Climate Change and Child Health

Re-imagining the Package of Care for Children Subgroup
November 10, 2022

Co-Chairs:
Cara Endyke Doran, cendykedoran@globalcommunities.org
Raoul Bermejo, rbermejo@unicef.org

Series Objectives

- Building from the Task Force-hosted panel discussion in May 2022, dive deeply into the child health & climate change
- Raise awareness of the child health-specific health and climate change intersections
- Inform actionable regional guidance, share advocacy/fundraising efforts, and shape global standards and definitions
- Build consensus on ways forward and monitoring
- Build capacity of Task Force members to inform climate adaptations to health plans and programs through sharing programmatic learnings

Series Overview

Session 1: Framing the series

- Provide an overview of the Healthy Environments for Healthy Children Framework
- Share highlights from UNICEF heatwaves report
- Review effects on health effects of heatwaves/heat stress on children
- Present an example an intervention addressing health

Session 2: Children's Climate Risk Index (early December)

Future sessions:

- Discuss child-specific health and climate change intersections

Presenters

Abheet Solomon
Global Programme Lead
Healthy Environments for Healthy Children
UNICEF

Nicholas Rees
East Asia and Pacific Programme Manager
Climate and Environment
UNICEF

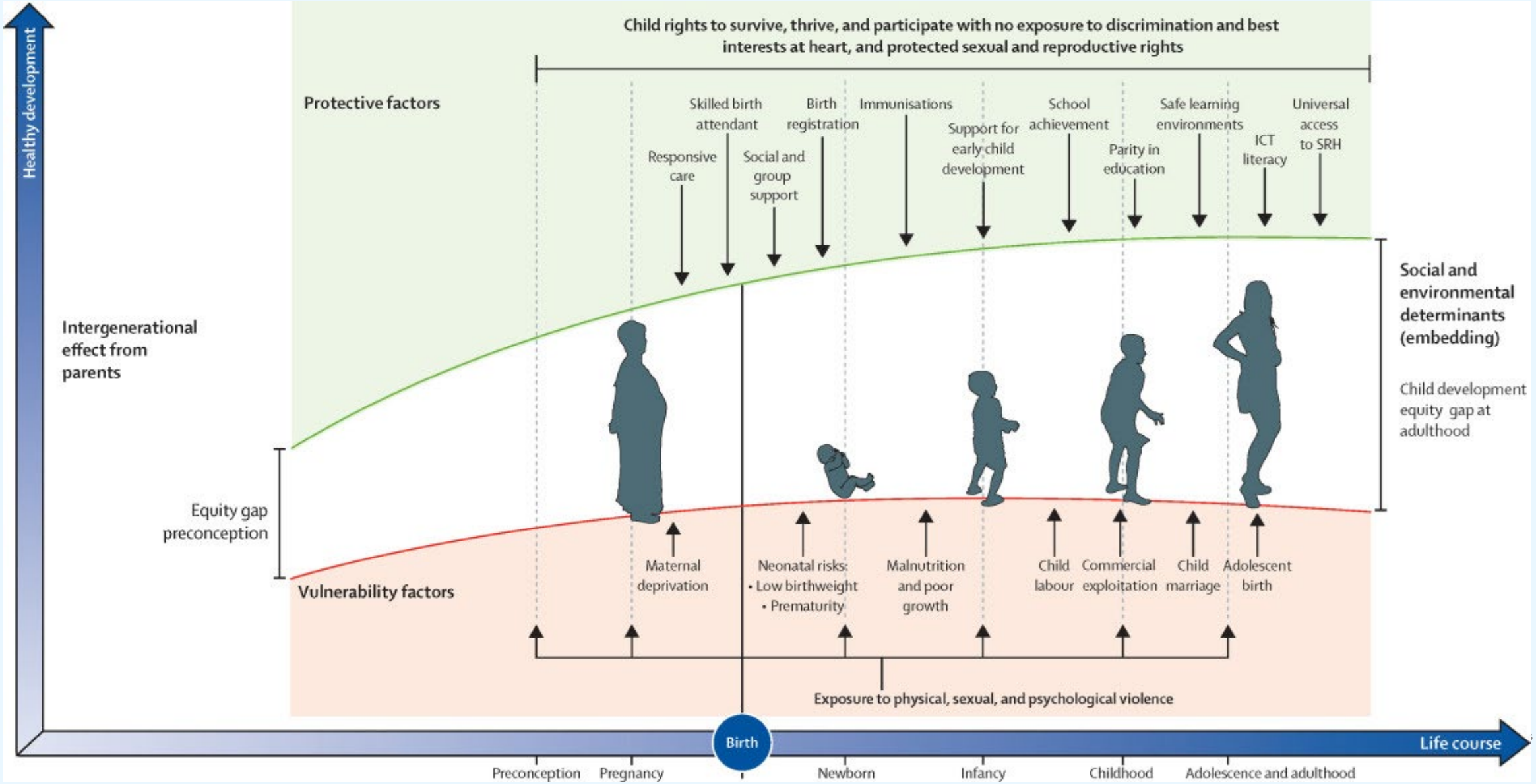
Dr. Lisa Patel
Assistant Clinical Professor of Pediatrics
Stanford School of Medicine
American Academy of Pediatrics Council on Environmental Health and Climate Change

Sari Kovats
Associate Professor in Environment and Health
London School of Hygiene and Tropical Medicine

Healthy Environments for Healthy Children

Abheet Solomon I Global Lead, Healthy Environments for Healthy Children
UNICEF HQ, New York

The global landscape for child health is changing – we need to change our response with it



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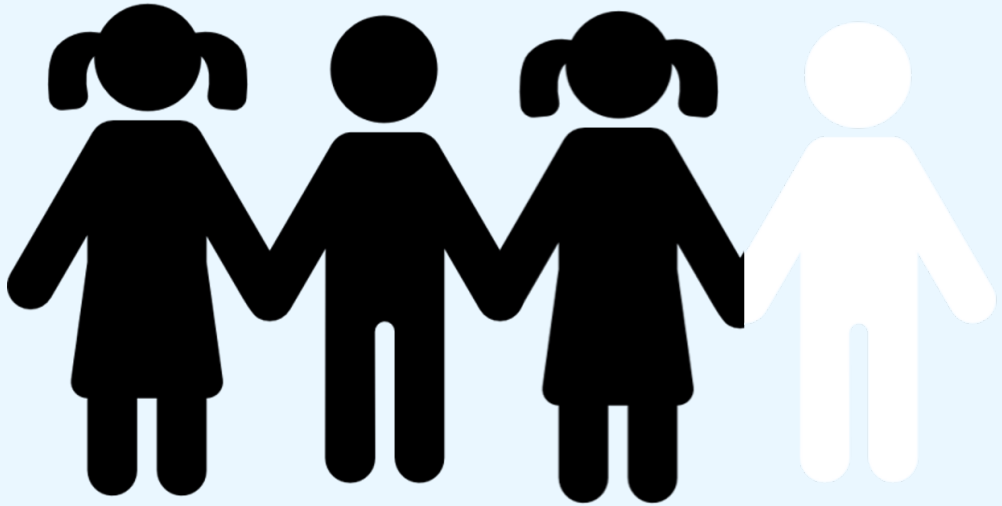
Child survival, health and well-being is under threat

Over **1 in 4** children under the age of 5 are dying from environmental risks



Healthy Environments for Healthy Children

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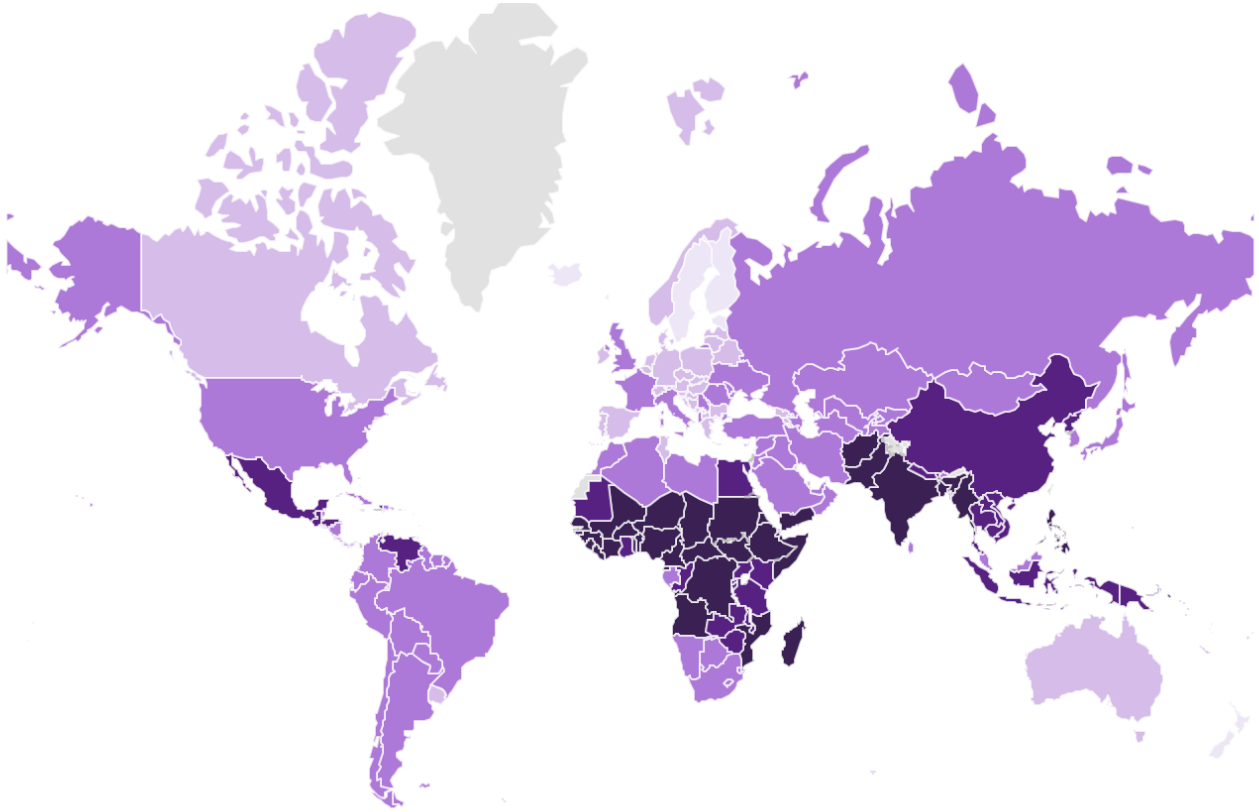
Approximately **1 billion children** (nearly half of the world's children) live in extremely high-risk countries

