source: Harvard course on EdX on Health Effects of climate change https://www.edx.org/course/health-effects-of-climate-change

[1] Climate change adaptation is defined by the Intergovernmental Panel on Climate Change as the "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities
[2] IPCC, Special Report: Global Warming of 1.5 °C, October 2018. https://www.ipcc.ch/sr15/
[3] https://www.ucl.ac.uk/news/2015/jun/climate-change-threatens-undermine-last-half-century-health-gains
[4] Watts N. *et al.* (2018) The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come. The Lancet, Vol. 392, Issue 10063,P2479-2514. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32594-7/fulltext
[5] https://www.un.org/press/en/2019/sc13677.doc.htm
[6] The World Economic Forum, "The Global Risks Report 2018" http://reports.weforum.org/global-risks-2018/global-risks-2018-fractures-fears-and-failures/
[7] Internal Displacement Monitoring Centre (IDMC). 2017. *GRID 2017: Global Report on Internal Displacement*. Geneva: IDMC. http://www.internal-displacement.org/global-report/grid2017/
[8] The Health Effects Institute, "State of Global Air: 2018" https://www.stateofglobalair.org/

4. Environmental Health and MSF

Environmental health issues can be framed within the broader context of climate change. Environmental health addresses all the physical, chemical, and biological factors external to a person, and all the related factors that can potentially affect health. It is targeted towards preventing disease and creating health-supportive environments.[9]

Over the past years the WatSan teams in MSF have implemented projects and activities in most major, and interconnected, branches listed by WHO as key components of Environmental Health: providing adequate water and sanitation, preventing exposure to chemical and biological agents (hazardous pharma and lab waste management), air pollution (TB projects), radiation (UV use for TB infection control projects), reducing the risks of poorly developed environments (prison or urban slum projects), limiting agricultural use (insecticide resistance build-up mitigation), alleviating the effects of climate change (safe potable water in malnutrition, floods-droughts). The list of projects is extensive and some examples of current and past EH activities by MSF can be found in the Annex.

5. From WatSan to Environmental Health

As a result of the profound changes happening in the contexts we work in, and to really face the very near future challenges ahead, the WatSan WG proposes to reframe WatSan as part of Environmental Health which is a branch of Public Health. This reframing was implemented in May 2018 in OCB and should provide a solid base to finally[10] guarantee the inclusion of Environmental Health (EH) - including the effects of climate change - within the programmatic medical discussions in MSF.

5.1. Adapting to new challenges

a) **Changes in the disease burden linked to the environment.** According to recent statistics from WHO 23% of global mortality is linked to the environment, this translates to 12.6 million deaths a year. Most of these people are either children or elderly (older than 50 years old) living in medium to low income countries[11] in challenging environmental settings with indoor air pollution, inadequate or poor quality of water, poor sanitation and hygiene and/or exposed to toxic substances. These are the settings in which MSF focuses the bulk of its interventions.

Box 1: chemical water pollution adding to the biological water quality: where previously the biological water quality was often the main issue in health structures (e.g. acute pseudomonas infection in 2016 in Tabarre Hospital - Haiti) or in communities (e.g. typhoid fever outbreak in 2011 in Kikwit town – RDC [12]) there now is also the chemical water quality concern in many low income countries. The water previously used in the MSF Pakistan guesthouse (2015) had levels above the WHO recommendations for Boron, Fluor and Chrome which might develop respectively into testicular lesions, fluorosis and cancer after long term exposure. Ongoing OR within MSF links the higher burden of certain cations in the drinking water to longer length of stay of children in therapeutic feeding centers. Additionally the resistance to antibiotic, antifungal, antiviral and anti-parasitic drugs represents a critical, healthcare issue and represents as well a growing concern for the management of potable and waste water in the MSF health structures.

[9] The WHO defines Environmental Health activities as those that encompass the assessment and control of the environmental factors (physical, chemical and biological factors external to a person) that can potentially affect health. Environmental Health aims towards preventing disease and creating health-supportive environments. This definition excludes behaviour not related to environment, as well as behaviour related to the social and cultural environment, and genetics. http://www.searo.who.int/topics/environmental_health/en/.

