



Urban Climate-Health Action

A New Approach
to Protecting
Health in the
Era of Climate
Change

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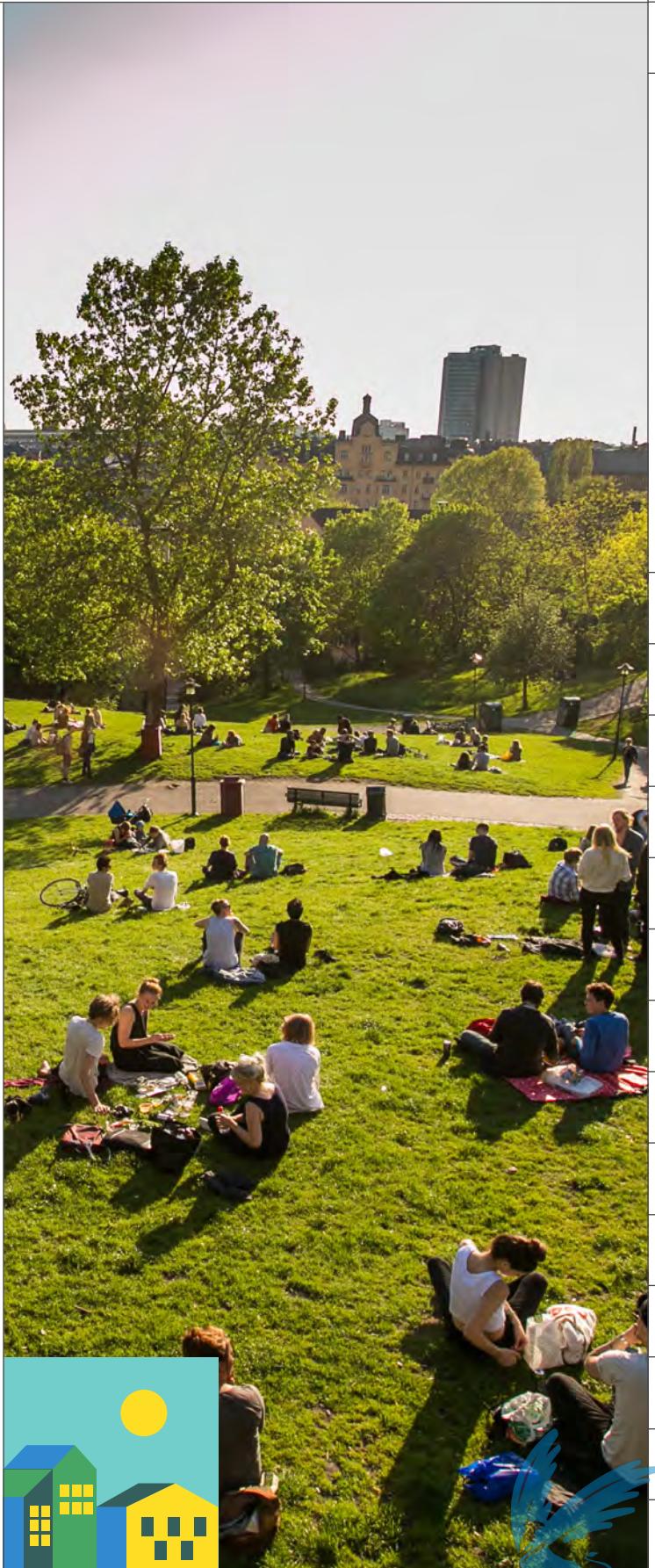
C40 Cities Climate Leadership Group

Yvonne Aki-Sawyerr & Sadiq Khan

As the mayors of Freetown and London, and as the co-chairs of C40 Cities – a global coalition of nearly 100 mayors united in action to overcome the climate crisis – we represent millions of people who are highly vulnerable to climate breakdown.

At C40, 75 per cent of our members are reducing per capita emissions faster than their respective countries, while 90 cities have Paris Agreement-compatible climate action plans being implemented today. We are a network of leaders and trailblazers. Our goal is to raise ambition by implementing groundbreaking climate policies. We are committed to ensuring the transition to net zero is just and inclusive, especially for those cities least responsible for, but most vulnerable to, the impacts of this emergency. We stand determined to marshal our resources to both mitigate the climate crisis and adapt to the changes that are already upon us.

Over half of the world's population live in urban areas, and over 75 per cent of energy-related emissions are generated by cities. Cities also represent the closest level of government to residents and are the first responders in emergencies. For us, the health and wellbeing of our citizens are essential for our success. The pandemic made clear that city governments have an important role in ensuring equitable health outcomes for our constituents. The same principle applies to the escalating threats that climate change is projected to have, including through the direct impacts of extreme weather on



people's physical and mental health, or the indirect effects such as disruption to essential infrastructure and services, food insecurity, inward migration, or the spread of infectious disease. Our cities were not planned for the scale and frequency of climate threats, nor exponential population growth.

For example, heatwaves are now far more common and severe than they were a decade ago in cities such as Buenos Aires, Karachi, and Lagos. Increasingly, temperatures in poorer and unplanned neighbourhoods are exceeding the city-wide average, due to corrugated roofs, large amounts of concrete and limited vegetation. Poorer residents are also far more likely to have jobs that expose them to unbearable heat, aggravating existing long-term health conditions and producing inequalities in health outcomes. Their capacities to adapt, respond, and recover are likely to be lower if they live further from life-saving care and can't afford to stop working when conditions are debilitating.

Given these challenges, cities must build strong, responsive systems that are able to plan ahead, predict when emergencies are likely to happen, respond effectively in real time, and implement long-term investments that prepare cities for tomorrow's climate. This report sets out a powerful model for how this can be achieved through local leadership supported by adaptive national and international infrastructure.

As mayors, we have taken decisive action in our cities. In London, our bold policies, including the Ultra Low Emission Zone, have almost halved roadside nitrogen dioxide concentrations between 2016 and 2023, allowing more Londoners to breathe cleaner air. In addition, we have planted over half a million trees, introduced more than 1,600 zero-emission buses, and installed more electric vehicle chargers than the rest of the United Kingdom combined. The London Climate Resilience Review – a pioneering report on the city's preparedness for climate threats – is reflective of our commitment to strengthening our urban resilience strategy.

In Freetown, we have planted over a million trees through #FreetowntheTreetown, a citizen engagement programme supported by the World Bank that restores lost trees from around the city and protects them for future generations. In doing so, the programme improves health and resilience to climate impacts such as heat and protects the city from floods and landslides. These actions demonstrate the power of setting bold ambitions and putting the health of residents at the heart of climate policy. With cities increasingly becoming key battlegrounds of climate polarisation, we know firsthand that we need to drive collaboration between all sections of society to mobilise public support and deliver improved, climate-resilient health outcomes.

Official powers over health and meteorological services, legal frameworks and financing often lie at national or state levels. But there is much that mayors can do, both by using the resources we control, and by convening, persuading and organising people and resources. Mayors have the platform and the mandate to champion the causes that are most important to the people they represent. And increasingly, the effects of heatwaves, floods, dengue outbreaks and other climate-related health threats are rising to the top of those concerns.

Working together through initiatives like the one outlined in this report, we can deliver for the people of our great cities and ensure they remain the most dynamic places in the world. Cities of every size, at every income level, are at the frontlines of the health threats caused by climate breakdown.

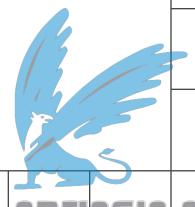
We must protect these economic and cultural engines of civilization, and that means protecting our people, as we strive for a fairer, safer, greener world for all.

Yvonne Aki-Sawyerr

*Mayor, Freetown, Sierra Leone
C40 Co-Chair*

Sadiq Khan

*Mayor, London, United Kingdom
C40 Co-Chair*



World Health Organization and World Meteorological Organization

Professor Celeste Saulo & Dr. Tedros Adhanom Ghebreyesus

With the effects of climate change bearing down increasingly on the lives and livelihoods of people everywhere, the world is coming to the realization that the climate crisis is a health crisis.

Turning this realization into action requires a step change in the type and depth of collaboration between health, meteorology, and other relevant sectors to deliver coordinated and timely interventions that can save and improve lives, based on accurate information about weather, climate, pollution and other environmental factors. In short, it requires effective climate services for health.

This report celebrates pioneering efforts driven by local leadership and vision. We need to learn from them and build a global movement to advance sustainable, high-capacity collaboration that materially improves health outcomes.

That is why WHO and WMO established a Joint Office for Climate and Health in 2014, to ensure that as global normative bodies, we are intentionally driving collaboration across disciplines and geographies.

Together, WHO and WMO experts have set out a global plan for fundamentally transforming the development and use of climate science and services for health. The Joint Office provides a gateway to technical resources through ClimaHealth.info, spearheads the Global Heat Health



Information Network, and supports partners and member states to develop good practices in using climate knowledge for health planning and programming.

Multilateral bodies are essential in developing coherent and robust foundations for global collaboration and coordination across member states. Unique partnerships like the Joint Office are exemplary models that support effective multi-disciplinary national, sub-national and local leadership and action.

That is why we are supportive of the approach outlined in this report, which would ensure climate and health action is informed by effective and useful climate science and services, while articulating pathways for multi-sectoral national and international partners to build meaningful partnerships.

This report is a valuable contribution to promoting and protecting the health of both people and the planet on which all life depends.

Dr. Tedros Adhanom Ghebreyesus

*Director-General,
World Health Organization (WHO)*

Professor Celeste Saulo

*Secretary-General,
World Meteorological Organization (WMO)*



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Some contributors may differ with aspects of this report or have stressed other matters of primary focus. All have contributed with the greatest sense of shared purpose in addressing the global health emergency of climate change.

Yvonne Aki-Sawyerr

Mayor
City of Freetown, Sierra Leone

Karl Astbury

Lead, Programs, Climate & Health
Resilient Cities Network

Dr. Christovam Barcellos

Senior Researcher, Health Information Laboratory, Institute of Scientific and Technological Communication in Health Pasteur Network Fiocruz

Dr. Serge Bataliack

Team Leader, Data Analytics and Knowledge Management
WHO's Integrated African Health Observatory

Dr. Deborah Campbell

Co-Lead, Lincoln Laboratory's Climate Change Initiative
Jameel Observatory CREWS-Net

Malcolm Campbell

Manager, Programs & Engagement
Resilient Cities Network

Dr. Quang Chan Luong

Head of Department for Disease Control
Pasteur Network Pasteur Institute,
Ho Chi Minh City

Dr. Tufa Dinku

Senior Research Scientist
Columbia Climate School International Research Institute

Dr. Majid Ezzati

Research Lead
Jameel Institute

Dr. Tedros Ghebreyesus

Director-General
World Health Organization (WHO)

Afroza Haque

Project Delegate, Anticipation/FbF
German Red Cross

Anna Stewart Ibarra

Executive Director
Inter-American Institute for Global Change Research

Dr. Jeannette Ickovics

Research Lead, Urban Pulse; Herman Professor
Yale School of Public Health

Rachel James

Interagency RCCE Coordinator
The Collective Service

Sadiq Khan

Mayor
City of London, United Kingdom

Tariq Khokhar

Head of Data for Science & Health
Wellcome Trust

Dr. Joseph Macarthy

Executive Director
Sierra Leone Urban Research Centre

Dr. Bilal Mateen

Executive Director of Digital Square
PATH

Gislani Mateus

Superintendent of Health Surveillance,
Rio de Janeiro
Epidemiological Intelligence Center

Maureen McKenna

Global Coordinator, Collective Service
The Collective Service, IFRC

Ousmane Ndiaye

Director of Meteorology
Agence Nationale de l'Aviation Civile et de la Météorologie (ANACIM)

Dr. Robert Ndugwa

Head, Data & Analytics, UN Habitat
UN Habitat's Global Urban Observatory Network

Alena Owen

Senior Advocacy Officer
PATH

Dr. Bhaskar Rajakumar

Program Director
ARTPARK

Ben Ryder

Research Manager, Climate Impacts & Adaptation
Wellcome Trust

Prof. Celeste Saulo

Secretary-General
World Meteorological Organization (WMO)