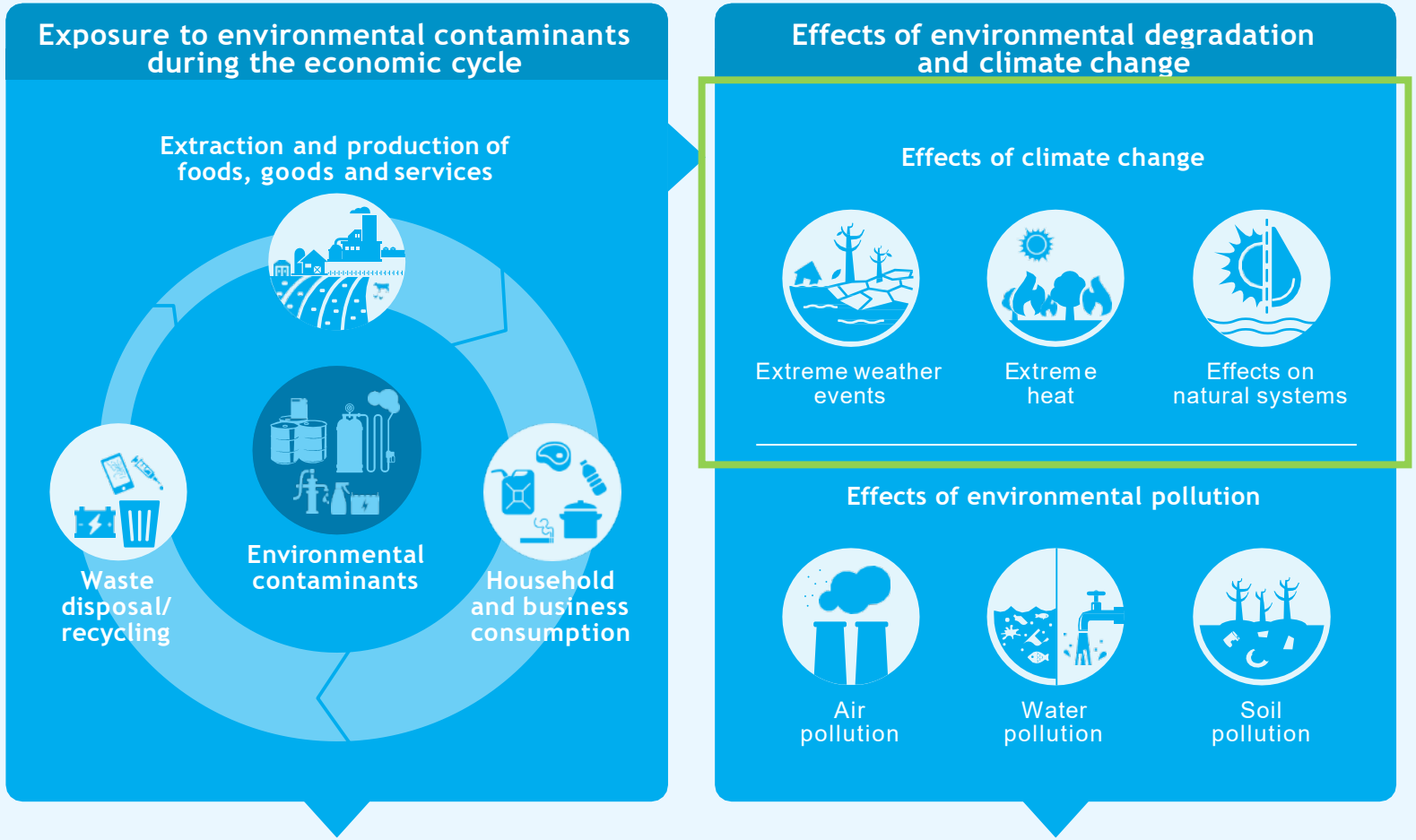


Extremely High | High | Medium-High | Low-Medium | Low | No data

This map does not reflect a position by UNICEF on the legal status of any country or territory or the delimitation of any frontiers.

Note: The CCRI is composed of many indicators across climate and environmental hazards, shocks and stresses, as well as child vulnerability.

Source: UNICEF (2021), The Climate Crisis is a Child Rights Crisis: Introducing the Children's Climate Risk Index



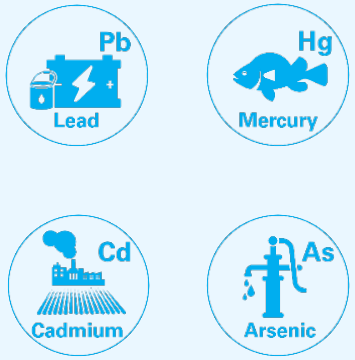
Our economic system is driving climate change and environmental degradation

Five categories of environmental hazards

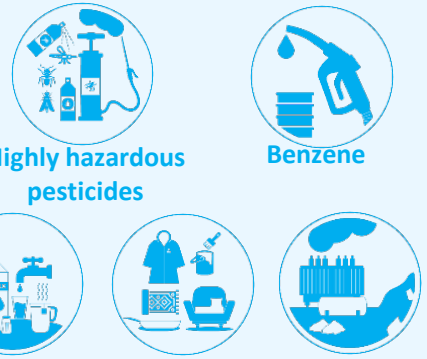
Primary Health Care responsive to environmental hazards

Climate Change

Toxic Metals



Toxic Chemicals



Highly hazardous pesticides

Benzene

Excess Fluoride

Additional chemicals in consumer products

Dioxins and dioxin-like substances (incl. PCBs)

Hazardous Waste

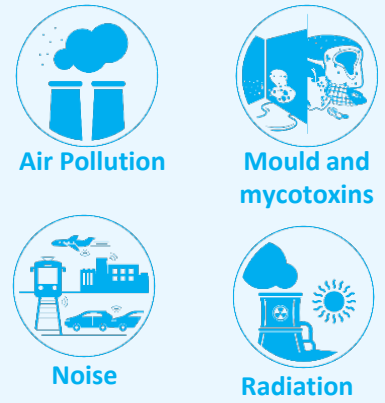
Landfills and household waste

E-waste

Medical waste

Conflict related contamination

Environmental Risks



Air Pollution

Mould and mycotoxins

Noise

Radiation

Climate Change Adaptation:
The urgency to strengthen primary health care and adapt

EXTREME WEATHER
Increased, frequency, intensity and uncertainty of extreme weather events

Floods, Cyclones, and Droughts

- Injury, death and disability
- Malnutrition, developmental delays, and mental health
- Disruption in access to essential health services, including due to migration and internal displacement

EXTREME HEAT
Increased numbers of warm days and nights; Increase in frequency and intensity of heatwaves; Increased fire risk in low rainfall conditions

Heatwaves and Wildfires

- Increased risk of preterm birth and stillbirth and adverse/abnormal outcomes for maternal and newborn health
- Health related disorders including dehydration, heat rash, heat cramps, heat oedema, heat syncope, heat exhaustion and heat stroke

EFFECTS ON NATURAL SYSTEMS
Higher temperatures and humidity, changing and increasingly variable precipitation, higher sea surface and freshwater temperatures, sea-level rise, salinization, and coral bleaching

Vector-Born and Zoonotic Diseases, Ozone and UV Radiation Exposure

- Influenced by the two effects above
- Projected to increase; will pose a heavy health burden on children
- Ground-level ozone (a key component of smog) is associated with diminished lung function, increased hospital admissions and emergency department visits for asthma, and increases in premature deaths
- Children with existing pollen allergies may have increased risk for acute respiratory effects

Healthy Environments for Healthy Children Framework

1 Pollution and health

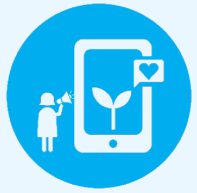
2 **Climate adaptation for health**

3 Climate-resilient and environmentally sustainable healthcare facilities

Strengthen climate-resilience and environmental sustainability in healthcare facilities

Develop responsive primary health care

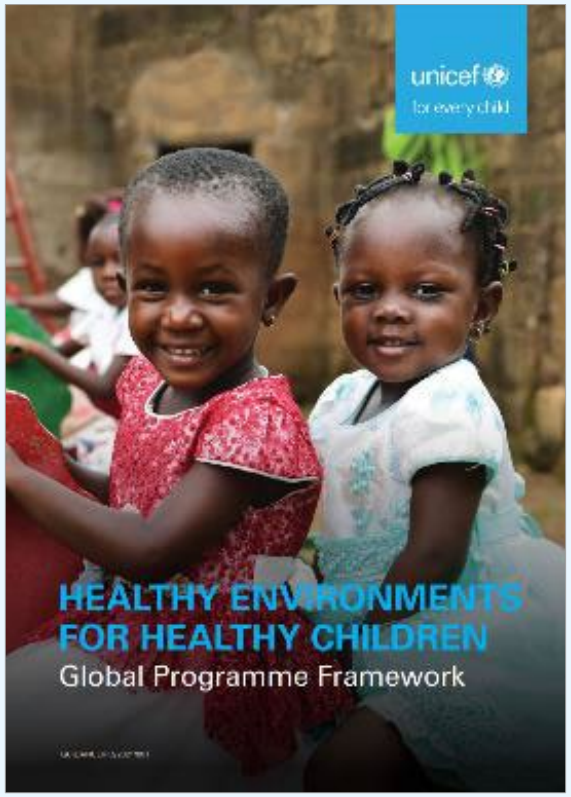
Embed environmental health in school programmes



Promote climate and environmental action with children, adolescents and young people

Mobilize collective action

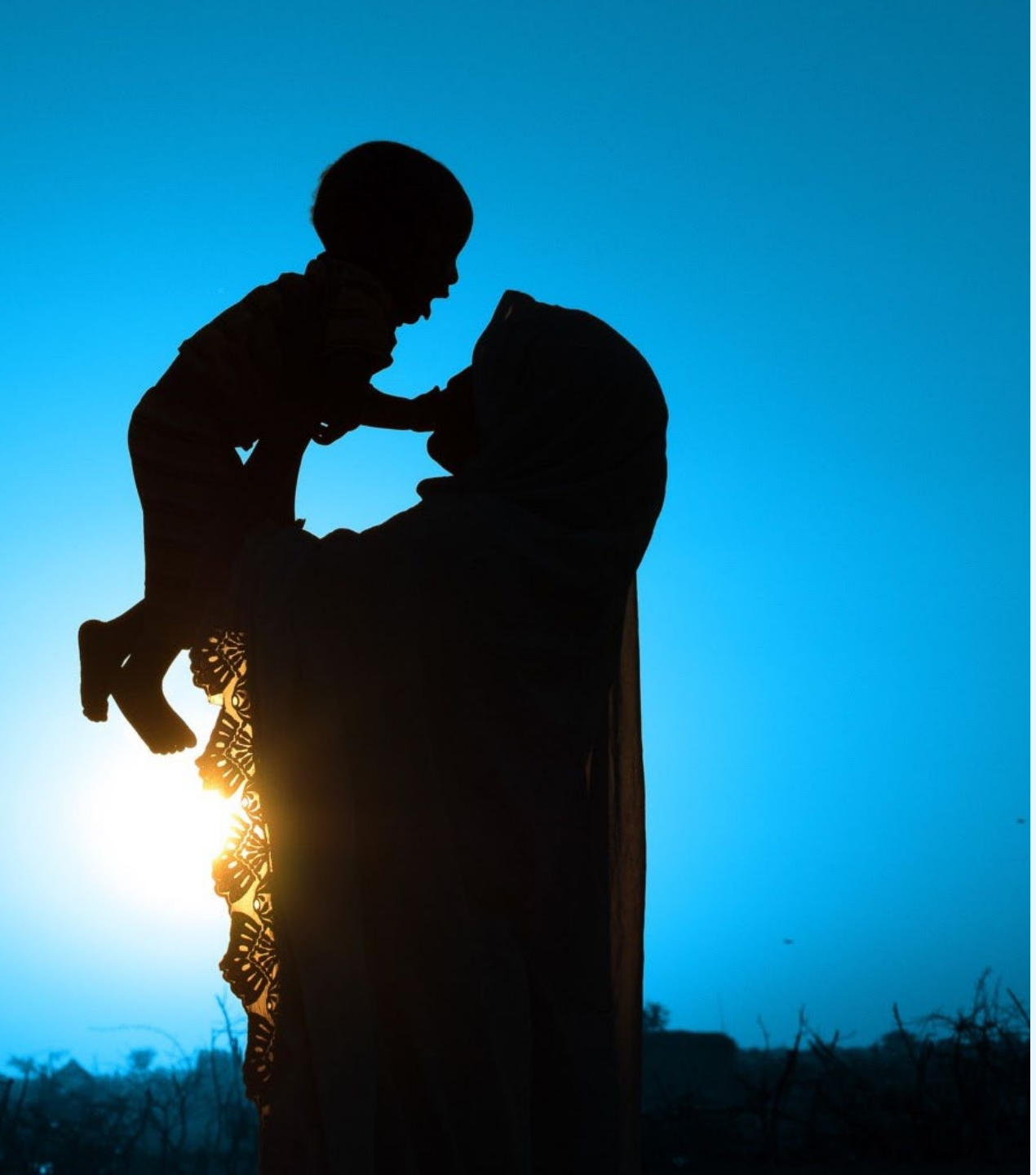
Global Assets to Advocate for Healthy Environments for Healthy Children



Key Messages

YouTube Playlist

HEHC Framework



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What we need…

- **Ambitious national targets** to mitigate environmental degradation and climate change, and institute protections for children from impacts already occurring.
- **Adequate funding** to prepare and equip health systems to monitor and respond to children's environmental health issues.
- **Primary health care** (facility, community, multisectoral) that can take on these challenges
- Capacity development of health workforce to **adapt skillsets and encourage adaptive preparedness efforts**, including ability to work multi-sectorally and public-private to address the determinants of health
- **Adoption and enforcement** public health, environmental, climate and labor **laws** to protect children from environmental degradation and climate change