[10] The Lancet editorial, 2008 (Keeping Sanitation in the international spotlight) castigated today's medical community for absolving itself of responsibility and underlined that "the shamefully weak presence of the health sector in advocating for improved access to water and sanitation is incomprehensible and completely short-sighted"

[11] https://www.who.int/phe/infographics/environmental-impacts-on-health/en/

[12] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6188896/

b) **Changes in outbreak patterns:** Last year's Lancet Countdown Report an interdisciplinary collaboration of 27 academic institutions and inter-governmental organizations which tracks progress on Climate Change and health through the monitoring of 41 indicators, showed that the global vectorial capacity for the dengue fever virus transmission was the highest on record in 2016, rising to 9.1% for Aedes aegypti and 11.1% for Aedes albopictus (above the 1950s baseline). The same year, the sub-Saharan Africa highlands saw a 27.6% rise in vectorial capacity for malaria transmission from the same baseline, and the Baltic region had a 24% increase in the coastline area suitable for epidemics of Vibrio cholera. Globally since 1990, about 157 million more people are exposed to heatwave events in 2017 compared with 2000. People in more than 90% of cities breathe polluted air that is toxic to their cardiovascular and respiratory health, with air pollution concentrations that have worsened in past years in nearly 70% of cities around the globe, particularly affecting low-income and middle-income countries[13,] where MSF is mostly active.

   In relation to vector control, it is important to note that according to WHO estimates, 80% of the world's population is at risk from at least one vector-borne disease like malaria, dengue, leishmaniasis or chagas disease. According to a recent study[14] forecasting the impacts of climate change on Aedes-borne viruses—especially dengue, chikungunya, and Zika, nearly one billion more people around the world within the next century are threatened with new exposure to these mosquito-transmitted diseases.

c) **Extreme weather events**: Severe drought in 2018 affected hundreds of thousands of people, from Central Asia to Central America, from the Sahel to North Korea. In Somalia, food shortages from drought and floods combined with conflict to force people from their homes. In Afghanistan, drought displaced nearly as many people as conflict in 2018, and the worst impacts may be yet to come. In 2017, the numbers of those internally displaced by environmental hazards (disasters) are much higher (18.8 million) than those displaced by conflicts (11.8 million)[15.] Yet, they are not yet properly recognized as Climate Change refugees or IDPs.

Box 2: Stronger, more intense floods and climate events. The current Mozambique, Malawi and Zimbabwe flooding is said to be the worst ever to strike the southern hemisphere, according to the UN. In Kenya, Baringo, MSF is faced with a snake bite outbreak linked to an extreme heat wave resulting in snakes entering houses. This leaves MSF scrambling to define preventative snakebite measures as currently the main MSF operational tool is focused on anti-venom use, once people have been bitten.

5.2. MSF's impact on the environment

Are we polluting the environment? A fundamental principle for MSF in addition to independence, neutrality and impartiality is the medical ethic of do no-harm. That promise is at the very core of the Hippocratic Oath. As such it is unacceptable that through lack of investment in time and energy or fear of change, MSF operations should have a preventable negative impact on the environment.

MSF must start being more aware of the environmental impacts of its operations, and its own foot print. The health sector needs to lead by example when it comes to procurement policies and services, hazardous waste management and energy-related choices in order to limit any negative direct impact on human health, the environment and climate. Does it make sense to keep using solutions that further stress global warming when more adapted/efficient solutions are available at a similar price? Can MSF not embrace the challenge and move from "Quick and Dirty" to "Quick and Clean"?