Rashid Seedat

Executive Director
Gauteng City-Region Observatory

Md. Shahjahan Saju

Project Coordinator
Bangladesh Red Crescent Society

Dr. Joy Shumake-Guillemot

Lead, WHO/WMO Joint Office for Climate and Health
Joint Office of the WHO and WMO

Cassie Sutherland

Managing Director, Climate Solutions & Networks
C40

Dr. Martha Vogel

Climate Scientist
Red Cross Red Crescent Climate Centre



01 Executive Summary

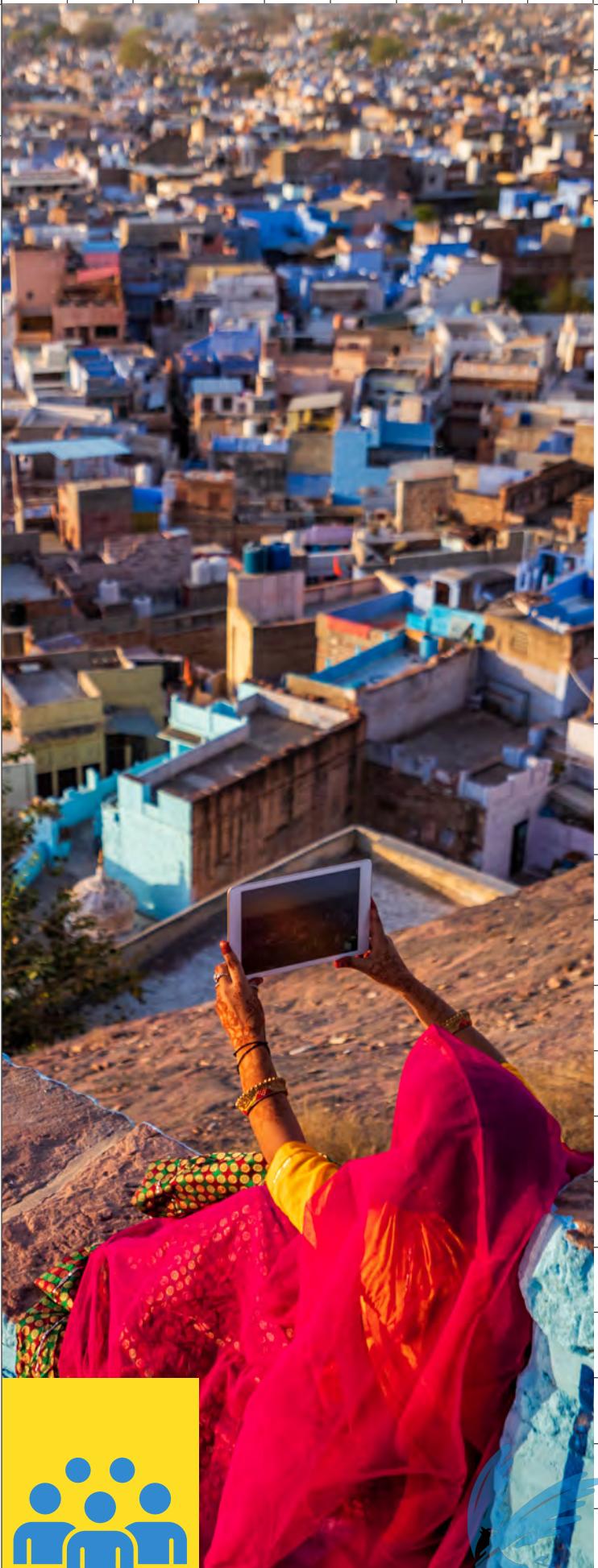
Climate change is making us sicker, and the world is not prepared to respond.

Historic rainfall is driving malaria, cholera, and dengue outbreaks and expanding the geographic reach of infectious diseases. Extreme heat kills almost half a million people each year. People all over the world are at higher risk of respiratory disease, cancer, and dementia simply because of the polluted air they breathe.

More frequent and intense climate disasters are pushing vulnerable communities—those who did the least to cause the climate crisis—past the breaking point.

The inextricable link between climate change and health is clear. Recently, the Ministerial Declaration on Climate and Health at COP28 in Dubai highlighted the threat to health that climate change poses, joining a growing chorus of organizations, reports, and forums dedicated to finding solutions to protect health in a warming climate. But the world still lacks effective systems to address the interconnected and complex nature of the climate-health crisis.

Climate change is global, but its health implications are highly local—and cities are particularly vulnerable. By 2050, nearly 70% of the world's population is expected to live in cities, each with a unique risk profile. The features that define cities—dense populations, abundant concrete, proximity to water, limited greenspace—make the air hotter and dirtier and offer more opportunities for the spread of disease. Some cities, like Delhi and Ouagadougou, are experiencing unprecedented heatwaves. Others, like Dhaka, Miami, and Dubai, have seen a rise in the frequency and severity of extreme flooding. Elsewhere, cities like Rio



de Janeiro and Ho Chi Minh City have seen significant growth in cases of dengue fever driven by a changing climate.

Yet survey data released in September 2024 from Resilient Cities Network and Yale University finds that less than one-fourth of cities are prepared with emergency protocols that integrate health into climate disaster plans. Today, too many cities are flying blind to the impact climate change is having on human health, and people are needlessly dying as a result. The Rockefeller Foundation, alongside

leading city networks such as C40 Cities Climate Leadership Group and Resilient Cities Network (R-Cities), is working to change that, and calling for urgent, local action.

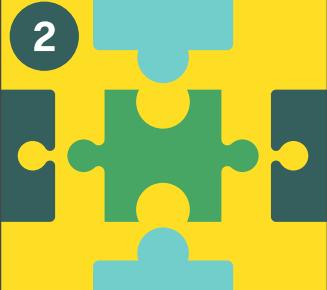
Decisive leadership from mayors and city leaders can unlock stronger partnerships with climate agencies, more accurate assessments of local health risks, and more flexible financing to warn vulnerable populations and deploy life-saving resources.

Integrating expertise from city leaders, climate experts, and finance partners, this report calls on cities to protect health by:



1

Advocating for collaboration between health and meteorological agencies to gather data and forecast the impact of climate change on the health of vulnerable populations;



2

Building local coordination for early action with leaders and experts across climate, health, urban planning, transportation, education, and civil society who apply climate insights to local prevention and response plans;



3

Preparing for future climate-related health threats by ensuring timely, effective communications reach those most at risk.





City-led action is a powerful investment and can pave the way to a healthier future. Early estimates by policy research firm Mathematica, commissioned for this report by The Rockefeller Foundation, reveal that if Dhaka were to prepare for just one heatwave that targeted the most vulnerable people in the city, the health benefits could be nearly 7 times the cost in terms of lives saved.¹ Without urgent action, climate change could cause 14.5 million excess deaths by 2050.

Local leaders recognize the specific challenges their communities face and can design and implement solutions that will have a meaningful impact on people's daily lives. Their leadership can prevent health emergencies, death, and city-wide damages from climate disasters.

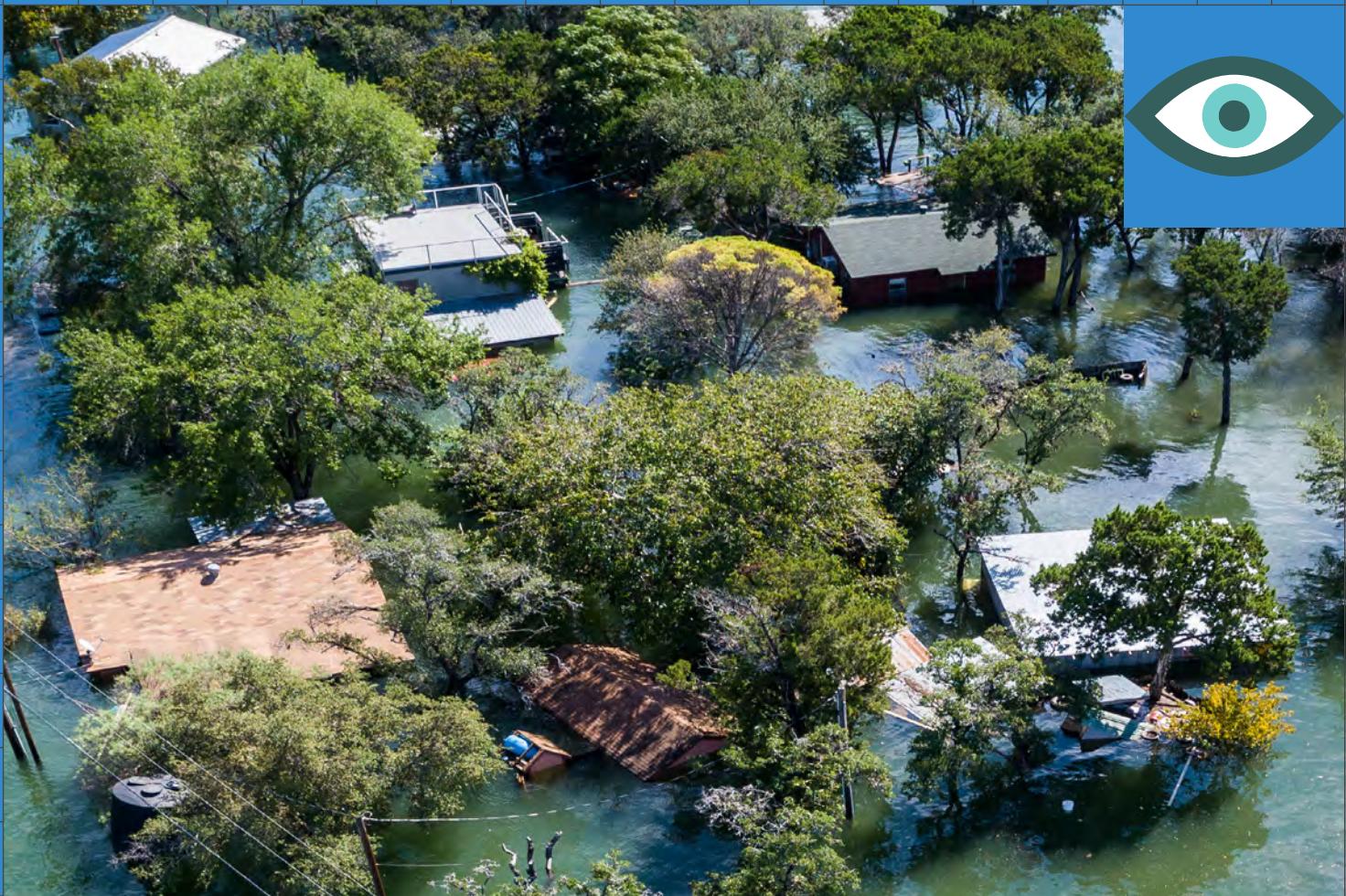
1. The analysis and calculations presented are provisional and based on high-level estimations, informed by historical findings in the academic literature, future projections, and preliminary planning efforts. These results provide initial insights and are meant to guide further exploration.

→ In **Rio de Janeiro, Brazil**, a multidisciplinary team, including Rio's Municipal Health Secretariat under the Health Surveillance Superintendence, set up the Dengue Emergency Operations Center to forecast dengue hotspots and predict spikes in early 2024. This work brought together the Operations and Resilience Center and other local partners to predict a spike two months earlier than forecasted by traditional epidemiological models, leading to timely notifications, increased deployment of resources at treatment centers, and the lowest death rate among the last four dengue epidemics.

→ In **Dhaka, Bangladesh**, the Bangladesh Red Crescent Society engaged a multisectoral team to develop an Early Action Protocol to minimize health risks during intense heatwaves. By leveraging heat forecasting and street-by-street vulnerability data, response partners in Dhaka have alerted a million people of their increased risk and deployed life-saving resources like safe drinking water and umbrellas at critical locations. If scaled to 57 countries, a warning system like this could save almost 100,000 lives a year, according to the World Health Organization and World Meteorological Organization.