Healthy Environments for Healthy Children


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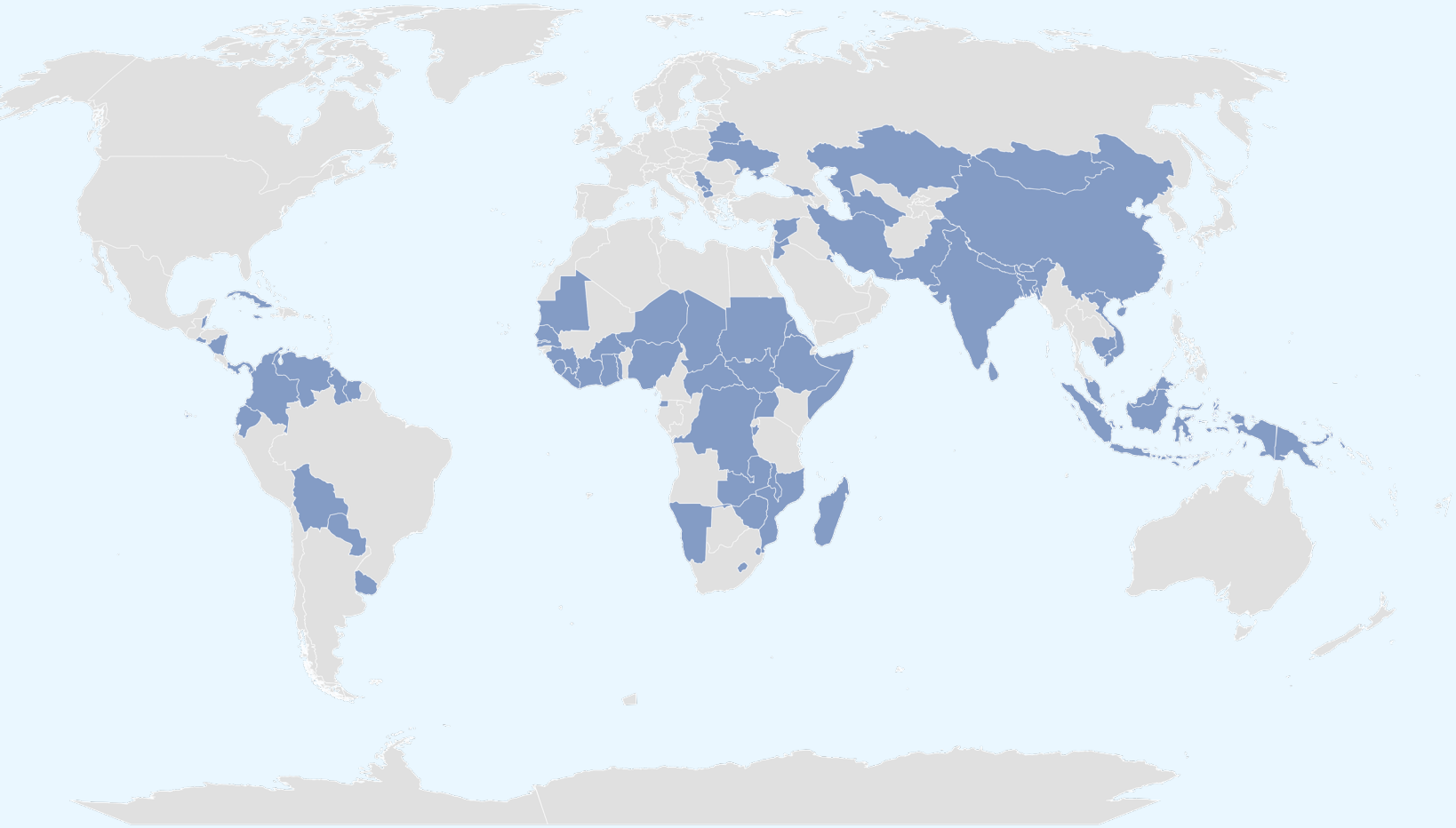
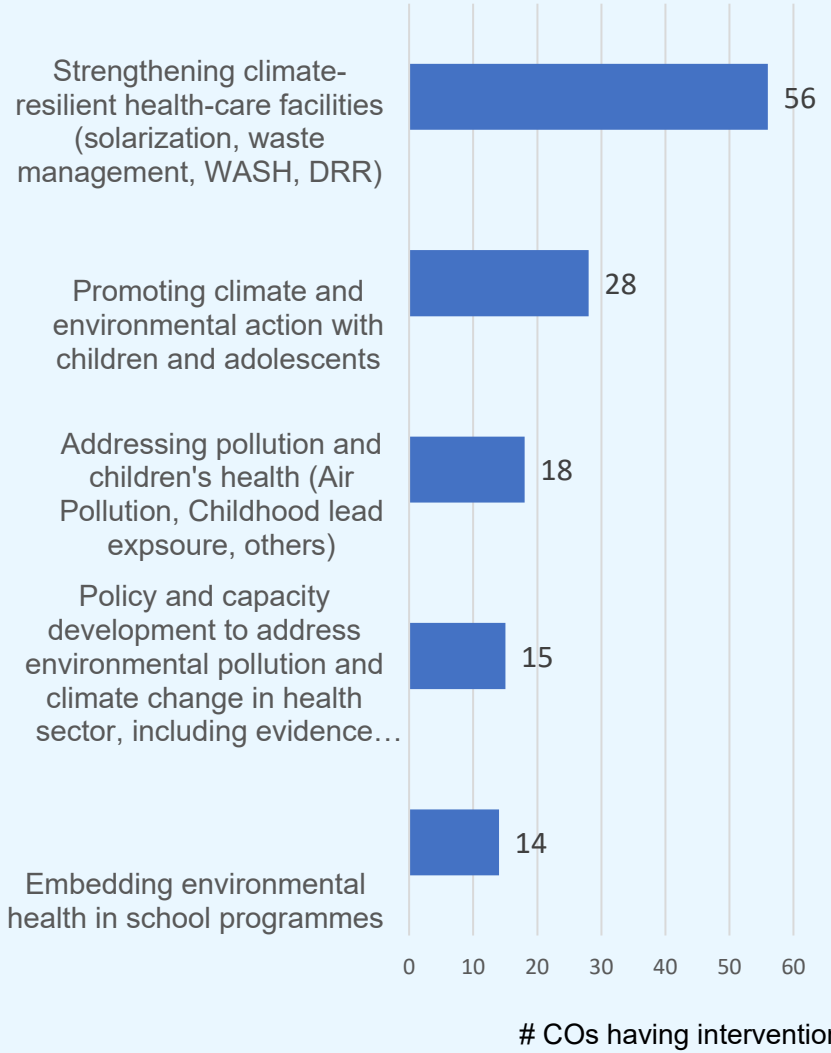
Thank you for your time

UNICEF's Global Footprint Scales Impact

76 countries reported at least one intervention in 2021





Healthy Environments for Healthy Children

'The Coldest Year Of The Rest Of Their Lives: Protecting Children From the Escalating Impacts of Heatwaves'

Webinar on Global Report

10 November 2022

The Climate Crisis is a Child Rights Crisis

The climate crisis is here and accelerating.

- The last 7 years were the hottest on record – WMO
- The world is 1.1c hotter – IPCC
- The world is experiencing more frequent, intense and extreme climate events

Horn of Africa, Sahel, Pakistan and many more....

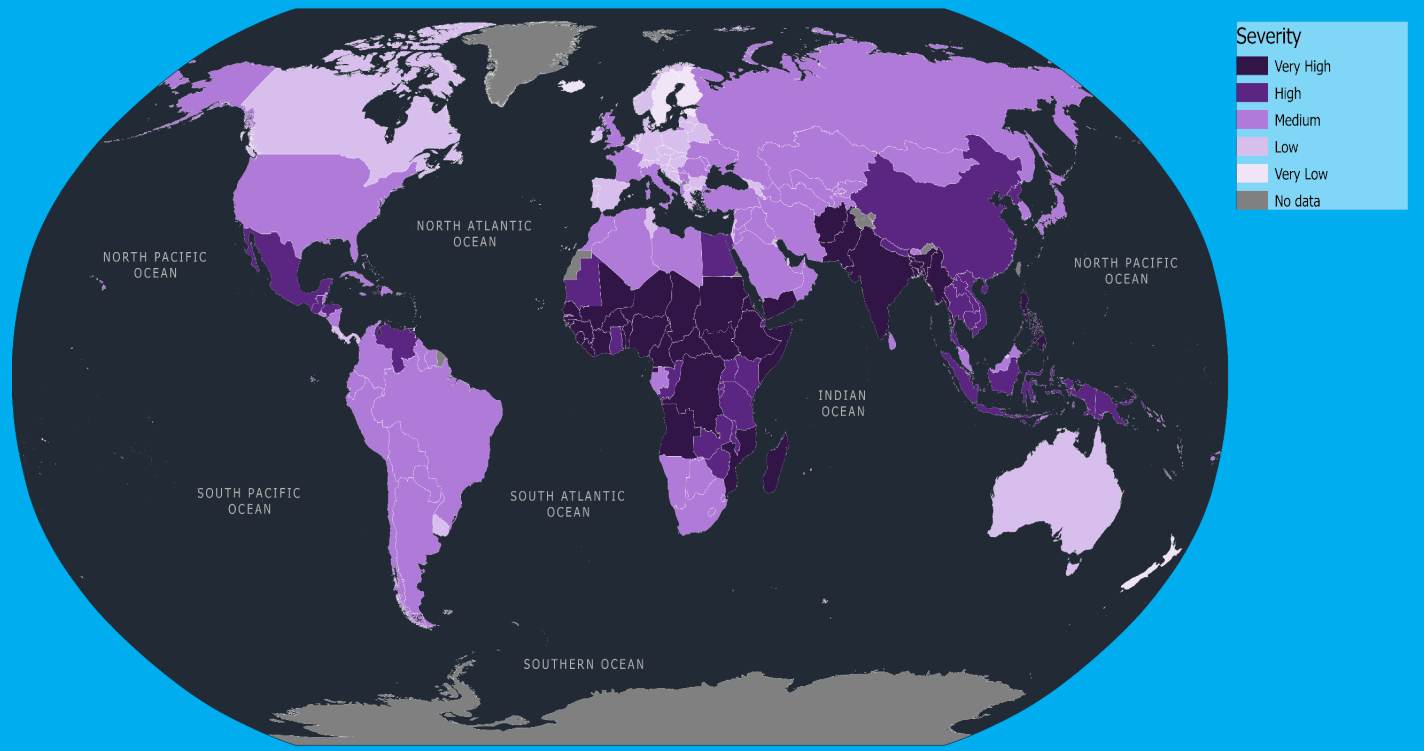
- We are seeing the deadly impacts of climate change globally, resulting in food insecurity, malnutrition, displacement, and climate induced migration.

Children are uniquely vulnerable.