13 Ibid.
14 Ryan SJ, Carlson CJ, Mordecai EA, Johnson LR (2019) Global expansion and redistribution of Aedes-borne virus transmission risk with climate change. PLoS Negl Trop Dis 13(3): e0007213. https://doi.org/10.1371/journal.pntd.0007213
15 IDMC, Global report on Internal Displacement, 2018 : http://www.internal-displacement.org/global-report/grid2018/

Box 3: Hazardous waste: pouring hazardous liquid lab/diagnostic testing waste down the sink is still a reality in MSF, Eco-San solutions (VIP latrines) that drastically reduce water needs and waste water production compared to flush latrines are becoming rare in MSF hospitals, about 90 % of MSF hospitals (>100 beds) in low income countries are still using pre-treatment by septic tank as final treatment while at times innovative and effective treatment systems are required (e.g. when the overflow of the septic tank ends up in an open gutter meandering through towns).[16] Solid Hazardous waste from isolation areas within the health facilities or expired drugs or insecticides are not always properly managed either.

The lack of local legislations, the large range and mixes of chemicals used and the difficulty to safely dispose of medical waste in the setting where we work have been the main excuse to neglect a proper management of hazardous waste. This mismanagement can cause pollution of the environment, endanger human health and further stress the local environment. The WatSan and Pharmaceutical working group have jointly published the hazardous waste tool to minimize environmental pollution derived from this mismanagement. Currently, a similar tool is under development by the Watsan and Lab working groups for laboratory waste - solutions are available or are being developed.

5.3. Long-term; short-term

Why do we tend to think of environmental health programs as long term interventions only? MSF thinks of itself as a short, to medium term emergency responder while environmental health seems to be about sustainability and long-term development projects.

The reality is that Environmental Health risks and interventions are acutely present in most of the MSF settings and choosing solutions in emergency settings based solely on immediate efficacy and speed of deployment (e.g. water trucking) is completely short-sighted and inefficient. Very often it needs to be at least complemented with an approach that other actors are interested in to take over (e.g. groundwater equipped with hand pumps). If we want to address environmental health issues adequately at their roots with complementary approaches to the emergency approach it would require a longer-term commitment (minimum 5 years). This would include preventive elements into our response, making a greater impact. This would be more cost effective than symptom management alone, but takes time to have an effect.

Box 4: Bending the cholera curve: MSF is present in contexts where recurrent cholera outbreaks happen time and time again in the same location. Instead of mobilising and re-mobilising an emergency response MSF implemented in Cyangugu, Rwanda in 1999 a 5 year and 1.100.000 euro successful longer-term project with more fundamental Environmental Health measures (integrated improvement of existing water sources, hygiene promotion campaign).[17] A similar approach was implemented in Harare Zimbabwe and will now start in in 2019 in Capo Delgado, Mozambique.

5.4. Environmental health: a gateway towards breaking the technical silos within MSF?

Even though the tendency of working in silos and limiting the benefits of interdisciplinary discussions and communication between experts is internally criticised in MSF this does not mean we always walk the talk. The frame of Environmental Health might be a natural catalyser for more interdisciplinary working groups, resulting in more appropriate, holistic and thus higher impact interventions.

Box 5: **interdisciplinary malaria interventions**: the control of malaria entails not only the use of effective drugs for treatment, mosquito nets distribution or the application of indoor spraying of insecticides. Currently most sections involve medical entomology experts to assess the presence of insecticide resistance and to look at mosquito behaviour

[16] Arbaoui et al., Hospital wastewater treatment in humanitarian contexts: an appraisal in Port-au-Prince, Haiti (in process to be submitted)
[17] http://hwts.web.unc.edu/files/2014/08/2012Marseille_T137_05_Maes.pdf

(biting pattern, breeding sites characteristics) to be able to propose complementary vector control activities that are aligned with the specific environment.

In Burundi 2018 , MSF launched a major Indoor Residual Spraying campaign for a population of 160.000 in the Ryansoro commune. The next malaria season the medical infrastructures, usually overflowing with malaria patients, were virtually empty this time. With the support of a health economist the cost effectiveness of this intervention will be studied and compared to the traditional MSF patient centred only approach. Health Promotion experts - increasingly used in MSF to study and improve approaches towards community mobilisation - linked up with anthropologists to make sure the community collaborates in building the bridge towards more culturally relevant context-specific activities focused on the actual needs of the population.