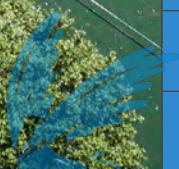
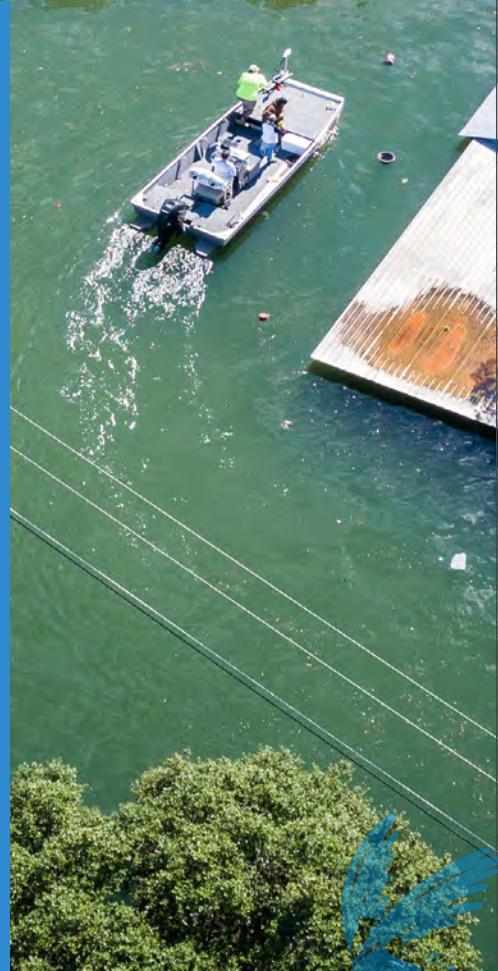
→ In **Lusaka, Zambia**, the El Niño climate phenomenon has led to acute drought and water insecurity, increasing the incidence and severity of cholera outbreaks. A Risk Communication and Community Engagement response led by the Collective Service has improved localized understanding of health-seeking behaviors and key concerns, propelling the uptake of the cholera vaccine and oral rehydration salts, which has led to fewer deaths from cholera.

There has never been a more urgent time to invest in the health of our cities. Local leaders need to advocate for close collaboration with climate agencies to translate weather data into health threat forecasts and create city-wide response plans that will keep communities safe from the global health emergency of climate change.



02. Recognizing the Climate-Health Crisis

**Health is the human face
of climate change.**



Sustained efforts from the global health and development communities have yielded decades of improvement in global public health.

But today, progress across every measure of development is threatened by climate change, and our warming planet is becoming more dangerous for everyone.

Climate-sensitive health outcomes encompass a range of interlinked environmental factors influenced by human activity that contribute to poor health:



Extreme weather events like heatwaves can lead to increased incidence of heat stroke, mental illness, and cardiac arrest.



Long-term changes in the climate can reshape geographic vulnerability and increase the range of diseases like dengue and malaria.



Air pollution caused by emissions is associated with 7 million premature deaths annually.



Climate Change

Health Risk



Vulnerability Factors

- Demographic
- Geographical
- Biological factors
- & health status
- Sociopolitical
- Health system capacity
- Gender & equity



Climate-related Hazards

- Extreme weather events
- Heat
- Sea level rise
- Air pollution
- Vector distribution & ecology
- Water scarcity
- Reduced food production



Exposure

- People & communities
- Health workforce
- Infrastructure
- Energy systems
- Water systems
- Food systems
- Health systems



Health systems must adapt to our changing climate. Even with efforts to draw down emissions, roughly 90% of projections suggest that the world, at least temporarily, will surpass the 1.5 degree warming threshold set forth in The Paris Agreement. Exceeding the 1.5 degree threshold is expected to have serious, far-reaching consequences for human health that will disproportionately burden vulnerable countries. If temperatures rise by 2 degrees, it could lead to an additional 28,000 heat-related deaths in China and hundreds of thousands more dengue cases in Latin America and the Caribbean. The health impacts of climate change are far-reaching and will disproportionately burden vulnerable countries.



EXAMPLES OF CLIMATE-INDUCED EVENTS IN 2023-24 WITH NEGATIVE HEALTH IMPLICATIONS:



Canada

Worst wildfire season on record

In 2023, more than 20 million acres were burned, compromising air quality across Canada and in parts of the United States. The number of extreme fires may rise by 50% by 2100 according to UNEP.



Brazil

Record 2.9 million dengue cases

Dengue cases increased 10x (500,000 to 5 million) between 2000-2019 due, in part, to increasing temperature and rainfall.



United Arab Emirates

Flooding caused by 1 year's worth of rain in 24 hours.

The heavy rainfall was made up to 50 times more likely by climate change.

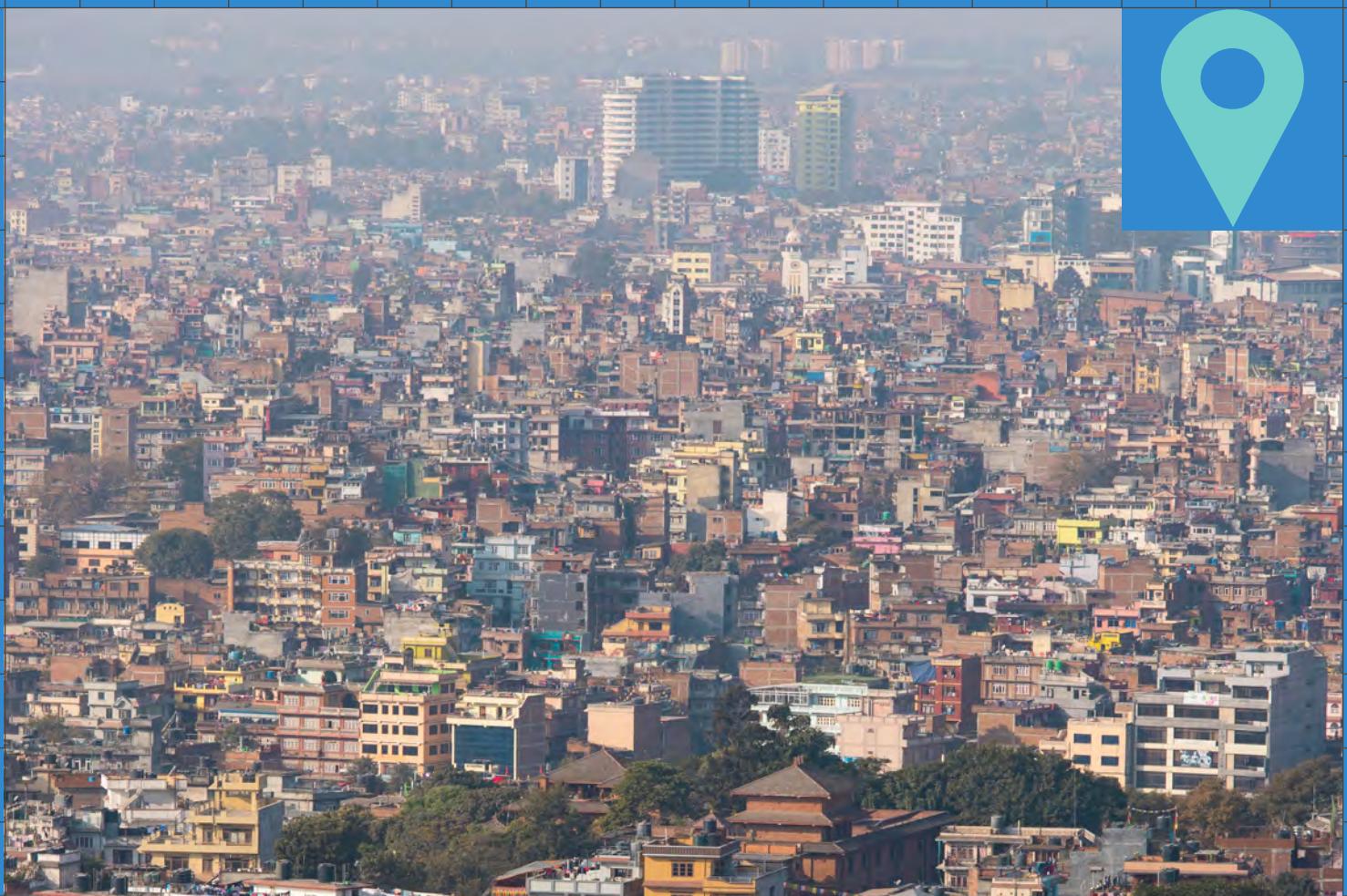


Mali

48°C/118°F heatwave, hundreds of deaths

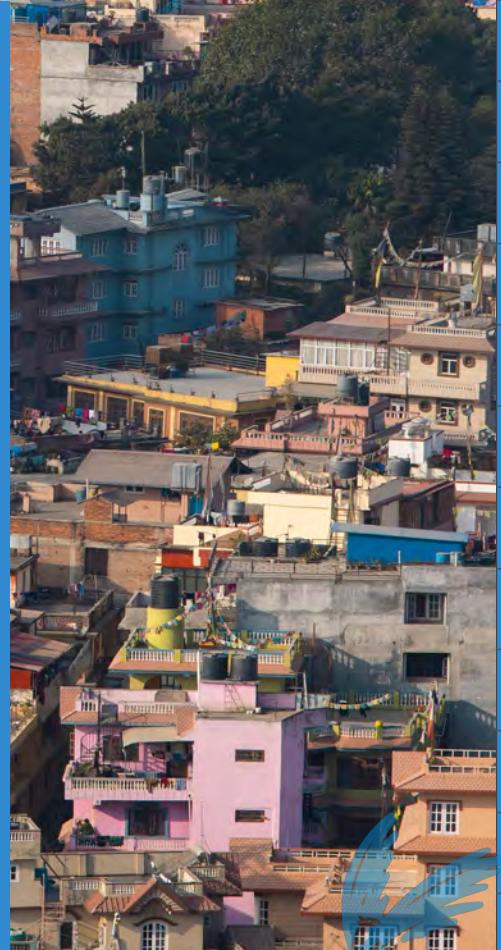
Climate change has made extreme heat events at least 10 times more likely to occur in Africa, according to World Weather Attribution scientists.





03. Cities are Central

The world is undergoing the largest wave of urban growth in history, but cities are not prepared for climate change.

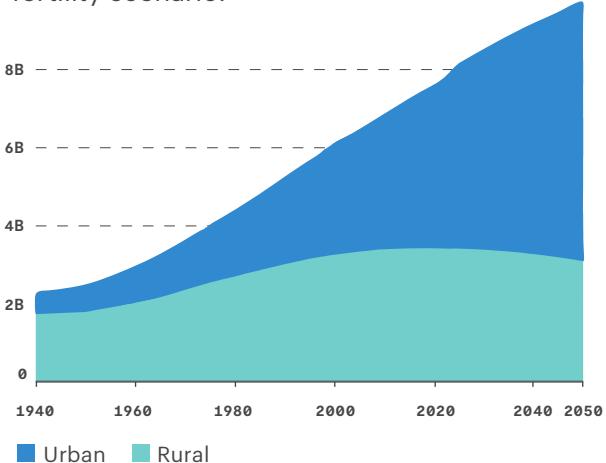


More than one-half of the world's population currently lives in urban areas, and this is projected to increase to nearly 70% - or 7 billion people - by 2050. By 2030, 2 billion people are expected to live in unplanned and informal urban settlements, with 90% of this increase concentrated in Asia and Africa.

These populations will likely bear the brunt of the direct and indirect effects of climate change, from extreme heat and variable precipitation to compromised air quality, water scarcity, and shifting incidence of infectious diseases.

URBAN AND RURAL POPULATION PROJECTED TO 2050, WORLD, 1940 TO 2050

Total urban and rural population, given as estimates to 2023, and UN projections to 2050. Projections are based on the UN World Urbanization Prospects and its median fertility scenario.