- Every child is exposed to more frequent, intense and destructive climate hazards (air pollution, water scarcity, heatwaves, vector-borne disease, cyclones, and river and coastal flooding) - CCRI
- 1 billion children at 'extremely high risk' now - CCRI

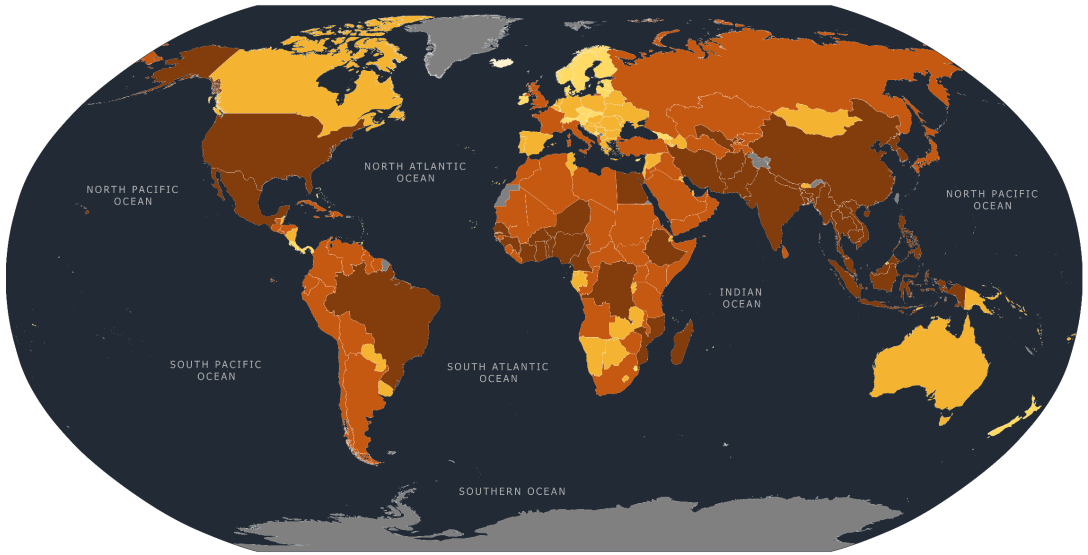
The Children’s Climate Risk Index (CCRI)

'The Climate Crisis is a Child Rights Crisis: Introducing the Children’s Climate Risk Index'



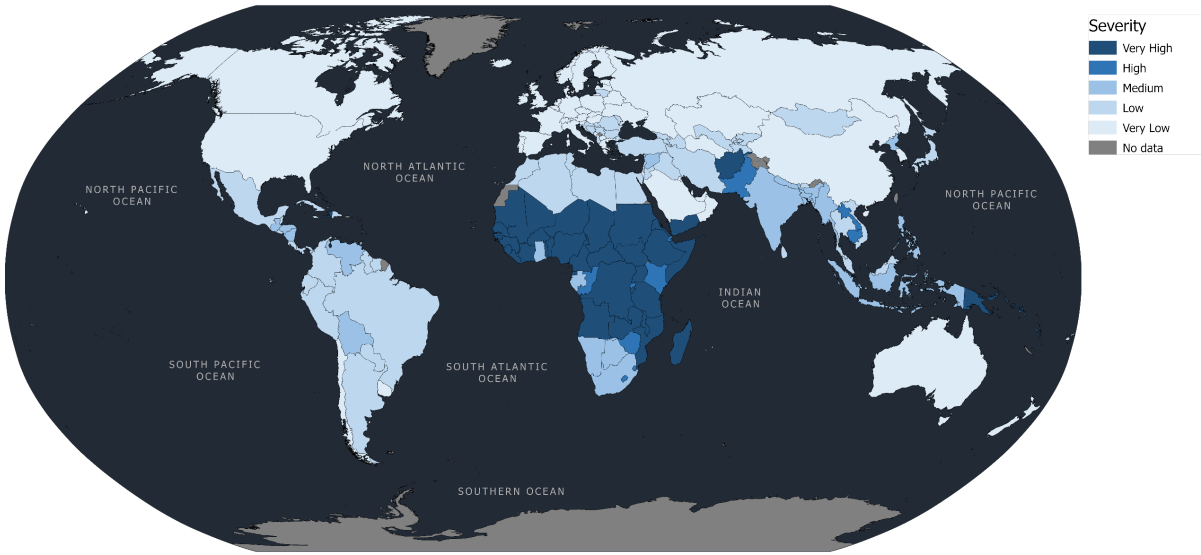
And assesses climate and environmental hazards in the context of child vulnerability

Pillar 1: Climate and environmental shocks, hazards and stresses



Water scarcity	Vector borne diseases
Riverine floods	Heatwaves
Coastal floods	Air pollution
Tropical cyclones	Soil and water pollution

Pillar 2: Child Vulnerability (Health, Education, WASH, Poverty and Social Protection)



Findings:

The report provides estimates and analysis on **the approximate number of children expected to be exposed to four measures of heat in 2020 and by 2050**: high heatwave frequency, high heatwave duration, high heatwave severity and extreme high temperatures.

Three of these measures correspond to heatwaves and one to heat.

The report examines two scenarios for 2050:

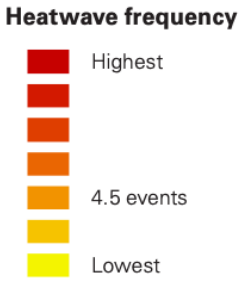
- Shared Socioeconomic Pathway 1 (SSP1): A low greenhouse gas emission scenario with an estimated 1.7°C of warming by 2050
- Shared Socioeconomic Pathway 5 (SSP5): A very high greenhouse gas emission scenario with an estimated 2.4°C of warming by 2050

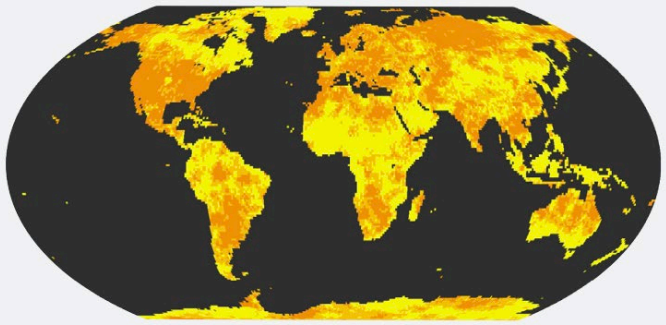
The estimates and analysis:

- Give us **modelled global, regional and country estimates of the number and proportion of children expected to be exposed to four high heat measures in 2020 and by 2050.**
- Provide **global maps of the places where children would be exposed to the four measures.**

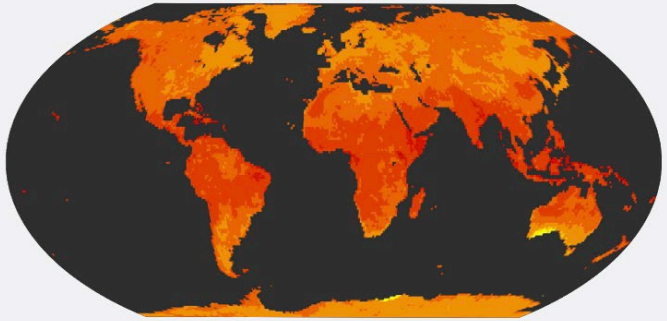
Children exposed to high heatwave frequency

- By 2050, under both low and very high emission scenarios, virtually every child on earth would be exposed to high heatwave frequency rising from only 1 in 4 children in 2020.
- While only 10 per cent of children in **Africa** are exposed to high heatwave frequency in 2020, this would rise dramatically to **100 per cent by 2050** under both scenarios of warming.

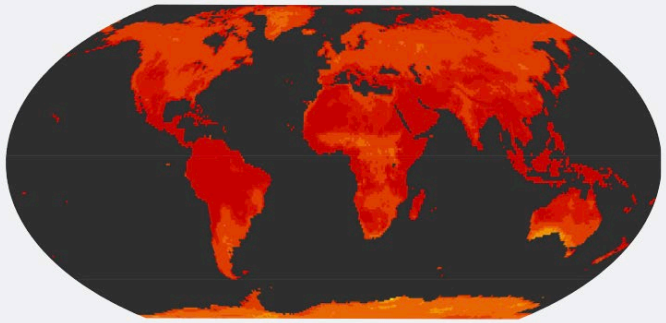




Map 3a: Areas exposed to heatwave frequency, 2020



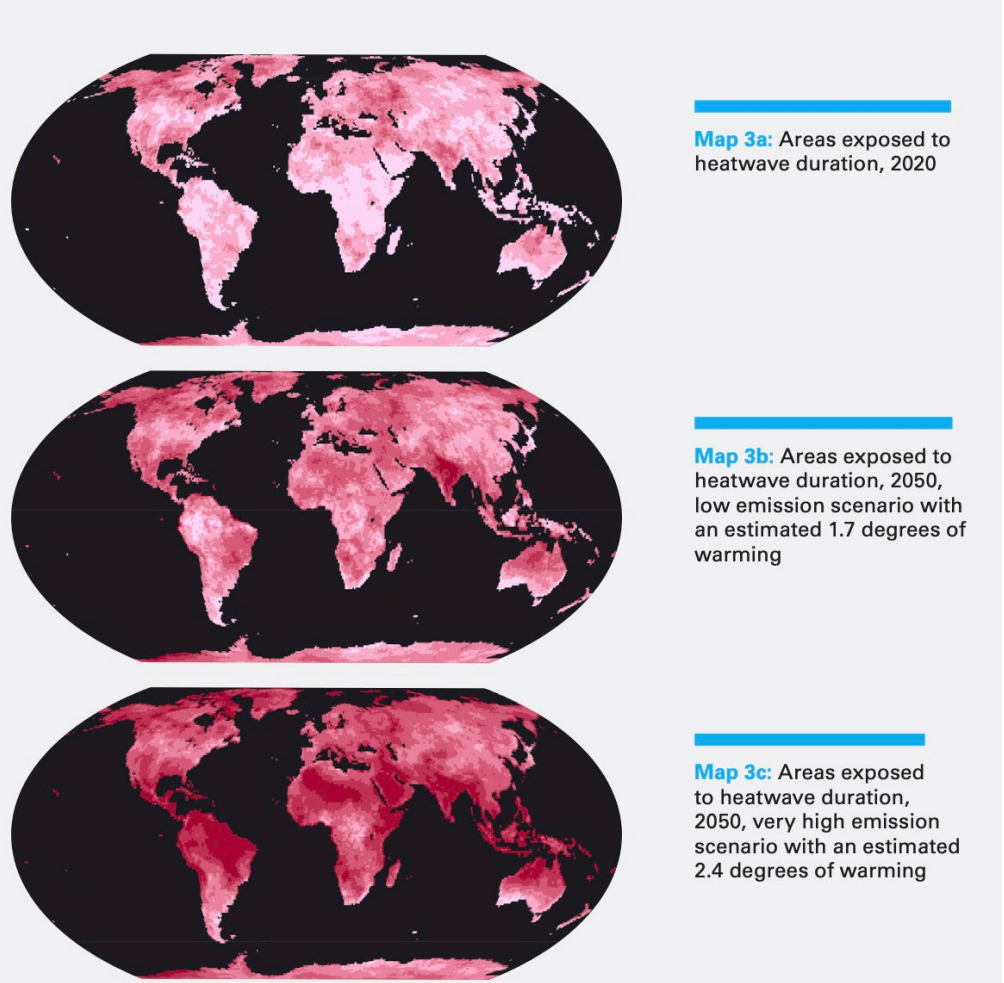
Map 3b: Areas exposed to heatwave frequency, 2050, low emission scenario with an estimated 1.7 degrees of warming



Map 3c: Areas exposed to heatwave frequency, 2050, very high emission scenario with an estimated 2.4 degrees of warming

Areas where there are on average 4.5 or more heatwaves per year are included in the analysis of children's exposure to high heatwave frequency.

Children exposed to high heatwave duration



Map 3a: Areas exposed to heatwave duration, 2020

Map 3b: Areas exposed to heatwave duration, 2050, low emission scenario with an estimated 1.7 degrees of warming

Map 3c: Areas exposed to heatwave duration, 2050, very high emission scenario with an estimated 2.4 degrees of warming

Heatwave duration

Highest

4.7 days

Lowest

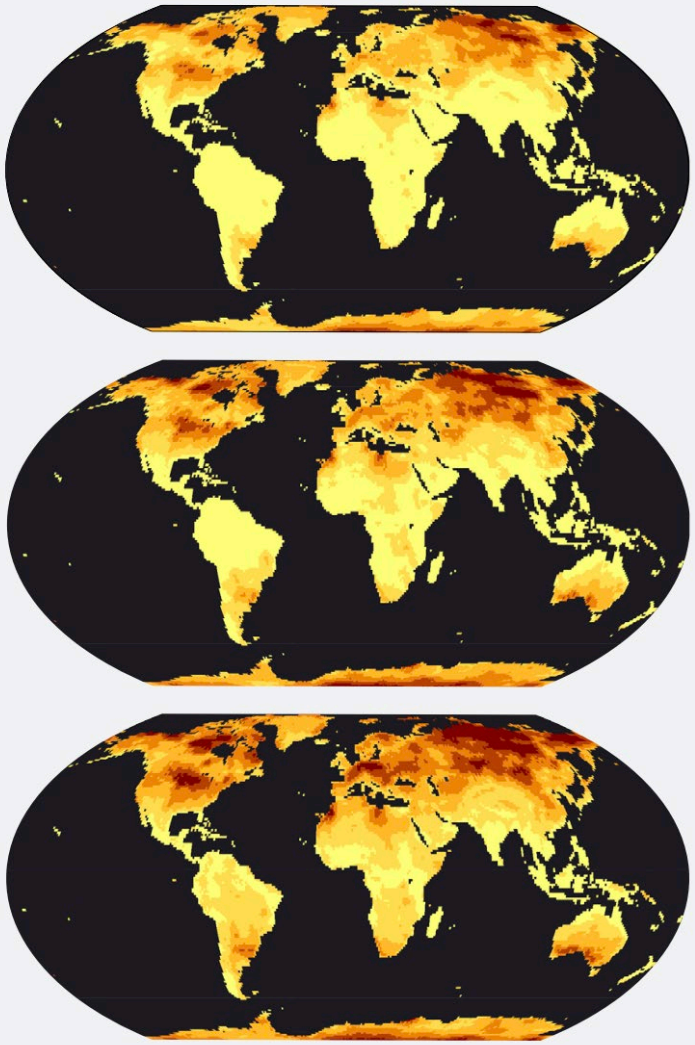
- About 1 in 4 children live in areas exposed to high heatwave duration in 2020.
- By 2050, this percentage would rise dramatically to over 3 in 4 children under a low emission scenario of approximately 1.7 degrees of warming.
- Under a high emission scenario, at approximately 2.4 degrees of warming, 94 per cent of children would be exposed by 2050.