There is increasing research linking climate change and mental health arguing that increasing extreme weather events can trigger post-traumatic stress disorder (PTSD), major depressive disorder (MDD), anxiety, depression, complicated grief, ... In fact, climate change is said to augment inequalities and leaving the most marginalized populations, which are often the communities already affected by mental health disorders even more vulnerable.[18]

Box 6: Mental Health and WatSan: during the 2011 mental health intervention after the earthquake in Port au Prince, Haiti , the consultations took place in comfort zones with adequate water supply, latrines and washing stations so that people had the opportunity to clean themselves and their clothes. During consultations people's opinion was asked on priorities for action and the feedback from those discussions was instrumental in orienting the direction of the MSF interventions.

Similar associations can be made between Environmental Health and other key MSF domains of intervention (e.g. malnutrition, TB …)

5.5. Speaking out on environmental health

Environmental Health (and previously, WatSan) is not seen as a driver for advocacy in its own right in MSF and has often remained limited to stereotyped images of jerrycans being distributed to smiling, helpless beneficiaries as part of a fund raising effort. As a consequence, opportunities for prompt communication, témoignage, and advocacy, all a core part of MSF identity, on topics involving Environmental Health are lost.

MSF is exceptionally well placed to link up with academics and activists to help address the urgent need to document the medical consequences of climate change. There is a need to properly document the health indicators, social needs, reasons behind population movements, and collect the narratives when population are pushed to migrate due to environmental degradation or loss of land as a proxy of climate change.

As a field-based organization, we witness first-hand what populations are facing. Through our action, there's a wealth of data we sit on or could produce that can contribute to research and advocacy. As a key global health actor there is an expectation that the power of our voice will be used to help raise awareness on the unfolding crisis.

But MSF is mostly silent on this subject with an advocacy strategy almost exclusively focused on pure medical-treatment approaches and issues. MSF should denounce abuses to the environment, primarily affecting our beneficiaries' health, in the same way as we advocate for new treatment protocols for TB, HIV or Malaria where MSF collects clinical trials evidence, testimonies, and builds operational legitimacy to speak out.

In order to address the current environmental issues MSF should therefore define clear advocacy objectives with clear and solid health consequences in populations that are high priority for MSF. Define what we want to say to whom, and

[18] Hayes et al. Climate Change and mental health: risks, impacts and priority actions. Int. Journal Ment. Health Syst (2018); 12;28.

document the required data in a few key projects. This work requires information collection and a comprehensive advocacy strategy in order to include environmental health as a potential catalytic component in our projects and provide MSF with leverage to influence policies and agendas. To be able to speak out on Environmental issues MSF also needs to build more on the knowledge and its links with academic partners (e.g. the lancet initiative).

Box 7: Advocacy/ témoignage: For instance, in the 2014 Libyan civil war, insecticides (neurotoxins) were used to poison water wells to push the population away, water supply to medical infrastructures was cut off completely pushing MSF to use the condensation water from air conditioners blowing full speed with open windows while MSF remained silent. In 2012 however, MSF spoke out and intervened in the lead poisoning crisis in Zamfara state in Northern Nigeria in an outcry against extractive industries.[19] Even as far back as 1999 MSF was active in Environmental Health advocacy on the Aral Sea human disaster.[20] Unfortunately these are only two exceptions to the rule when environmental abuse is diagnosed.

5.6. Recommendations

MSF should:

- **Acknowledge that environmental health is a key component of public health:** Medical Humanitarian action is directly linked to the environment; if the environment is compromised; health is compromised, which is MSF focus. It would be coherent to look into Environmental Health as one of the pillars for MSF operations even if this means further developing specific know-how internally and through collaboration with external partners? Like WHO, MSF should consider environmental health a key component of public health as well as an issue of humanitarian concern, to fall within the remit of a medical humanitarian organisation's scope of intervention

- **Review its global strategy in the face of climate change:** What is the role and vision of a medical humanitarian organization in the face of this foreseeable global scenario of decreasing Environmental Health including climate change? What are the partnerships we should engage into to join forces and amplify our impact, action and voicing? An institutional transversal policy on MSF's position, adaptation and mitigation plans regarding Environmental Health including Climate Change should be adopted at movement associative level.