Data source: United Nations, Department of Economic and Social Affairs, Population Division (2018); HYDE (2023) OurWorldInData.org/urbanization

Urban dwellers are more vulnerable to the health impacts of climate change for a number of reasons:



Coastal locations

Nearly two-thirds of the world's large cities (>5M inhabitants) fall at least partly in low-elevation coastal zones, exposing them to flooding and increasing the impact of heat from high humidity.



Heat islands

Cities are particularly vulnerable to the health effects of extreme heat, given the "urban heat island" effect.



Infectious disease

The combined dynamics of rapid, unplanned urbanization and warming temperatures are changing the transmission patterns of vector-borne diseases like dengue and malaria.



Concentrated risk

Given the dense concentration of populations, extreme weather events affect a much larger number of people when they strike cities.



Limited infrastructure

Many cities, and especially informal settlements within them, lack the infrastructure, green spaces, and other assets that would reduce their vulnerability to heatwaves, heavy precipitation, and other extreme weather events.

Urban health systems must respond to the rapid demographic, social, and disease transitions they face. Given the projected rates of urban population growth and cities' vulnerabilities, health must be a priority in city climate planning. But there is currently a lack of action on climate-related health adaptation in cities.

Urban Pulse: Identifying Resilience Solutions at the Intersection of Climate, Health and Equity

Report of the 2024 Survey of Cities

Through the [Urban Pulse Initiative](#) – a collaboration between Resilient Cities Network and Yale University to identify urban health and climate priorities – The Rockefeller Foundation supported the [Urban Pulse: Identifying Resilience Solutions at the Intersection of Climate, Health and Equity](#) survey of city and civil society leaders around the world to capture insights on climate-health priorities and challenges. The survey received 191 responses from 118 cities in 52 countries, representing nearly every region in the world, and found:



Nearly 70% of cities recognize the dangers posed to health by severe climate threats such as extreme heat, flooding, and air pollution.



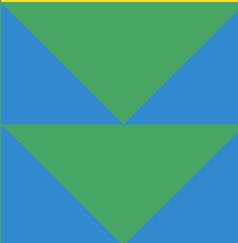
Less than 1/4 of cities have a Climate Resilience Plan or other planning tool that integrates climate and health.



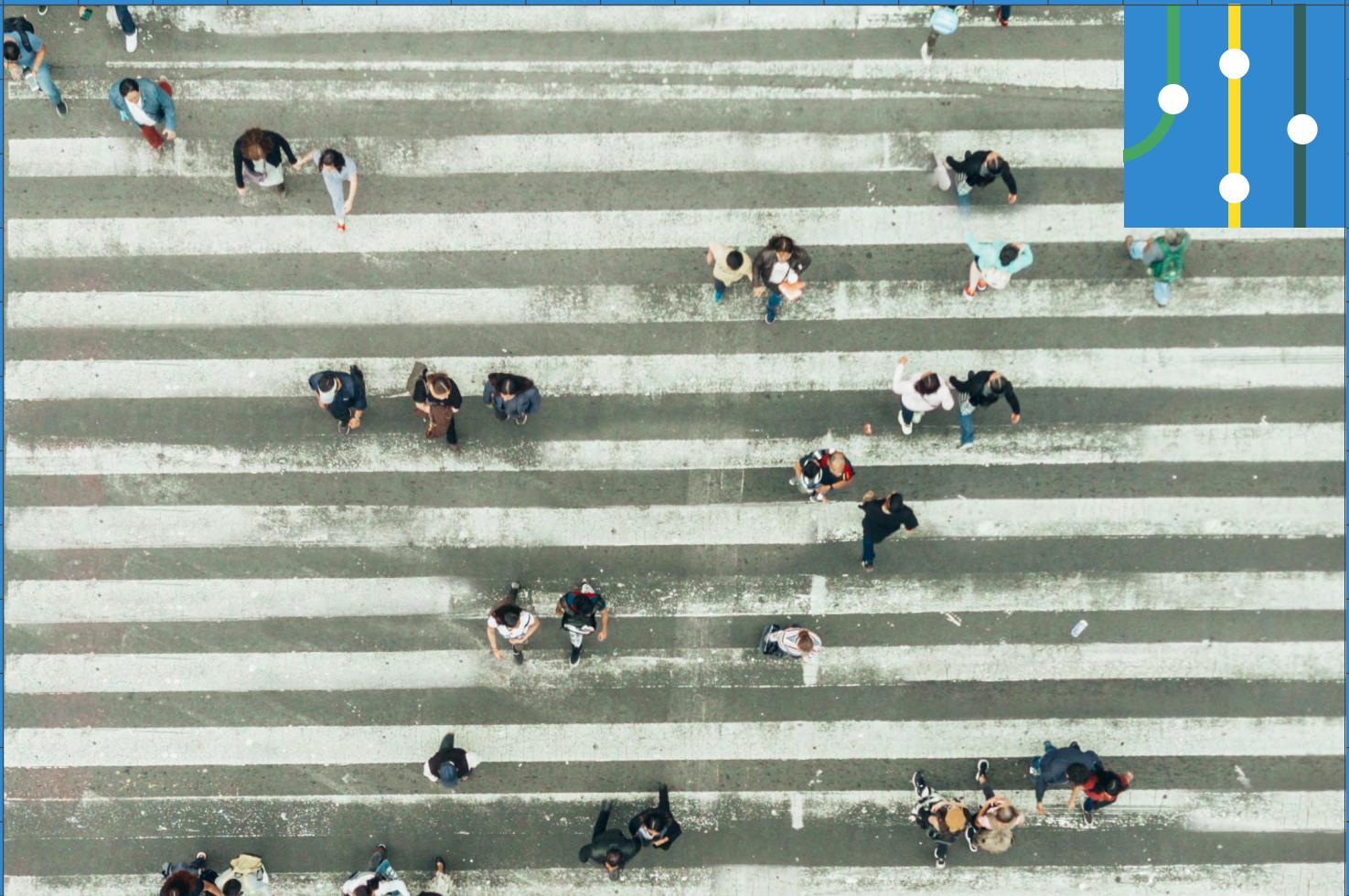
Only 30% of cities have reliable access to early warning systems for climate threats.



The majority of cities noted insufficient cross-sectoral and cross-departmental coordination in tackling climate-health issues.

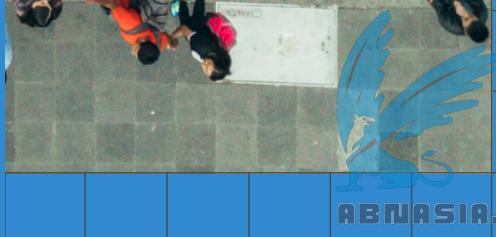


Nearly all cities reported economic losses due to climate threats (~92% of cities report losses due to extreme weather events, including heatwaves).



04. A Pathway for Local Action

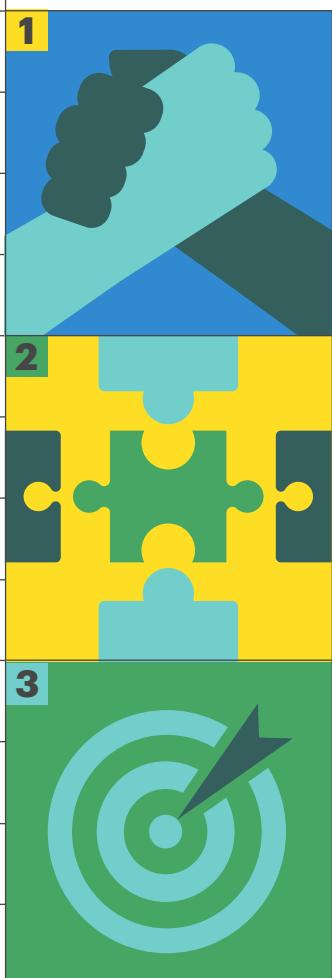
A new approach to deliver
climate-informed health
action in cities



This report calls for a new approach to address the urban-climate-health nexus to save lives. Developed as part of an ongoing consultation with academics, practitioners, funders, governments, and normative agencies working across climate science, health systems, and urban resilience, this report calls for the scale-up of a **three-step approach** to address the urban-climate-health nexus, with local capacity at its heart, supported by a national policy environment and global public goods.

For cities to effectively deliver climate services for health, we propose an “always on” system that brings together expertise and capacity across sectors and is institutionalized within government agencies.

A successful local delivery system will require three key elements:



Cities around the world are already implementing components of this three-step approach and are observing a meaningful impact on people’s lives.

Each component of the model is illustrated by a corresponding case study showcasing how locally led action saved lives during a climate-aggravated health emergency. Additional case studies are included in the Appendix.





Collaboration between health and meteorological agencies

Currently, most health systems do not take climate threats into consideration when mapping vulnerability to health risks. This preparedness gap will only widen as climate change accelerates.

Climate and health professionals often use different language and terminology and are not experts in each other's fields. Partnerships must be built to produce appropriate information and insights that can be easily understood by the full range of relevant stakeholders and translated into action.

Climate services for health, defined by the World Meteorological Organization as the entire iterative process of collaboration between relevant climate and health decision makers and researchers, can bridge the gap between climate data and the health sector. Climate services for health can help health decision-makers better understand and respond to climate and health threats, including understanding how and when climatic changes will impact health systems and populations. However, only 23% of ministries of health currently use meteorological data in health surveillance systems.

Partnerships between the climate and health sectors provide answers to a range of critical questions that health systems need to plan and respond, such as:

Health Threat	Critical health systems questions requiring climate information
Heat stress	When are heatwaves expected this year?
Drought-induced food shortages	When and where will the next drought event likely occur (to pre-position food supplements)?
Poor access to care	Which populations will not have access to healthcare during flood events?
Cholera	How many days after a flood/drought event are cholera cases expected to increase?
Diarrhea	Where will diarrhea cases likely increase/decrease during La Niña events?
Broken cold chain	Which health facilities are most at risk of power cuts during extreme events (to relocate vaccines and other medicines that require a cold chain)?

Collaboration between the climate and health sectors must be institutionalized at the national level and with systems and capacities that respond to appropriate, timely, and right-sized action. As national entities, meteorological services do not often produce climate models that are granular enough to forecast localized health vulnerabilities.

Effective coordination and systemic partnerships between the climate and health sectors will yield focused and routine analysis, which will provide decision makers with timely, actionable insights. The WHO-WMO Joint Office produced a comprehensive [implementation plan](#) to set out the foundational areas for local implementation that provide the greatest opportunity for rapid progress.



Collaboration between health and meteorological agencies

Heatwaves in Senegal



Problem

Senegal is highly exposed to heatwaves and sustained high temperatures, with health impacts ranging from heatstroke to severe cardiovascular illnesses. Despite having robust meteorological data, a lack of integration between the Senegalese meteorological service (ANACIM) and the Ministry of Health and Social Action (MSAS) hampered effective early warning systems for heatwaves, leading to a critical information gap that failed to mitigate adverse health impacts during extreme weather events.

Climate and health partnerships in action

The collaborative efforts of ANACIM, the Directorate General of Public Health (DGSP) within MSAS, and the National Oceanic and Atmospheric Administration (NOAA) resulted in the first Heatwave Early Warning Bulletin, published in 2022, which included a color-coded map of heatwave-prone zones in Senegal, the specific health impacts of heatwaves, and prospective mitigation measures.

In March of 2023 the Bulletin was piloted in the Fatick region, given its high exposure to heatwaves. Fatick's governor was supportive of the Bulletin and it had cross-sectoral support from the Health, Youth, Environment and Interior departments, strengthening collaborative efforts and enhancing the sustainability of the heat-health early warning system. Crucially, the Bulletin enabled locally relevant early warning messages to be disseminated to residents via text and radio, and facilitated the coordination of Red Cross volunteer activities in advance of anticipated heatwave events.