Areas where the average heatwave event lasted 4.7 days or longer are included in the analysis of children's exposure to high heatwave duration.

Children exposed to high heatwave severity

- Under a low emissions scenario with approximately 1.7 degrees of warming, the number of children in areas where the average exceedance of a heatwave event is equal to or above 2°C would almost **quadruple** (from around 28 to 100 million)

- Under a very high emissions scenario with 2.4 degrees of warming, the number of children exposed to high heatwave severity would see an **almost eight-fold increase** (from around 28 to 212 million).



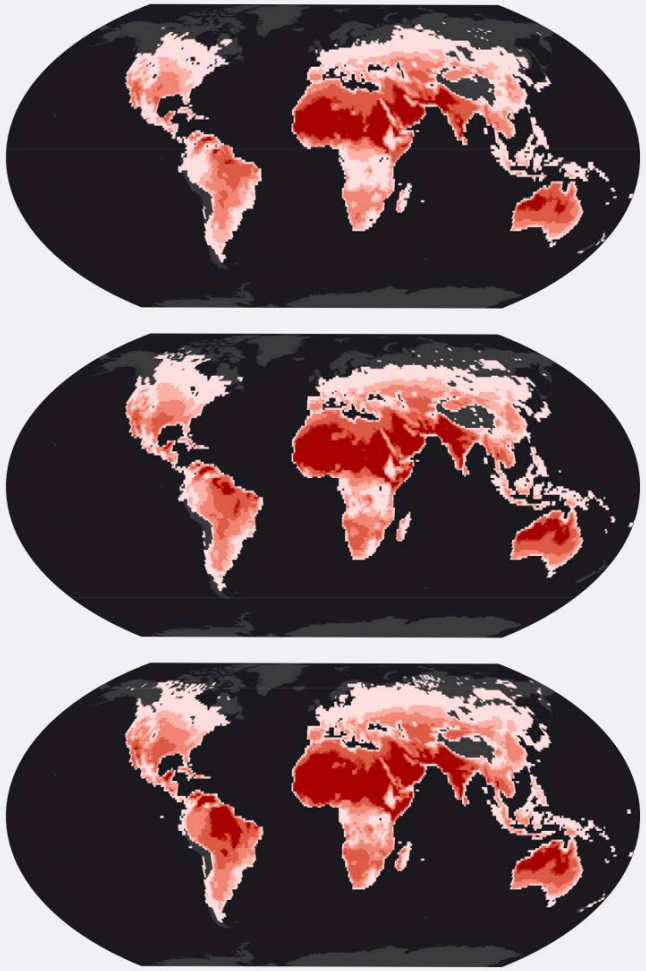
Map 3a: Areas exposed to heatwave severity, 2020

Map 3b: Areas exposed to heatwave severity, 2050, low emission scenario with an estimated 1.7 degrees of warming

Map 3c: Areas exposed to heatwave severity, 2050, very high emission scenario with an estimated 2.4 degrees of warming

Note: Areas where the average heatwave event is 2°C or more above the local 15-day average are included in the analysis of children's exposure to high heatwave severity.

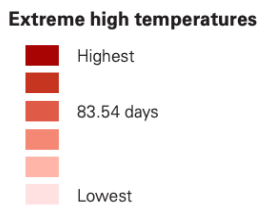
Children exposed to extreme high temperatures



Map 3a: Areas exposed to extreme high temperatures, 2020

Map 3b: Areas exposed to extreme high temperatures, 2050, low emission scenario with an estimated 1.7 degrees of warming

Map 3c: Areas exposed to extreme high temperatures, 2050, very high emission scenario with an estimated 2.4 degrees of warming



- In 2020, around 740 million children **(1 in 3 children globally)** lived in countries with 83.54 or more days per year exceeding 35°C.
- By 2050 under a very high emission scenario with approximately 2.4 degrees of warming, this figure is expected to rise to approximately **816 million (2 in 5 children).**

Areas where, on average, 83.54 or more days a year exceed 35°C are included in the analysis of children's exposure to extreme high temperatures.

Why this matters for children

It will affect children’s health, safety, nutrition, education, access to water and future livelihoods

Children are most vulnerable

It affects kids differently at different stages of the lifecycle

Calls to Action

1

PROTECT children from climate devastation by adapting social services.

2

PREPARE children to live in a climate-changed world.

3

PRIORITIZE children and young people in climate finance and resources.

4

PREVENT a climate catastrophe by drastically reducing greenhouse gas emissions and keep 1.5 degrees Celsius alive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Thank you.
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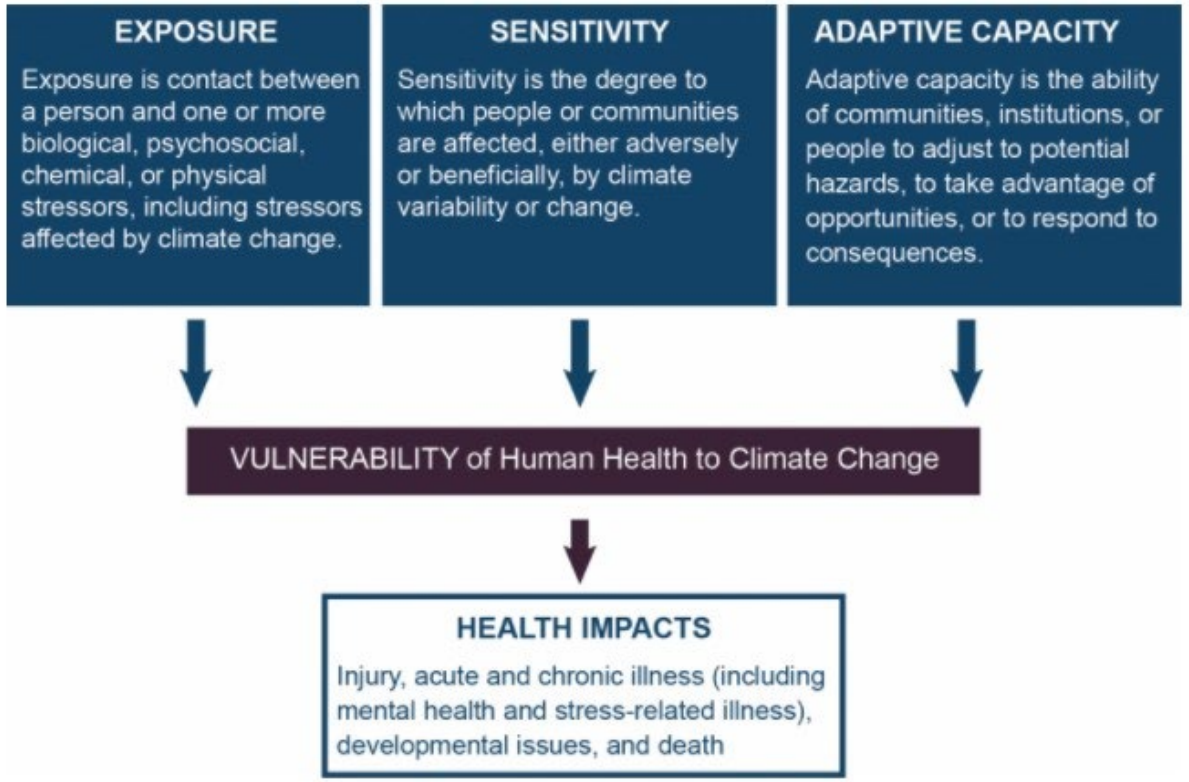
Heat Waves and Children's Health

Clinical Assistant Professor of Pediatrics, Stanford School of Medicine
Deputy Executive Director of the Medical Society Consortium on Climate and Health, in collaboration with
Sean N. Parker Center for Allergy and Asthma Research

@LisaPatelMD

Climate change and vulnerability

Figure 9.1: Determinants of Vulnerability



Defining the determinants of vulnerability to health impacts associated with climate change , including exposure , sensitivity , and adaptive capacity . (Figure source: adapted from Turner et al. 2003)[4]