- **Integrate an environmental health perspective on all MSF interventions:** MSF should aim to integrate in its emergency responses and current running projects an Environmental Health lens, and adapts those interventions accordingly. Take a political stand and translate the vision into a Policy for operations. Some questions that should be addressed: What are the areas where we want to invest our expertise and capacities? How should we adapt our current or future interventions to better match the impact and localization of Environmental Health impacts? How do we better integrate Environmental Health into our internal but also external narrative? Should MSF review its environmental health activities with a view of expanding its remit, with for example:
  - Occupational health (primary and secondary extractive or oil industries) and industrial hygiene.
  - Environmental health emergencies, such as large-scale industrial accidents and toxic exposures[21]
  - Climate change and its effects on health, particularly malnutrition[22,] vector[23] and water borne diseases, extreme weather events, water security, displacement, urbanization …

- **Do no harm to the environment:** MSF must do no harm and be more aware of the environmental footprint of its operations. MSF should list the potential problems and projects to be targeted, make sure guidance is made available and follow-up that these issues are remedied.

19 https://www.msf.org/lead-poisoning-crisis-zamfara-state-northern-nigeria
20 https://www.msf.org/aral-sea-wheres-beach
21 https://www.msf.org/lead-poisoning-crisis-zamfara-state-northern-nigeria
22 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0050982
23 https://www.msf.org/sites/msf.org/files/tim_vec_int_prevent_malaria_ep.pdf

- **Learn by doing**: MSF should lead by example and therefore learn. Same as MSF did with the HIV/AIDS crisis, MSF should have a limited number (2-4 in OCB) of innovative catalytic projects by choice - of minimum 5 years - addressing environmental health issues in the 2020-2023 SP cycle. They can be stand-alone vertical health oriented projects or be integrated in existing projects. The interventions should target affected vulnerable / marginalised populations with significant and chronic environmental health needs that MSF can impact on; where the local health system response is unlikely to address those needs; and preferably in places already identified as being under the thread of climate change. An OR component should be integrated in these projects.

  The development of an environmental and vulnerability index could help MSF in prioritizing where to assess hazards and possibly respond based on robust indicators. In addition to providing symptom management and treatment to reverse the effects in populations exposed to environmental health hazards (including treatment of poisoning), MSF should develop (secondary) preventative interventions to avoid (re-)exposure.

  This means MSF must improve its risk analysis, acknowledging the fact that Environmental Health issues, including Climate Change, amplifies existing issues and alters some disaster and crisis patterns, usage of Environmental Health vulnerability and hotspot indicators, etc. need to be better integrated in our operational approaches

- **Speak out!** And last but not least, MSF should speak out. Whenever possible, MSF should attempt to document the health consequences of broader structural issues including climate change, and to use our voice within civil society and more broadly to drive system level positive change.

ANNEX: WHO definition of Environmental Health (EH) and some EH activities in MSF.

Inadequate water and sanitation:

- Water supply for outbreak control (e.g. typhoid fever and cholera in Harare, Zimbabwe; 2017).-OCB
- Waste water management (e.g. proposal for Okpoko, Nigeria slum context; 2017)-OCB
- Excreta & waste water disposal (e.g. Rotating Biological Contactor in Tabare hospital in Haiti2017; Kenema Hospital in Sierra Leone, 2019;)-OCB
- Human remains management (e.g. cremation site management in Monrovia, Liberia; 2014)-OCB
- Biosafety in health care settings (e.g. Ebola outbreak management in Bikoro, RDC; 2018)- OCB
- Menstrual Hygiene management-OCB
- Wastewater management (e.g. evapotranspiration zones in Sudan, 2017; Niger, 2019) – OCBA
- Wastewater management (e.g. anaerobic filter + infiltration Haiti,2012; Kenya 2018)- OCG
- Wastewater management (e.g. Kit prototype of anaerobic filter + intermittent aerobic filter South Sudan 2017) OCG
- Water treatment (e.g. Chlorine production with electrolyze, Yemen 2018) OCG
- Water treatment (e.g. nitrate pollution: concentration follow up, Kyrgyzstan 2014) OCG
- Water treatment (e.g. Household water treatment on nutrition program Chad 2013) OCG
- Water treatment (e.g. Reverse Osmosis for dialyses machine Kirkuk Iraq 2010) OCG
- Water supply to camp (e.g. long-distance supply to camp on non-productive aquifer, Minawao 2016) OCG
- Targeted hygiene improvement: water/hygiene practices & soap (e.g. hepatitis E, Minakaman, SSoudan, 2014, Rann, Nigeria 2017) OCG

Air Pollution:

- Air quality management (e.g. New Dheli, India air pollution issue, 2016) - OCB
- Use of UVGI lights/ceiling fans for TB project in Dnepro, Ukraine; 2017)-OCB
- Making pellets as alternative cooking fuel to reduce women risk to violence and air pollution inside households in Pulka, Nigeria; 2018-OCBA
- Air borne infection control (e.g. use of UVGI lights/ceiling fans for TB project in Osh, Kyrgystan; 2014) OCG
- Air borne infection control (e.g. use of controlled mechanical ventilation for TB lab in Swaziland; 2009) OCG
- Use of solar driven wind turbines ("Whirly Birds") for TB project in Malawi 2018-19) - OCB

Chemicals:

- Toxic chemical exposure (e.g. disinfection of patients chemical weapons , Syria conflict; 2017) - OCB, OCG
- Hazardous Waste management (e.g. Viral Load waste in Tete and Beira, Mozambique; 2017)-OCB
- Hazardous Waste Management (e.g. Viral Load and Lab waste in Nsanje, Malawi; 2018) - OCB
- Hazardous Waste management (e.g. Viral Load waste+ cytotoxic waste Mozambique, Swaziland, Myanmar 2017) OCG
- Hazardous Waste management (e.g. Medical waste shredder sterilizer context where incineration is forbidden by local regulation, Iraq 2019/2020) OCG

Radiation:

- Sadam Hussain precision bombing Iraq with depleted uranium (Baghdad, 2003)-OCB

Occupational Risk

- Nigeria Gold mining water and soil contamination -OCB
- Contaminated site remediation (e.g. lead poisoning Zamfara state, northern Nigeria.; 2013)-OCB
- Industrial pollution heavy metals (e.g. Kadamjay Kyrgystan outsourced to external toxicologist by operation cell) OCG

Build environments:

- Land use planning and response (e.g. Amptouri Rohingyas refugee camp Bangladesh; 2018)-OCB
- Hospital construction (Tabarre, Haiti)-OCB
- Housing of vulnerable populations (e.g. EH for the prison population in Nsanje, Malawi; 2017)-OCB
- Hospital construction (Agok, South Sudan)-OCG

Climate change: with current focus on Vector Control exacerbated by Climate Change

- Cholera prevention in Zimbabwe (Harare) by groundwater provision and hygiene promotion, 2018, OCB.
- Cholera prevention following extreme weather event in Beira, Mozambique. 2019-OCB
- Vector control (e.g. malaria IRS in Ryansoro district, Burundi for 160,000 persons; 2018)-OCB
- New tools on vector control (Attractive Toxic Sugar Baits in South Kivu, DRC) – OCBA
- Vector control in displaced populations (entomological / epidemiological surveillance, PBO net distribution, Tanzania- 2016- 2019) OCG
- Vector Control, Arboviruses recurrent outbreaks in urban area (dengue, Cap verde 2012, Leogane haiti, 2013, dengue/chikungunya/zika, Tegucigalpa, Honduras 2017, 2018, 2018, dengue/rift valley, Kenya eastern coast. 2018-