Impact

In Fatick, a survey of over 600 residents revealed positive behavioral changes related to seeking shade, protecting livestock, and distributing water based on the early warnings. Medical workers were also found to be better equipped in communicating with citizens, anticipating patients, and reaching specific vulnerable groups.

The expansion of the Bulletin has encouraged the Senegalese government to create frameworks for joint efforts on various environmental issues. ANACIM and MSAS's collaboration underscored the importance of synergy across state departments, drawing on a mutual understanding of climate services and their role in addressing health sector needs.

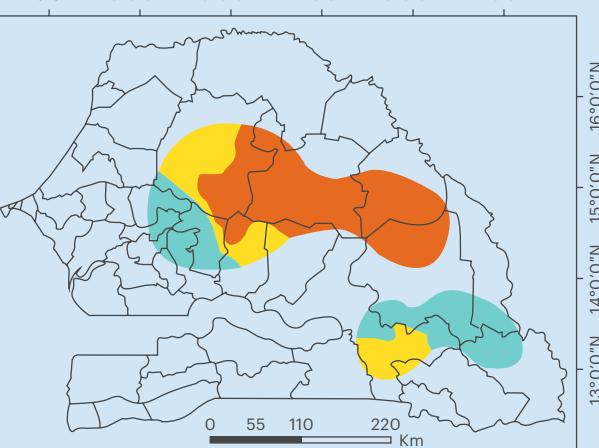
Bulletin d'alerte précoce aux vagues de chaleur et impacts pour la santé

Bulletin n°: 12

Date de diffusion: 26 Juin 2024

Période de validité: du 26 Juin au 02 Juillet 2024

17°0'0"W 16°0'0"W 15°0'0"W 14°0'0"W 13°0'0"W 12°0'0"W



Niveau de vigilance

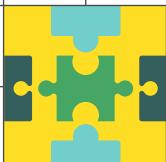
DANGEREUX
TRÈS INCONFORTEABLES

SURVEILLANCE
DÉPARTEMENT

Niveau de risques sanitaires

Niveau de vigilance	Alerte	Impact sanitaires
Très Dangereux	Très Dangereux Coup de forte chaleur possible	Aggravation possible des maladies cardio-vasculaires et pulmonaires
Dangereux	Dangereux Coup de chaleur possible	Epuisement, syncope, déshydratation sévère, crampes
Très Inconfortable	Très Inconfortable Attention aux personnes vulnérables	Déshydratation, étourdissements, maux de tête, vertiges
Surveillance		Négligeable





Local, multisectoral coordination for early action

23

A Pathway for Local Action

A local multisectoral, “always on” coordination team must be established, containing all expertise necessary to address climate-health challenges.

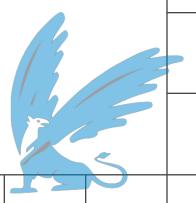
This team should meet regularly and should be accountable for bringing climate insights into local prevention and response plans. This is critical to ensure that health decisions are not left to a single set of stakeholders who may not have the necessary tools or authority to act.

Coordination teams should include health and meteorological expertise, as well as experts/input from other sectors relevant to vulnerabilities in that area—for example, transportation, power and education. They should also include members from civil society to ensure that the needs of vulnerable people are understood and to maintain positive relationships across population groups.

Coordination mechanisms like these are common during individual emergencies, such as floods, heatwaves, or disease outbreaks. However, they are rarely developed as “always on” capabilities that can drive long-term preparedness and planning by considering climate impacts on local health when there is no immediate emergency. Developing an “always on” multisectoral coordination mechanism reporting to a local authority would dramatically improve the climate resilience of health in many local contexts.



An important part of rapid, consistent and evidence-based decision making is to have a set of response protocols already in place as part of risk assessment and strategic planning processes. These protocols specify a threshold (for example, if the temperature is forecast to rise above a certain level), and a response (for example, actions could include distributing drinking water and providing shade). Well-designed protocols, based on scientific evidence and backed up by clear responsibilities, available assets and monitoring mechanisms, give cities the best chance of rapidly responding when – or even before – an emergency arises.



Local, multisectoral coordination

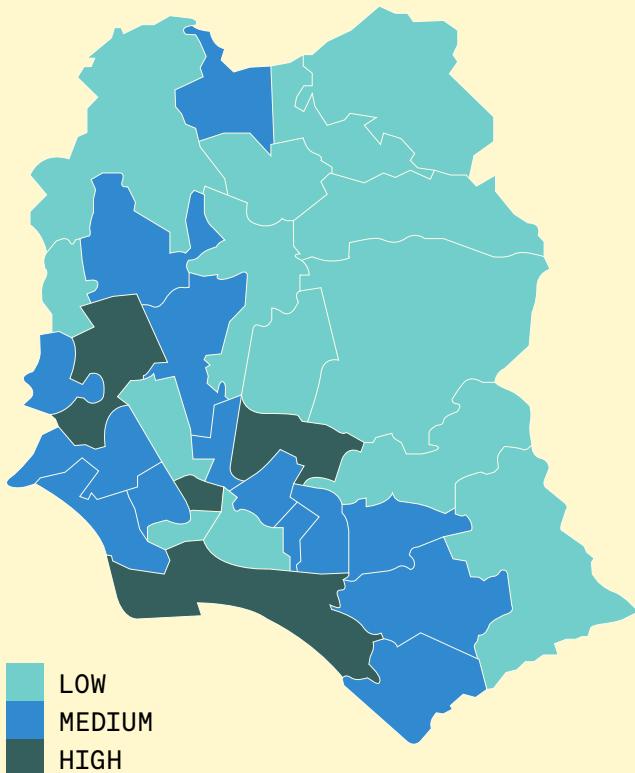
Heatwaves in Dhaka



Problem

Given its geographic location, dense population, unplanned urbanization, and pre-monsoon climate, Dhaka City was identified as acutely vulnerable to heatwaves. However, little action has been taken to designate heatwaves as a national emergency or to allocate resources to preparedness and response.

Relative exposure to heatwaves after combining heat island effect, population density and built-up area using weightage



Multisectoral coordination team in action

Recognizing this, the Bangladesh Red Crescent Society (BDRCS) collaborated with disaster preparedness and response partners to develop an Early Action Protocol (EAP) to minimize health risks during intense heatwaves.

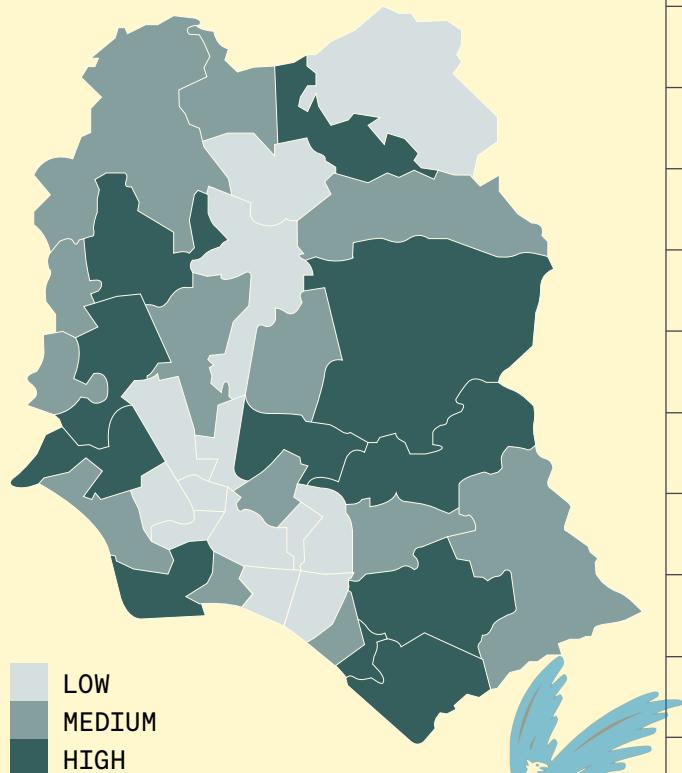
The EAP clearly defines what should be done during a heatwave, where it should be done, and with what funds. The EAP has three core components:

- 1. A “trigger”, or a specific threshold value based on climate forecasts and risk data;**

- 2. Pre-defined actions to be taken when a trigger is reached; and**

- 3. Forecast-based financing, or the release of funds to carry out the pre-defined actions.**

Relative vulnerability to heatwaves in Dhaka city



Impact

The EAP was activated in April 2024, as Dhaka experienced its longest heatwave in recorded history. Over 13 days, BDRCS and partners protected the lives and livelihoods of vulnerable groups in Dhaka through the:



Distribution of 3,500 umbrellas and 3,500 protective caps to at-risk populations



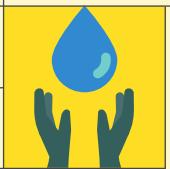
Dissemination of awareness messaging to 1 million residents in 129 localized wards



Distribution of multi-purpose cash grants of at least 5,000 BDT (43 USD) to 4,000 households, including a top-up of 2500 BDT for 243 households with persons with disabilities



Installation of 3 cooling stations with in-house medical teams, psychosocial health experts, and first aid support, serving 15,000 individuals



Provision of safe drinking water to 30,000 recipients at critical locations





Effective communication initiatives

Effective communication that builds trust with the local community is critical for response efforts.

How people receive information, how they make sense of the world, and who they trust have been affected by dramatic changes in technology. This makes it harder for people to access, understand and act on information, especially in life-threatening situations.

Breakdowns in communication occur when response efforts fail to meet the needs of the impacted community during an emergency. These breakdowns are attributed variably to mis- and disinformation, historic and current systemic inequities, politicization of the crisis, and other factors. But the root cause is a lack of trust. Trust is the single most important determinant of action – trust in government and institutions, trust in local leaders, trust in healthcare and humanitarian aid, and trust in each other. Building trust requires effective communications strategies developed with the community before, during, and after emergencies.

Often, official communications during emergencies can only be delivered through nationally mandated authorities. Declaring an emergency for a drought, for example, would be owned nationally according to meteorological service protocols. The time lag due to communication protocols create information gaps where people will look

elsewhere for information, a ripe moment for mis- and disinformation to spread. In addition, the messenger – a nationally mandated authority – may recommend actions that are not based in the reality facing communities on the ground, eroding trust in the institutions meant to serve them.

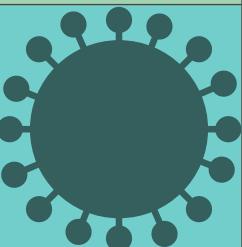
Communication cannot begin and end during an emergency or when stakeholders are required to act. It is most effective when it is “always on,” and done in close coordination with community leaders, relevant city- and national-level officials, and service providers. This requires building relationships with local community leaders and conducting bottom-up listening activities to better understand the needs of the community. Using this knowledge, communication strategies can reach intended audiences more effectively with messages that resonate. This ensures a two-way learning process that includes feedback loops and refinement, to ensure public trust and effective action.



Photo credit: Rachel James/Collective Service

Risk communications

Cholera in Lusaka



Problem

The El Niño climate phenomenon, marked by increased surface temperatures, has contributed to drought conditions in Zambia, amplifying the incidence and severity of cholera outbreaks. In Lusaka, the negative health impacts of cholera are further amplified by inaccurate risk perceptions, misinformation, and barriers to accessing health services. After a significant surge in cholera cases in early 2024, the Zambia Ministry of Health looked to understand why most deaths were occurring in communities, outside of formal healthcare settings.

3Cs to stop Cholera



Clean and safe water



Clean hands



Early care

Effective communication in action

The Collective Service, a partnership between IFRC, UNICEF, and WHO, conducted Risk Communication and Community Engagement (RCCE) activities to inform cholera response efforts. Identifying Lusaka as a high-burden region, the Collective Service trained partners to conduct Rapid Qualitative Assessments (RQAs), including interviews with people from communities affected by cholera, to understand the social, cultural, and behavioral factors influencing transmission.