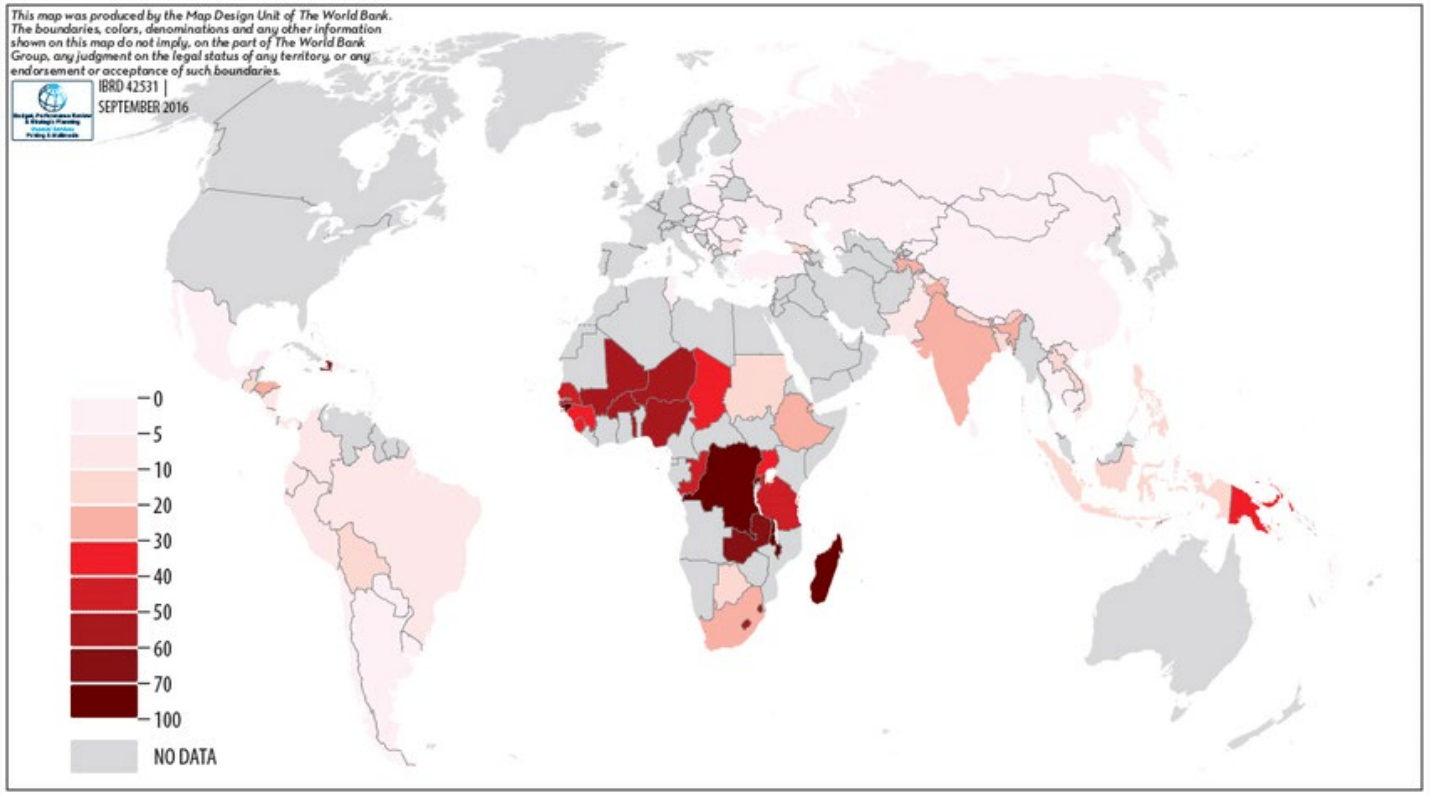
Exposure

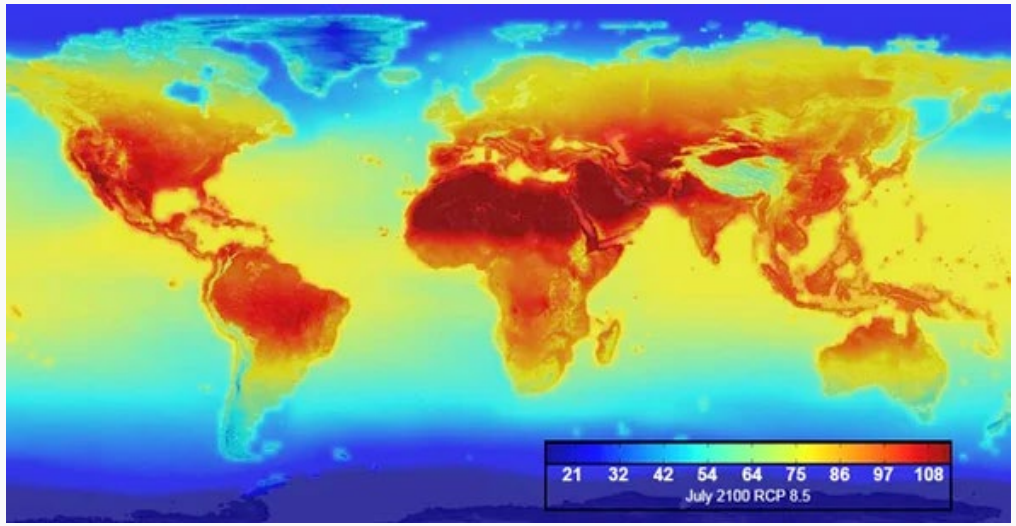
Behavioral/Development risk

- Children spend more time outside/closer to ground

Social Determinants of Health risk

- Childhood poverty increases a child's vulnerability
- Parts of the world that stand to grow hottest are places where there are already high rates of childhood poverty





Sensitivity

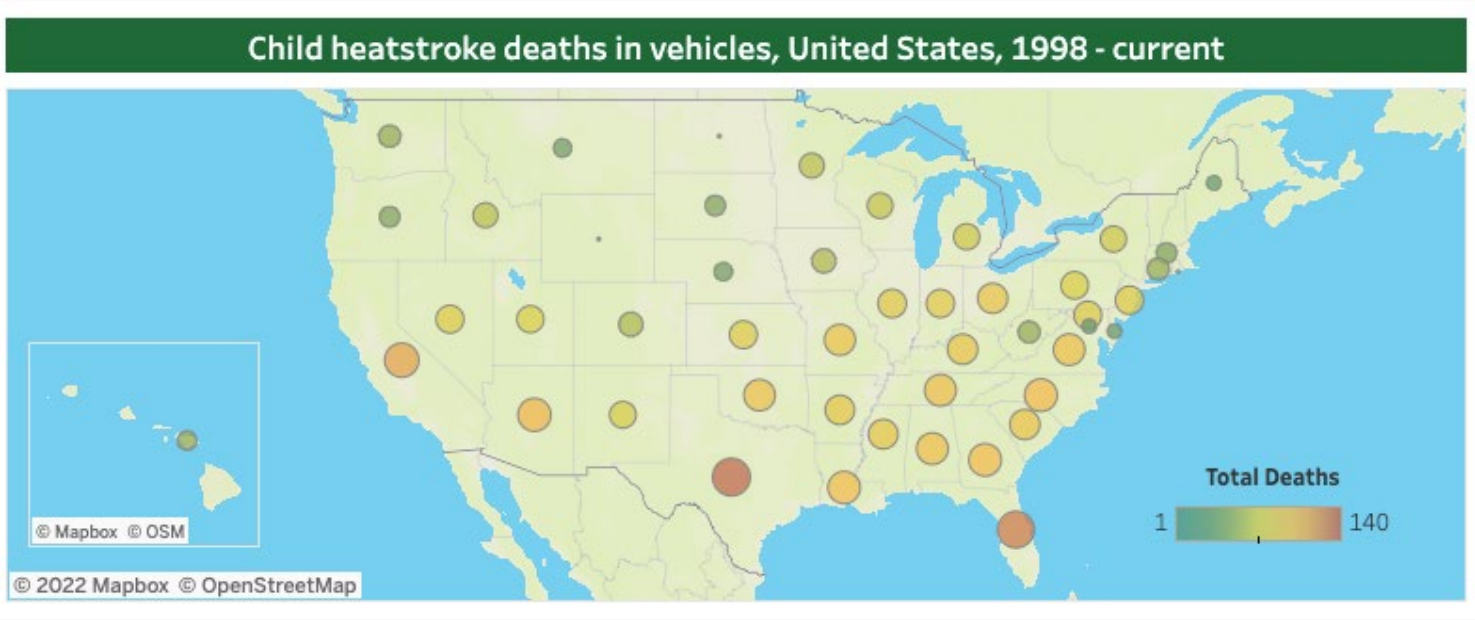
Physiology:

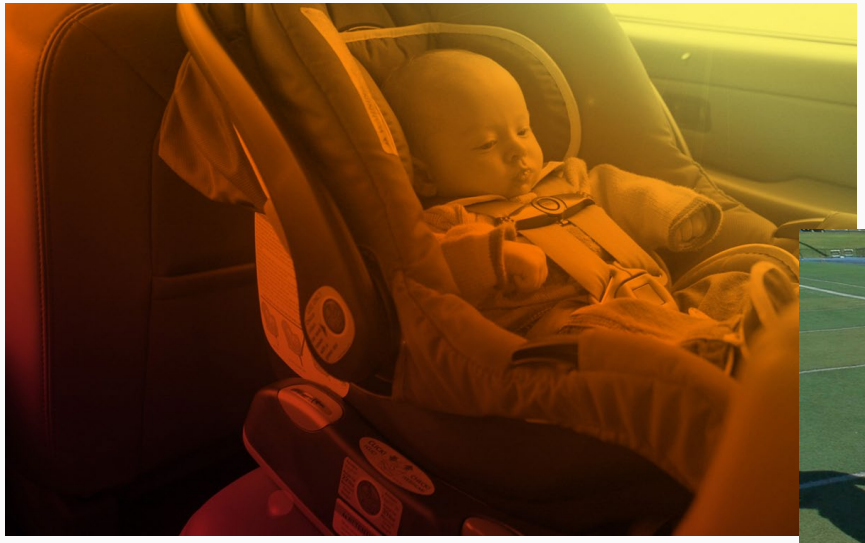
- Infants, particularly in 1st week of life, have immature thermoregulation
- Study by Basagna et al found a higher risk of mortality for infants in 1st week of life born during heat wave
- Children also have higher surface area to mass ratio meaning they absorb more heat, and lower blood volume which results in heat accumulation

Adaptive Capacity

Children often rely upon adults who determine their environments, decreasing their adaptive capacity to heat

- Children can’t decide to leave a classroom if it’s too hot
- Infants/toddlers can kick off blankets, leave a hot car, etc.
- Athletes or outdoor workers may be forced to work/practice/play in hotter conditions than their bodies can handle





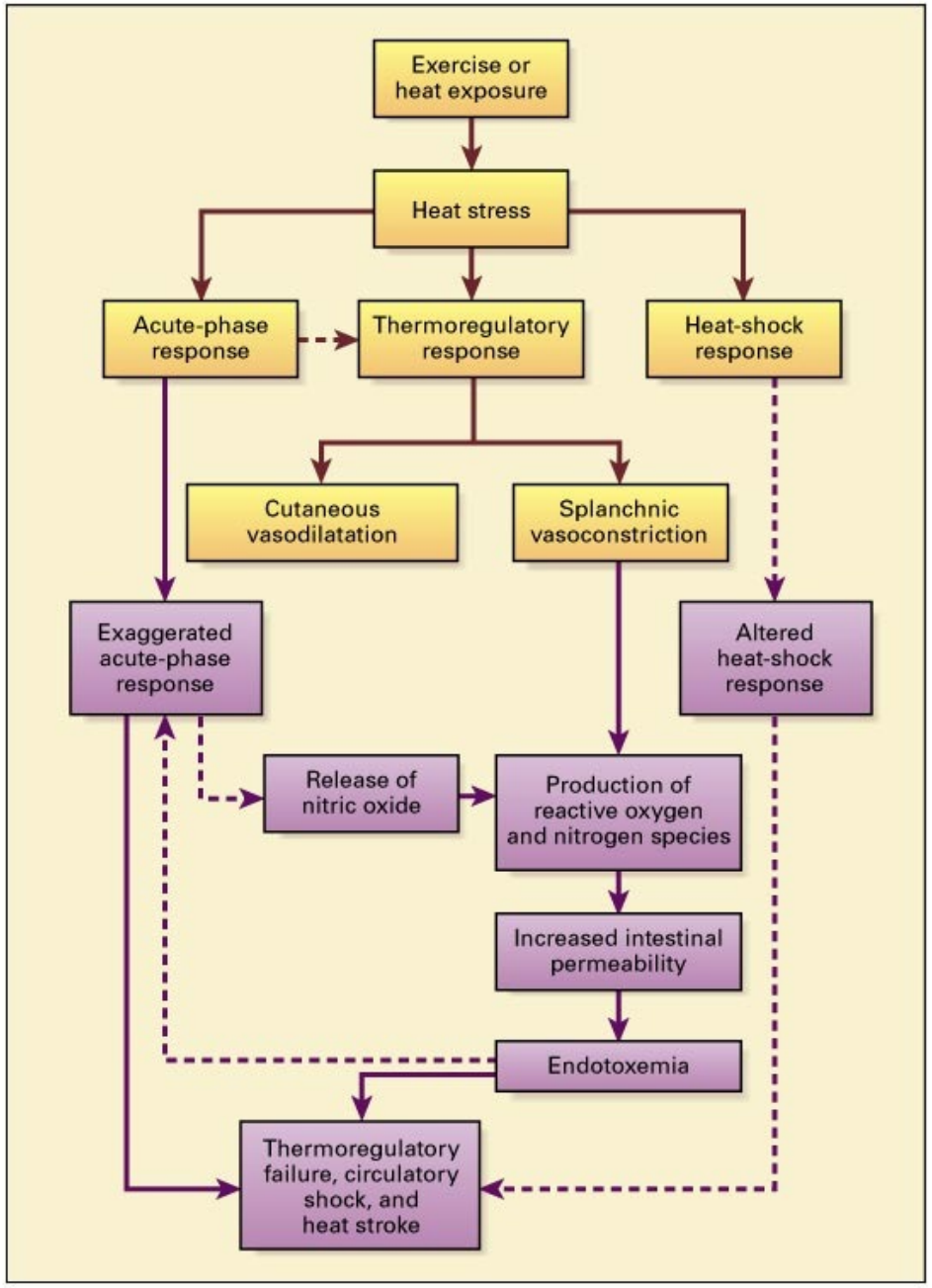
Features of heat stroke in children

Heat can cause a systemic inflammatory response that can result in multiorgan failure.

Features of heat stroke:

Elevated core temperature (≥40 to 40.5° C [104 to 105° F]) + central nervous system abnormalities like impaired judgement, inappropriate behavior, seizures, ataxia, coma

Other symptoms include vomiting, diarrhea, warm/flushed skin



Heat and mental health

- Each 10°F rise in mean apparent temperature (which combines heat and humidity) increases the risk for emergency room visits for mental health disorders, self-injury and suicide, and intentional injury and homicide. (Basu et. al. 2017)
- Risks for self-injury and suicide associated with higher temperatures is highest among youth aged 6-18 years old.

Climate change and toxic stress

A child's early exposure to toxic stresses like poverty, housing insecurity, racism, mental illness in a parent/caretaker without the buffering protection stable/nurturing home → lifelong health consequences.

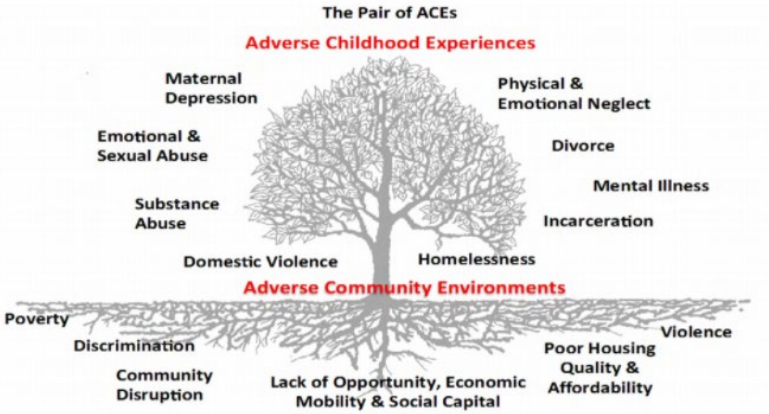
Climate change will exacerbate these stressors placing children at greater risk

A PERSON WITH 4 OR MORE ACES IS:

- 2.2 times as likely to have ischemic heart disease
- 2.4 times as likely to have a stroke
- 1.9 times as likely to have cancer
- 1.6 times as likely to have diabetes

A PERSON WITH 4 OR MORE ACES IS:

- 12.2 times as likely to attempt suicide
- 10.3 times as likely to use injection drugs
- 7.4 times as likely to be an alcoholic



Ellis, W., Dietz, W. (2017) A New Framework for Addressing Adverse Childhood and Community Experiences: The Building Community Resilience (BCR) Model. Academic Pediatrics. 17 (2017) pp. S86-S93. DOI information: 10.1016/j.acap.2016.12.011

Heat and pregnancy

- Increasing evidence on risk of 1st trimester exposure to extreme heat and heart defects (Zhang et. al. JAHA 2019)
- Risk of preterm birth and low birthweight (Bekkar et. al.)
- Risk of gestational diabetes, preeclampsia (Samuels et. al. 2022)

How can we keep children safe?

- Need to ensure better access to cooling in homes and schools
- Need better worker protections
- Need better protocols to protect athletes
- More health professional education to ensure we are counseling families and schools appropriately for safety
- Need school and urban environments where it is safe for children to play on hot days

LONDON SCHOOL of HYGIENE &TROPICAL MEDICINE

Climate Change & Planetary Health

Climate, heat and child health

Developing interventions and health protection measures

Dr Sari Kovats, Associate Professor
NIHR Health Protection Research Unit in Environmental Change and Health
Department of Public Health, Environments and Society
London School of Hygiene & Tropical Medicine
Sari.kovats@lshtm.ac.uk

Connecting HEALTH & CLIMATE CHANGE

CHAMNHA
CLIMATE, HEAT AND MATERNAL AND NEONATAL HEALTH IN AFRICA

Heat and child health

High temperatures increase risk of adverse birth outcomes

- risk of pre-term birth, low birth weight
- congenital abnormalities

=> Interventions to protect pregnant women

High temperatures effects on children

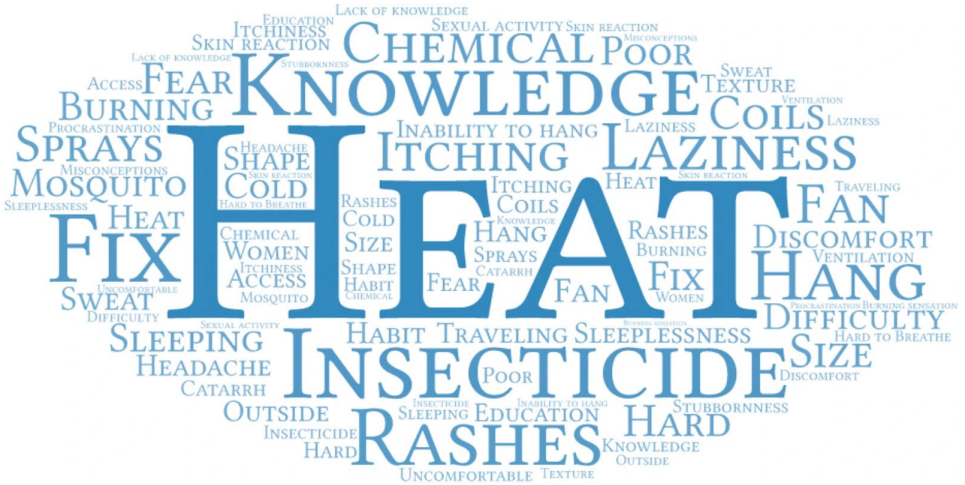
- High temperatures increase risk of acute mortality
- Physical activity (sports, informal workers) increases risk of heat injury
- Dehydration risks kidney damage (can be exacerbated by recreational drugs)
- High temperatures increase transmission of vector borne diseases, e.g. Malaria
- High temperatures increase risk of infectious diseases, e.g. shigella, salmonellosis, bacterial infections

=> Interventions to protect children

Heat and child health

Heat effects on behaviour

- Reduced time breastfeeding, skin to skin contact
- Perception that there is need to supplement breast feeding
- Pregnant women less likely to access antenatal care
- Less likely to use to bednets
- Stress/anxiety, sleep disruption
  - Undermines learning/school attendance
  - Irritability, ? aggression



Edney JM, **Kovats RS, Filippi V, Nakstad B** (2022) Hot climate and weather impacts on infant feeding practices in low- and middle-income settings: a systematic review of epidemiological, clinical, and anthropological evidence. Frontiers in Paediatrics

Heat affects breastfeeding behaviour

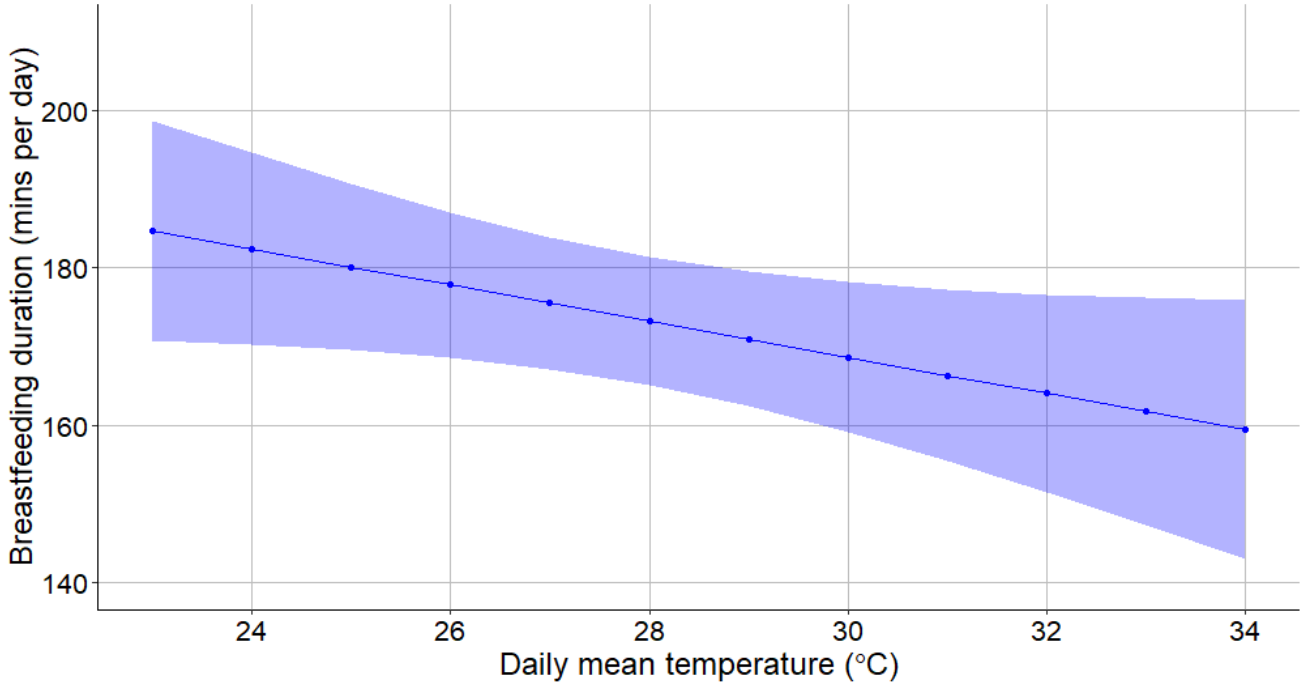


Fig 1. Estimated effects of temperature on time spent breastfeeding (mins per typical day)

Breastfeeding decreased by 2.3 mins per day (-4.6 to 0.04, $p = 0.05$) per 1°C increase in mean temperature.

This equates to a 23-minute reduction in daily breastfeeding during the hottest, compared to coolest, times of the year.

* Population-representative cohort of childbearing women in Bobo-Dioulasso, Burkina Faso [866 women, aged 14-47 years). 7 months gestation - 3 months postpartum at recruitment
Original study: CRESSWELL J, et al. 2015. Productivity, family planning and reproductive health in Burkina Faso: the PopDev study. LSHTM.
Analysis published: PART C, et al. BMJ Global Health. 2022

Heat interventions

Built environment

Housing

Public health/education (Heatwave Plan for England)

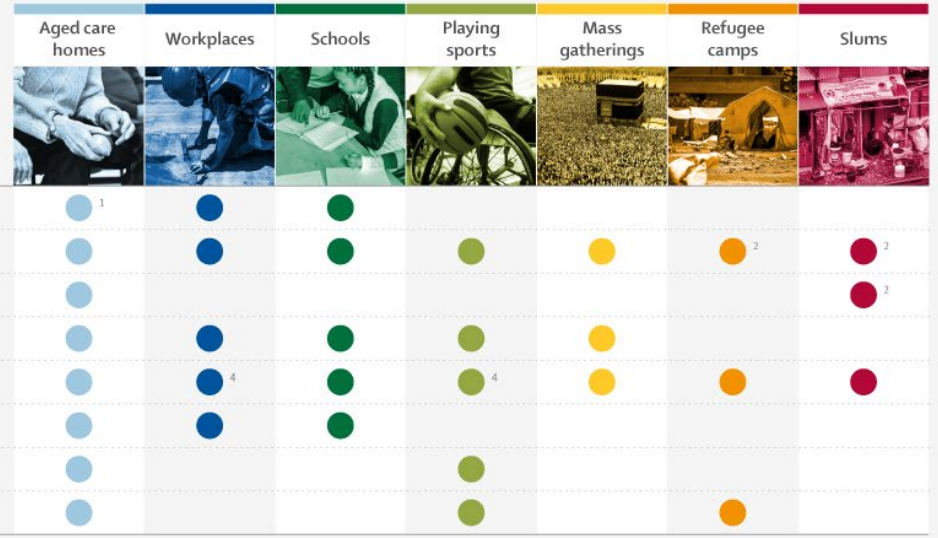
Occupational health/health and safety

Heat Health Action Plans

Clinical guidance (early detection and treatment of heat injury/heat stroke)

Sustainable cooling strategies to protect health in heat-vulnerable settings

Heat extremes and hot weather are harming health. While mitigating climate change is vital, the inevitble rise in global temperature is expected to exacerbate these harms in future, and identifying opportunities for applying sustainable cooling strategies in heat-vulnerable settings is also important



Read the full paper: Jay O, Capon A, Berry P, et al. Reducing the health effects of hot weather and heat extremes: from personal cooling strategies to green cities. *The Lancet* 2021. Published online August 19

Housing: heat equity

Informal settlements (LMIC)

Urban mapping (US)

US health disparities: Heat stroke deaths in homeless, low income households

Access to cooling spaces

Informal settlements in India

- Lack of greenspace, space cooling
- Unreliable access to energy and water supplies
- Informal workers have to work even if its not too hot or loss of income

A house made of semi-permanent material

Agarwal, S.,et al. (2022). *Prioritising action on health and climate resilience for informal workers.* IIED, London