The Collective Service synthesized findings from each round of RQA and uploaded them to a centralized community feedback mechanism (CFM), visualized via a data dashboard. This dashboard, also including other forms of community feedback collected by trained response partners, was then shared with the MoH, partners, and response pillars to inform activities at community, district, and provincial levels.

Impact

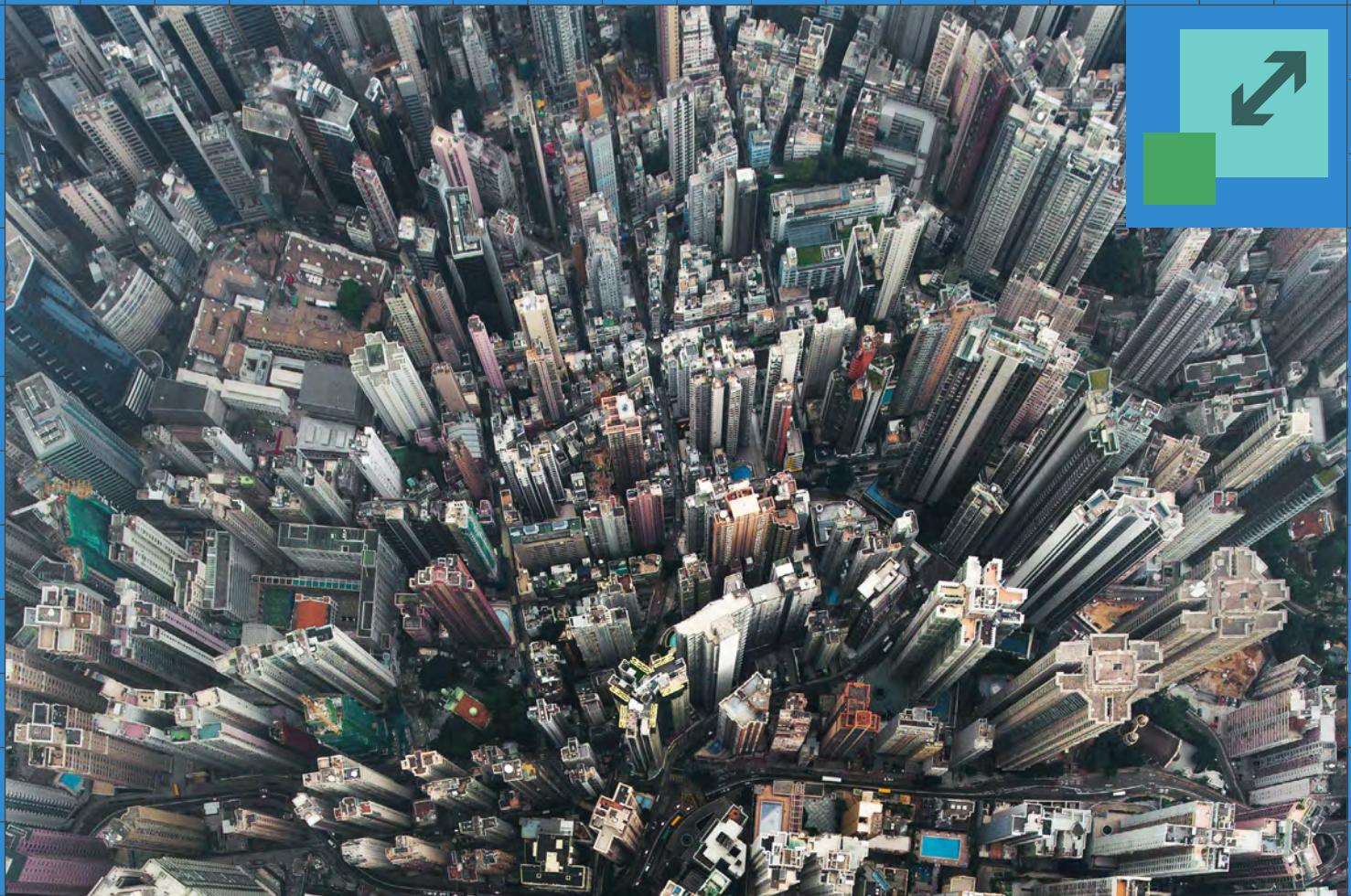
The Collective Service facilitated a flexible and dynamic cholera response. For instance, when a lack of transportation was identified as a key barrier to timely and effective health-seeking behaviors, the Ministry of Health and UNICEF jointly funded and allocated seven ambulances to transport patients. And when mixed messaging around cholera prevention was found to cause confusion, an infographic on 3Cs for cholera (Clean water, Clean hands, Early care) was developed in multiple languages, and its core messaging was shared through 15 national FM radio stations with an estimated listenership of 10 million.

RCCE partners were able to reach more than 2 million community members in Lusaka and its surrounding provinces, contributing to an increased uptake of oral rehydration solution, 100% uptake of oral cholera vaccines, and a decline in community deaths.

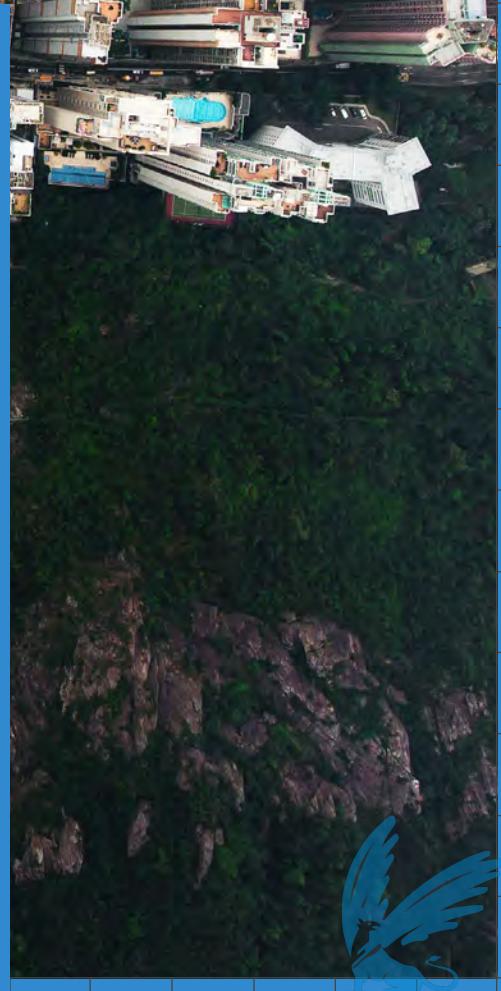




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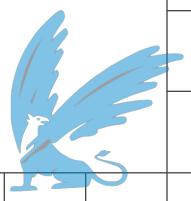
05. Scaling the Local Approach





While this approach is focused on local delivery, it cannot succeed without an enabling policy and fiscal environment at the national and international levels.

For that reason, The Rockefeller Foundation recommends national governments, multilateral institutions, and normative bodies work together to accelerate local climate-health action by empowering mandated authorities to address the realities facing cities, developing national plans and frameworks for climate adaptation, and developing global goods and norms to accelerate financing and scale up of effective climate and health solutions.



Mandated Authority

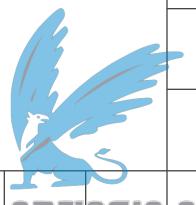
Effective, localized climate services for health require sufficient prioritization, collaboration and authoritative action that cannot take place without the leadership of a mandated authority, which is often the mayor in an urban setting.

Different geographies have different governance and legal frameworks. In some countries, especially small states, only national leadership has sufficient mandate to drive action, even at the local level. In other contexts, such as large, federated states, the sub-national level will be where authority lies. Some cities, such as Nairobi, have authority vested primarily at a municipal level, i.e., a smaller unit than the city itself.

Given these differences, there is no single solution that will fit all contexts. However, an overarching governance structure that trickles down to the smallest administrative units, may be the most effective way to ensure that local leaders have the power to make decisions, allocate resources, and respond to the specific factors affecting the health of their communities. For example, this could mean appointing a senior sub-national leader with responsibility for a city, such as the Deputy Chief Minister of Karnataka State in India, who has specific responsibility for planning in Bangalore.



The single most important role of the mandated authority is to prioritize specific climate risks (e.g., a heatwave), and activate the collaborative work needed across government and society to ensure that climate information is effectively used within their jurisdiction to improve health resilience for those prioritized challenges.



National Policy

National policy must reflect and be responsive to local resources and capacities, constraints, and on-ground needs.

National Adaptation Plans (NAPs) can provide an overarching strategic framework, while simultaneous Vulnerability and Adaptation Assessments (VAAs) can offer a more granular analysis of risk and exposure, to guide localized action under a national framework. In fact, climate services have been identified in several Health NAPs as critical to public health action.

As outlined by the WHO-WMO implementation plan, national coordinating mechanisms can strengthen alignment across ministries of health, national meteorological offices and other institutions that often have lines of authority that fail to engage with, and address, the local level where climate vulnerability is most felt. National governments must also establish a local mandate for coordination to set the conditions for local climate-health action.

Nationwide standard operating procedures (SOPs) and protocols for how different agencies should collaborate will ensure that climate services for health can translate into streamlined local delivery. SOPs may include, for example, mandates around data sharing and cross-departmental training to facilitate multisectoral collaboration and efficient response capabilities.

National actors are also best placed to create mechanisms for the cross-sectoral transfer of data as digital public goods, including climate, epidemiological, and community data. Traditionally, much of this data may not be shared due to siloes



between sectors at both national and global scales. A platform for sharing data resources at all scales would thus streamline local response processes, by avoiding unnecessary duplication and barriers to sharing.

Finally, national governments can produce, incentivize and promote capacity development for professionals operating at the nexus of climate and health. Producing a cadre, at the national level, of skilled professionals who are conversant in the fields of both climate and health, and particularly in the intersections between the two, would serve as a key resource for implementers at the local level. Building such cadres can be done in a range of ways, both through formal educational programs and through career development and secondment tracks.



Global Goods

Some critical enablers of local leadership come in the form of global goods that benefit many countries at once, encourage intergovernmental dialogue on climate and health priorities, and contribute to reducing global inequities in climate vulnerability and preparedness.

The international community should prioritize access to climate and development financing that supports countries in scaling local approaches. Importantly this can help supplement local budgets for climate-informed health actions and provide critical knowledge support, without undermining the agency of local authorities.

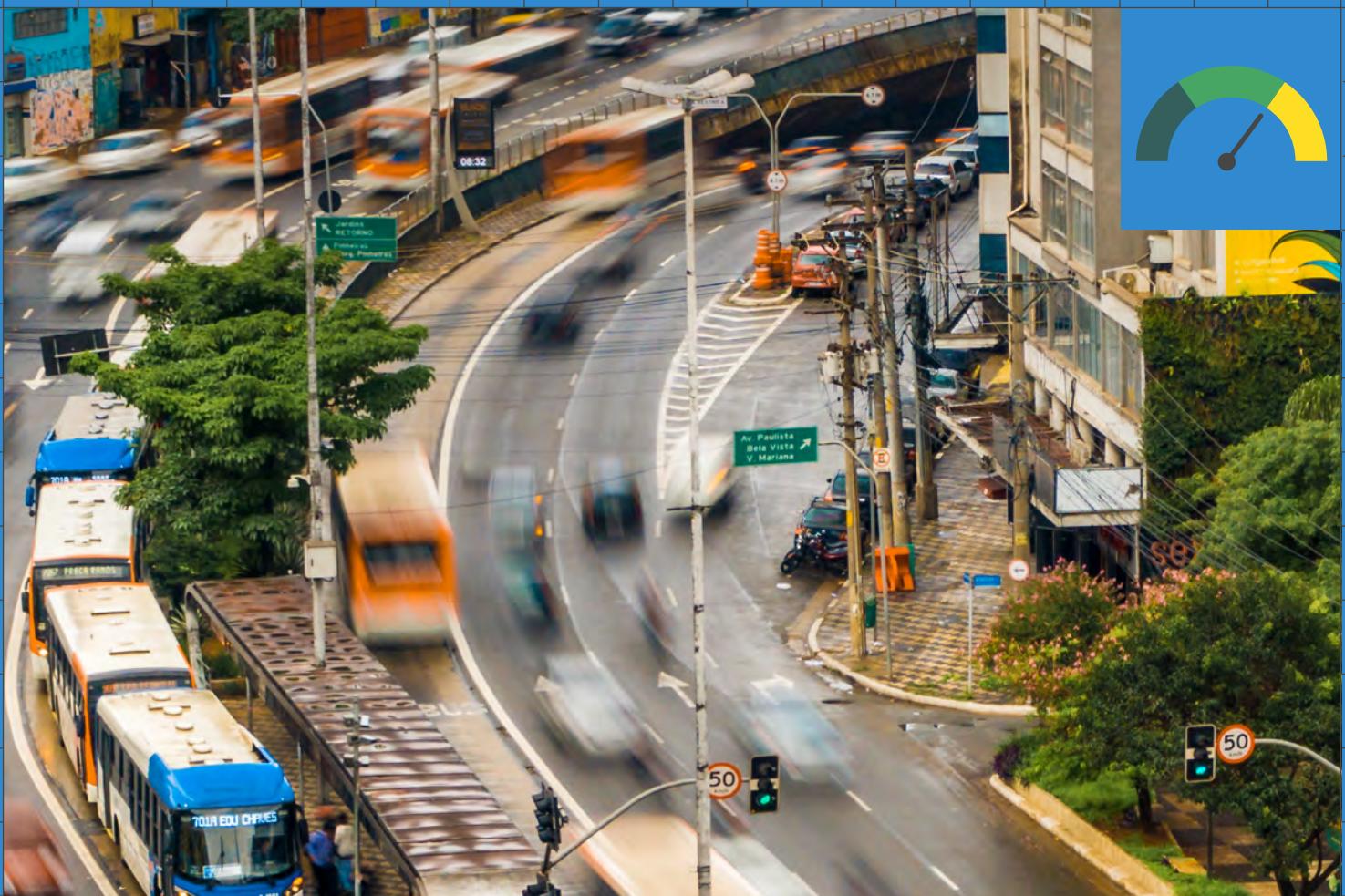
Model laws and regulations, and technical standards and guidance, can support the scaling of best practices. Whether developed in consultation with international organizations or created in individual countries and then made widely available, shared technical standards can maximize the efficiency of national and sub-national health services, and advance the global field of climate-informed health action by drawing on established experience and evidence. Well-developed peer-learning networks, including global convenings and agreements, are key to sharing these ideas, experiences and capacities.



Scientific research and the development of new technical tools (e.g., analytics software and data dashboards), wherever it is carried out, should be designed to be as widely applicable as possible, and globally accessible. Data processing tools often sit with high-income countries, where analytical tools are inapplicable to low- and middle-income countries. Additionally, these tools are often not taken up by government systems, including public health, due to their complexity, poor maintenance, and low interoperability. Ensuring ease of use and cross-contextual relevance of these data tools is thus paramount. To maximize their value as global public goods, knowledge resources and technical products must be collaborative, equitable, and user-centric from their inception.



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06. Accelerating Implementation



Climate change is destabilizing health systems and pushing vulnerable communities past the breaking point. We must rapidly advance climate-informed health systems driven by powerful partnerships that share a common language for climate and health issues, leveraging improved intelligence and local, and local, multisectoral collaboration.

City-led action is a powerful investment in our collective future. Early estimates by Mathematica commissioned for this report by The Rockefeller Foundation reveal that if Dhaka were to prepare for just one heatwave that targeted the most vulnerable people in the city, **the health benefits could be nearly 7 times the cost in terms of lives saved.²**

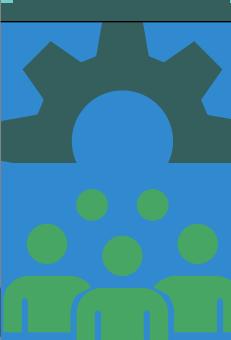
Yet, despite the tremendous benefits to communities and economies, barriers to implementation persist. Limited resources and an uneven political focus on climate issues mean that health is not always prioritized in climate adaptation planning. Collaborative networks require common skillsets and standards to succeed, which are not always available, while most countries lack formal mechanisms for climate and health agencies to work together. And quality climate data and analytic tools are not often available.

Cities—housing the majority of the world’s population—must rise to the challenge and advocate for stronger partnerships between climate and health agencies, build responsive multisectoral coordination teams, and establish trusted lines of communication with at-risk populations.

There is a role for everyone to play. In addition to advocating for the scaling up of climate-informed health action:



City leaders must recognize the unique role they play in the climate and health crisis, advocate for the specific needs of their communities, and engage in climate-informed health system planning.



Policymakers across the health, finance, and environmental sectors must increase their coordination, communication, and collaboration, building sustainable partnerships between health, climate and meteorological agencies.



The research community must continue to advance the evidence base and investment case for urban climate-informed health action.



Funders must recognize the immense economic benefits of preparing health systems for climate change and make meaningful investments in urban resilience planning.

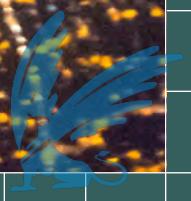
With the right partnerships, data, and communication, we can scale and accelerate climate-informed health solutions. There is no time to waste.



2. The analysis and calculations presented are provisional and based on high-level estimations, informed by historical findings in the academic literature, future projections, and preliminary planning efforts. These results provide initial insights and are meant to guide further exploration.



Appendix: Case Studies





Climate and health sector collaboration Dengue in Bangalore

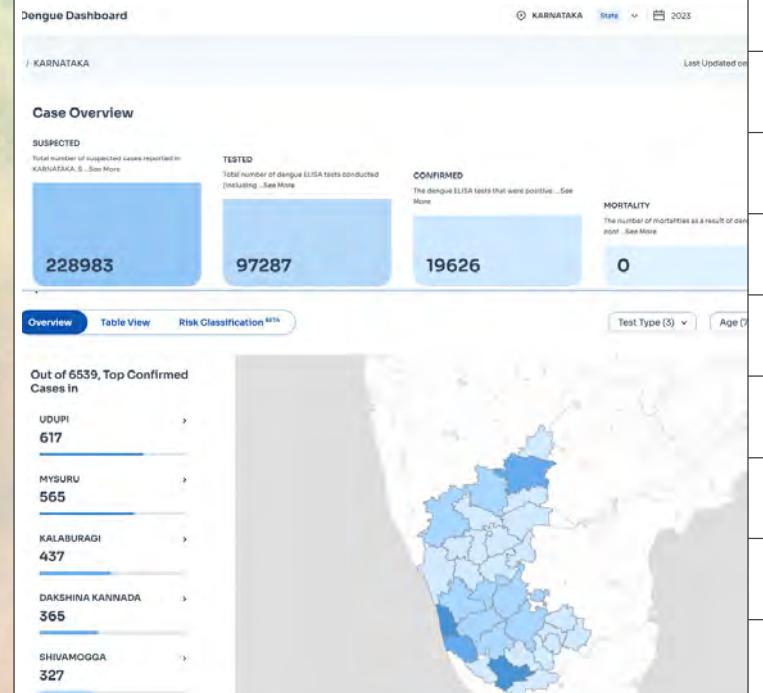
Problem

The incidence of dengue is heightened in Bangalore over the summer monsoon season when pools of stagnant water emerge, relative humidity rises, and temperatures increase, forming the ideal breeding ground for *Aedes aegypti* mosquitoes. Climate change has only worsened seasonal outbreaks, as longer rainy seasons and more frequent flooding have allowed mosquitos to thrive. In 2023, Karnataka State recorded its highest number of dengue cases in a decade, with health officials looking for ways to better anticipate, monitor, and manage these cases.

Analytics in action

The Artificial Intelligence and Robotics Technology Park (ARTPARK) built a system for tracking dengue data across Bangalore. By integrating this data with meteorological forecasts, vector surveillance, socioeconomic data, and urban land use data, ARTPARK built a platform for health practitioners across the city to better forecast, track, and respond to outbreaks.

The data is then made available through the Dengue Platform, which provides risk classification forecasts for dengue outbreaks across districts and sub-districts up to 4 weeks in advance, allowing city administrators to strategically coordinate prevention and mitigation activities.

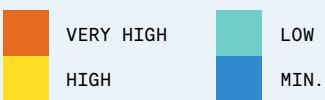
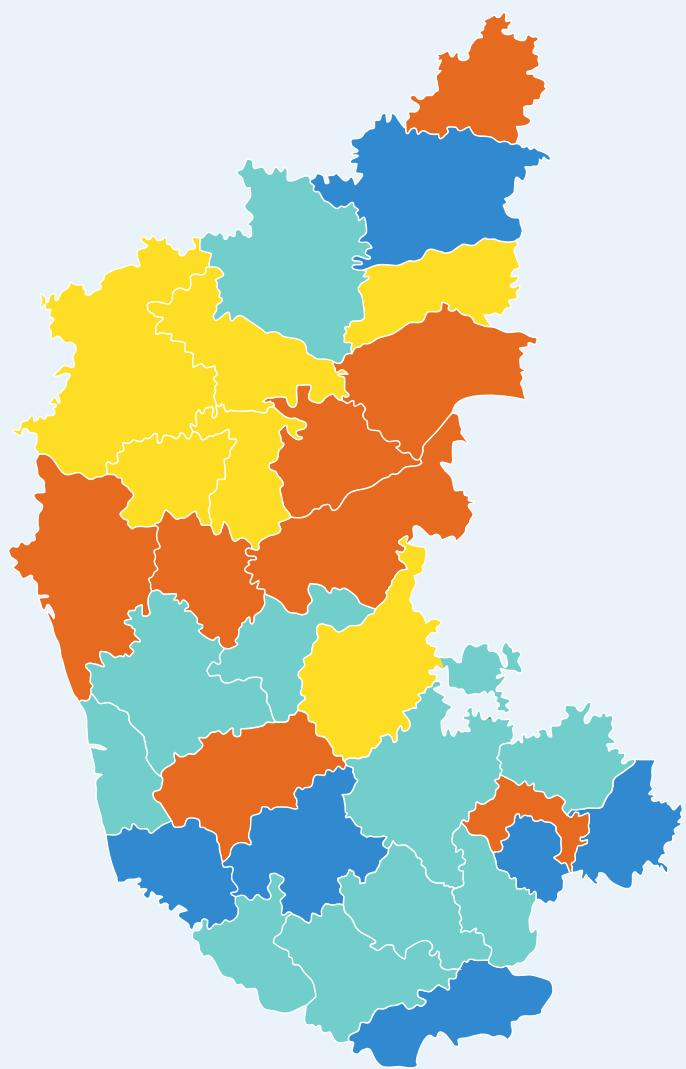


Numbers are not reflective of real case numbers, and are for demonstrative purposes only





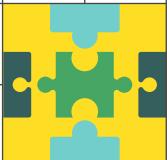
Karnataka map showing 4-week predictive risk forecasts at a district level (image for representational purposes only)



Impact

The Platform has streamlined dengue management for a population of over 7 million. The app is now being used by 1,000+ frontline community health workers and registering approximately 10,000 site surveys daily during the peak season. Frontline workers have identified over 80,000 breeding sites so far by taking a photo of a vector site and answering a short survey.

The Dengue Platform's nowcasting service has been taken up by approximately 50% of practitioners at the state level, facilitating pre-emptive disease control and resource allocation by local governments. The platform has proven so effective that it is proposed to be incorporated into the BBMP's Integrated Command and Control Center and India's Integrated Health Information Platform, a nationwide system which monitors and detects diseases early to inform interventions.



Local, multisectoral coordination

Heatwaves in Dhaka

Problem

Climate change has increased the frequency and intensity of heatwaves, with severe repercussions for human health, including heatstroke, heat exhaustion, and dehydration. Poverty, large-scale informal housing, and occupational hazards amplify the vulnerability of specific urban populations to heat stress.