Resilience to extreme weather in informal settlements

Built environment

Improved housing and shelter

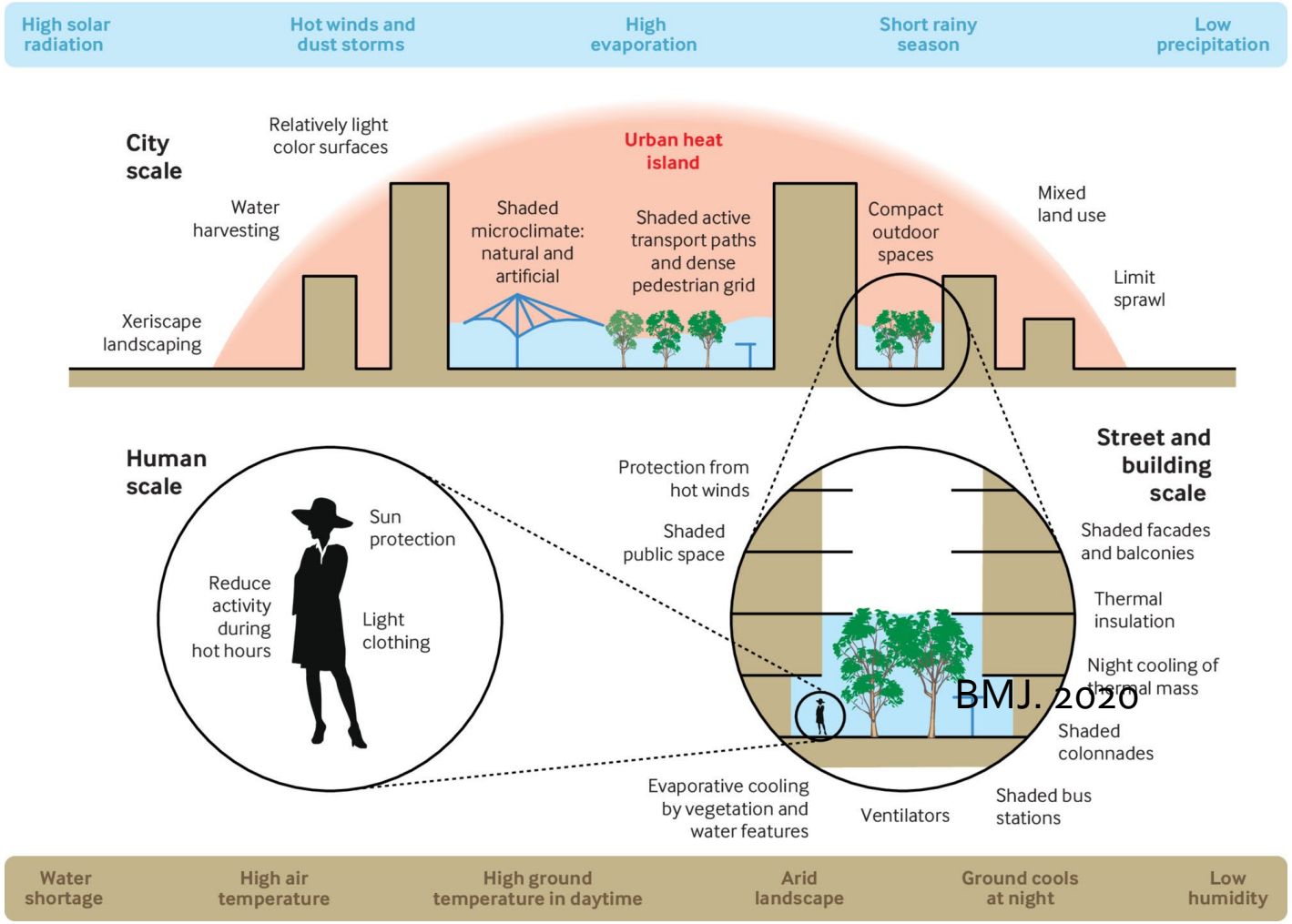
- acquisition of individual assets (e.g. shading, cool roofs).
- Building materials
- collective infrastructure
  - functional sewerage system
  - greenspace for cooling and recreation
  - trees.

- Diversified livelihoods: engaging in multiple activities to make earnings more stable. Difficult to work during a heatwave.
- Strong social networks: food security was often enhanced through relationships with producers (accessing food at lower cost) or through maintaining connections with relatives in rural areas.
- Access to entitlements: food subsidy cards, Employee State Insurance, and proof of address in Indore can lead to a range of social benefits.

Cooling cities

Barriers to implementation are not technical

- governance, political priorities
- Difficult to demonstrate cost-benefit



BMJ. 2020

Synergies: adaptation with mitigation

Local and renewable energy supply will increase resilience in hospitals, schools and other settings..

Heatwave can cause power failures due to surges in demand

- https://irena.org/newsroom/articles/2021/Jul/How-Solar-Power-is-Reducing-Maternal-Mortality-Rates-in-Zimbabwe/
- Renewable energy innovation has improved obstetric care to communities in Zimbabwe, successfully supporting over 180,000 deliveries per year since its introduction

Co-design of interventions

General objective

To improve the knowledge of women and their entourages on good practices and strategies to mitigate the effects of extreme heat on pregnant women, mothers and children and to put them into practice.

Specific objective

Engage health professionals and community health workers **to integrate heat and dehydration messages into their routine work with** pregnant and postpartum women.

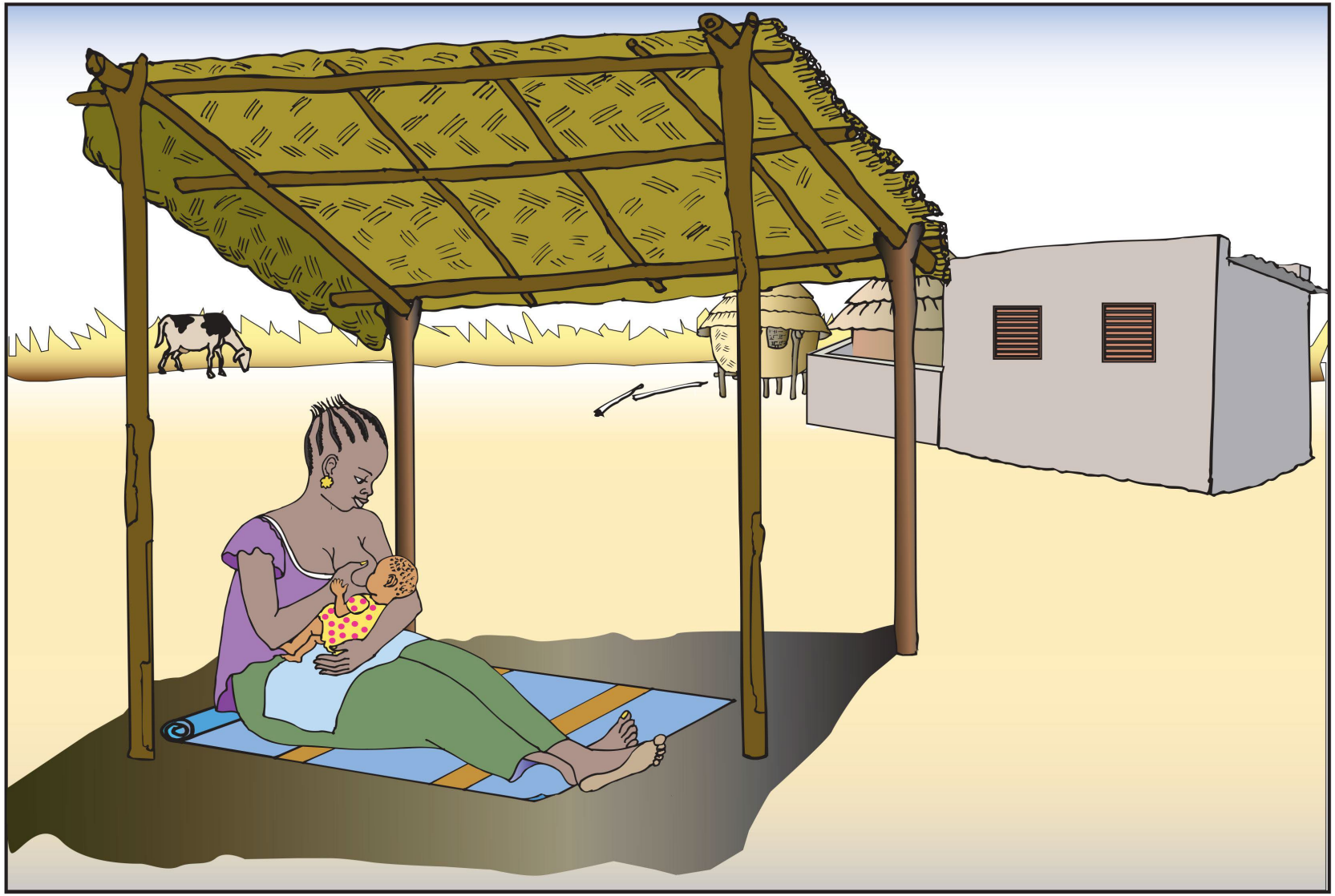
Ouagadougou implementers

Wemtenga Communuty

Prioritisation of interventions: Kilifi, Kenya

Ranking	Likelihood of Success	Cost Effectiveness	Effectiveness	Sustainability
1	Water	Education	Water	Water*
2	Education	SBCC	SBCC	SBCC*
3	SBCC	Family support	Education	Education
4	Family support	Water	Family support	Family support
5	Construct health facilities	Construct health facilities	Construct health facilities	Construct health facilities

SBCC =socio-behaviour change



Challenges and lessons learned

Lessons learned

- Mainstream heat messages within current health strategies
- Evidence based interventions
- Focus on mother to ensure she has adequate food, hydration, rest
- Importance of engagement with communities
- Importance of evaluation of messages around heat

Challenges

- Low awareness of heat risks (heat is normalised)
- Constraints on women's activities and responsibilities
- Need to demonstrate impact on health

Thank you!

https://www.lshtm.ac.uk/research/centres-projects-groups/chamnha

Mgamboni Dispensary, Kilifi, Kenya

CHAMNHA Consortium

- London School of Hygiene & Tropical Medicine, United Kingdom: Dr Sari Kovats, Dr Shakoor Hajat, Prof Veronique Filippi, Dr Cherie Part
- University of Washington, United States of America: Dr Jeremy Hess, Prof Kristie Ebi
- Leeds University, United Kingdom: Prof. John Marsham, Dr Cathryn Birch, Dr Sarah Chapman
- University of Oslo, Norway/University of Botswana: Prof Britt Nakstad
- Karolinska Institutet, Sweden: Dr Nathalie Roos, Dr Massimo Stafoggia
- South African Medical Research Council: Dr Caradee Wright
- Institut de Recherche en Sciences de la Santé (IRSS), Burkina Faso: Prof Seni Kouanda, Dr Kadi Kadidiatou
- Aga Khan University, Kenya: Prof Stanley Luchters, Dr Adelaide Lusambili

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Resources on Maternal, Newborn and Child Health and Heatwaves

Recommended Literature from Presenters

- UNICEF (2022). The Coldest Year of the Rest of their Lives: Protecting children from the escalating impacts of climate change. Report. Link here
- UNICEF (2021). The Children's Climate Risk Index. Report. Link here

Other Reports and Peer Reviewed Articles

- Lakhoo et al (2022). The effect of high and low ambient temperature on infant health: A systematic review. Journal of Environmental Research and Public Health. Link here
- Chersich et al. (2020). Associations between high temperatures in pregnancy and risk of preterm birth, low birth weight, and stillbirths: systematic review and meta-analysis. British Medical Journal. Link here
- Duchoslav, Jan (2017). Prenatal Temperature Shocks Reduce Cooperation: Evidence from Public Goods Games in Uganda. Frontiers in Behavioral Neuroscience. Link here
- Isen, Adam & Rossin-Slater, Maya (2017). Relationship between season of birth, temperature exposure, and later life wellbeing. PNAS. Link here

A list of resources will be shared with the recording and presentation slides

Climate Change and Child Health Discussion Series

Engage with the co-chairs:

- Cara Endyke Doran: cendykedoran@globalcommunities.org
- Raoul Bermejo: rbermejo@unicef.org

Reach out to the Child Health Task Force Secretariate: childhealthtaskforce@jsi.com

Healthy Environment Healthy Children Framework:
https://www.unicef.org/media/91631/file/Healthy-Environments-for-Healthy-Children-Global-Programme-Framework-Summary.pdf

Heatwaves Report:
https://www.unicef.org/reports/coldest-year-rest-of-their-lives-children-heatwaves

Subgroup information, recordings and presentations from previous webinars are available on the subgroup page of the Child Health Task Force website:
www.childhealthtaskforce.org/subgroups/expansion

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