A 2017 study revealed that Bangladesh's heatwaves were becoming hotter and more frequent. Given its geographic location, dense population, unplanned urbanization, and pre-monsoon climate, Dhaka City was identified as acutely vulnerable. However, little action has been taken to designate heatwaves as a national emergency or to allocate resources to preparedness and response.

Solution

Recognizing this, the Bangladesh Red Crescent Society (BDRCS) collaborated with disaster preparedness and response partners to develop an Early Action Protocol (EAP) to minimize health risks during intense heatwaves.

The EAP clearly defines what should be done during a heatwave, where it should be done, and with what funds. The EAP has three core components:

1 A “trigger”, or a specific threshold value based on climate forecasts and risk data;

2 Pre-defined actions to be taken when a trigger is reached; and

3 Forecast-based financing, or the release of funds to carry out the pre-defined actions.

Impact

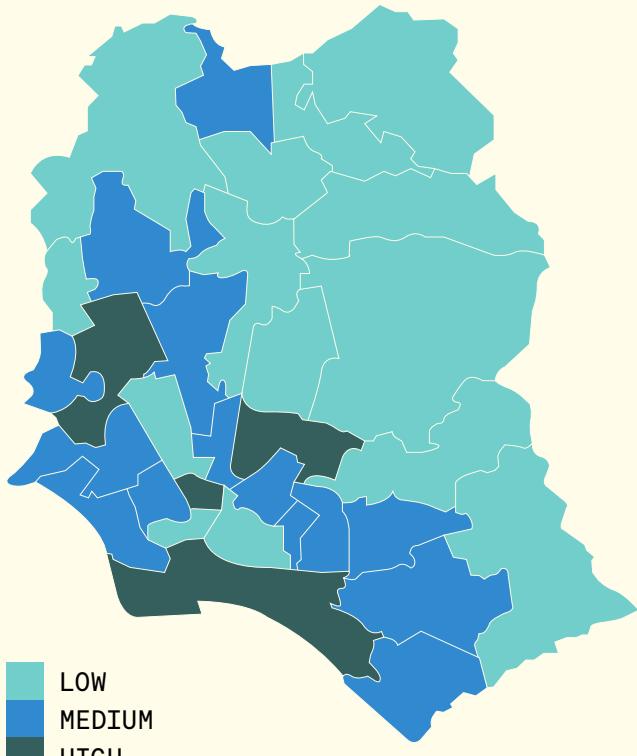
The EAP was activated in April 2024, as Dhaka experienced its longest heatwave in recorded history. Over 13 days, BDRCS and partners protected the lives and livelihoods of vulnerable groups in Dhaka through the:

- Installation of 3 cooling stations with in-house medical teams, psychosocial health experts, and first aid teams, serving 15,000 individuals;
- Provision of safe drinking water to 30,000 recipients at critical locations;
- Distribution of 3,500 umbrellas and 3,500 protective caps to at-risk populations;
- Dissemination of awareness messaging to 1 million residents in 129 localized wards;
- Distribution of multi-purpose cash grants of at least 5,000 BDT (43 USD) to 4,000 households, including a top-up of 2500 BDT for 243 households with persons with disabilities.

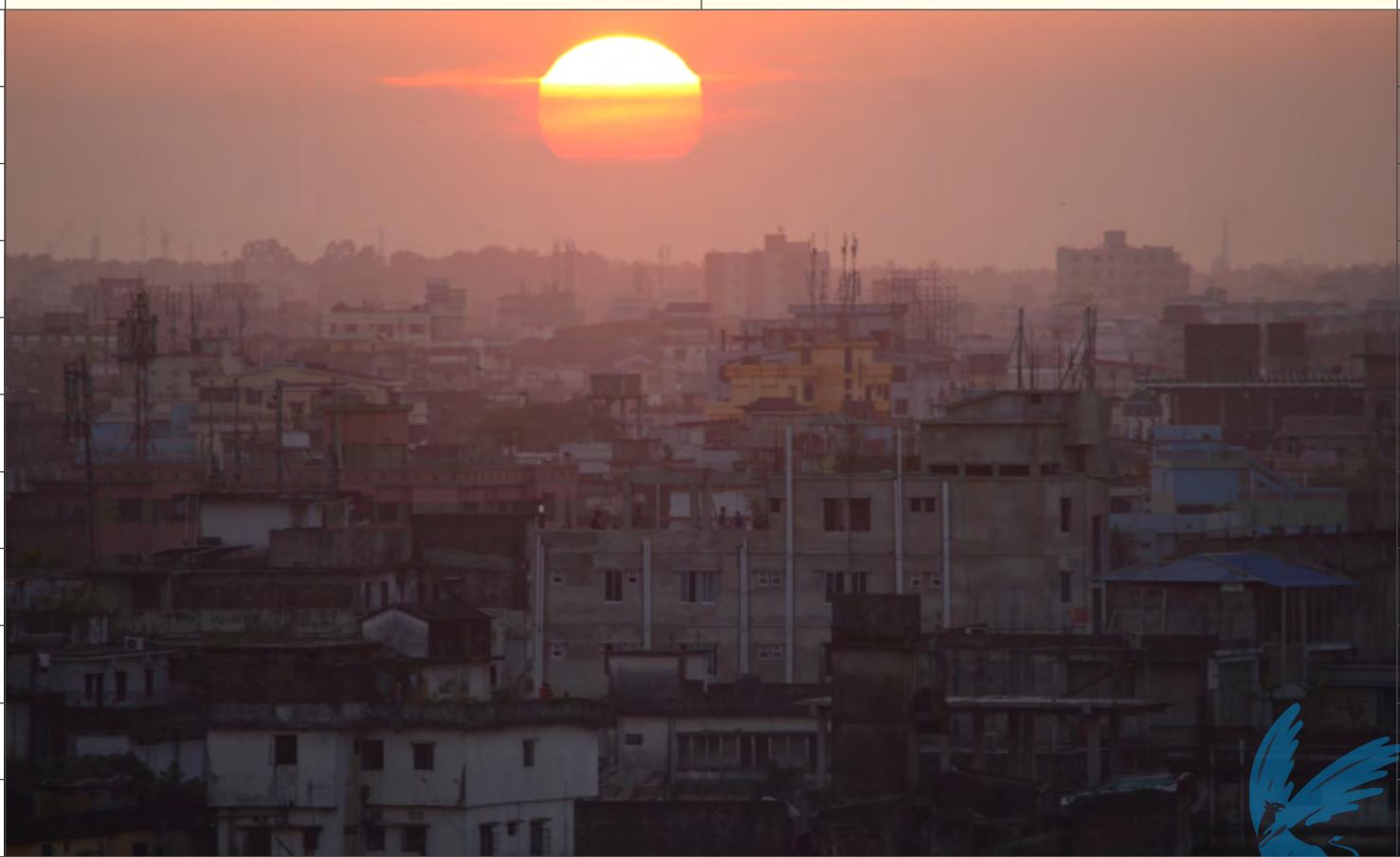
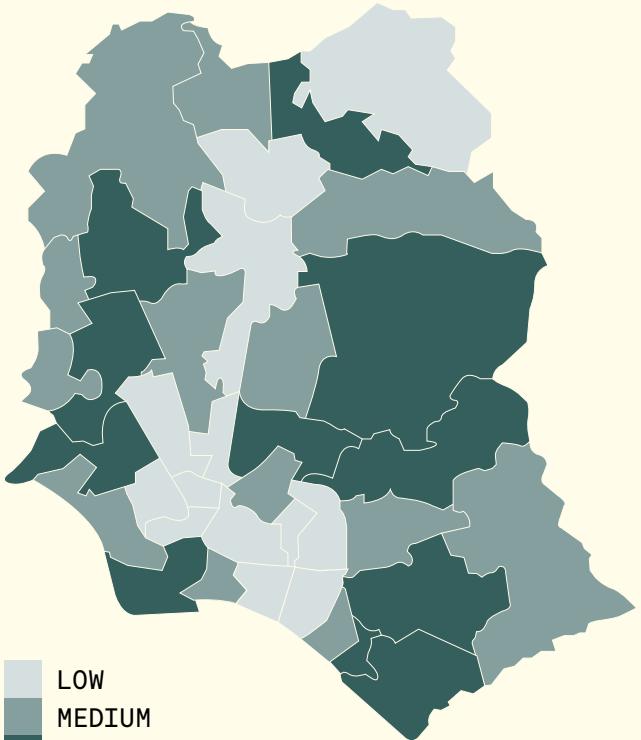
The BDRCS is now engaging with Bangladesh's Directorate General of Health Services and other actors to explore the development of a National Early Action Protocol for heatwaves.

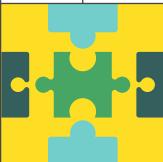


Relative exposure to heatwaves after combining heat island, population density and built-up area using weightage



Relative vulnerability to heatwaves in Dhaka city





Local, multisectoral coordination Dengue in Rio de Janeiro

Problem

Although Brazil has long been recognized as a leader in dengue management, the emergence of joint climate-health risks has highlighted the need for new forms of cross-sectoral partnerships to build coherent responses and increase urban resilience. A combination of factors has contributed to a marked increase in the number of dengue cases in Brazil, with a disproportionate burden in cities such as Rio de Janeiro, which reported 10,000 dengue cases in one month at the start of 2024.

Solution

Rio's Municipal Health Secretariat (SMS) worked alongside the Health Surveillance Superintendence (SVS) to set up the Dengue Emergency Operations Center (COE Dengue). The multidisciplinary team brought together experts in entomology, meteorology, geography, and urban planning to ensure a coordinated response that equipped all sectors with tailored dengue management capabilities.

The team identified breeding hotspots with city-wide epidemiological monitoring. SVS built health surveillance models to track dengue cases and georeferencing tools to determine when and where cases were spiking while an IT sub-unit provided programming support, maintaining the data infrastructure. Critical climate data, combined with health service data, was uploaded to a shared platform accessible to SVS, COR, and other local agencies, providing a four-week predictive window for planning and executing management strategies.

Impact

Bringing these actors together in a centralized Operations Center facilitated a coordinated, real-time response strengthened by transferring skills and knowledge across teams. In 2024, SVS was able to predict a spike in dengue cases two months earlier than forecasted by traditional epidemiological models, georeferencing 90% of new dengue cases within just a few days of their occurrence. Their model resulted in the inspection of over 2.8 million properties and the elimination of 447,000 breeding sites in the first three months of 2024.



Photo credit: Edu Kapps/ SMS-Rio





Risk communications Cholera in Lusaka

Problem

The El Niño climate phenomenon, marked by increased surface temperatures, has contributed to drought conditions in Zambia, amplifying the incidence and severity of cholera outbreaks. In Lusaka, the negative health impacts of cholera are further amplified by inaccurate risk perceptions, misinformation, and barriers to accessing health services. After a significant surge in cholera cases in early 2024, the Zambia Ministry of Health looked to understand why most deaths were occurring in communities lacking formal healthcare settings.

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Impact

The work of the Collective Service facilitated a flexible and dynamic cholera response. For instance, when a lack of transportation was identified as a key barrier to timely and effective health-seeking behaviors, the Ministry of Health and UNICEF jointly funded and allocated seven ambulances to transport patients. And when mixed messaging around cholera prevention was found to cause confusion, an infographic on 3Cs for cholera (Clean water, Clean hands, Early care) was developed in multiple languages, and its core messaging was shared through 15 national FM radio stations with an estimated listenership of 10 million nationally.

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3Cs to stop Cholera



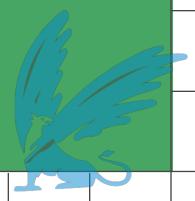
Clean and safe water



Clean hands



Early care





Collaboration between health and meteorological agencies Heatwaves in Senegal

Problem

Senegal is highly exposed to heatwaves and sustained high temperatures, with impacts ranging from heatstroke to worsening cardiovascular illnesses. Despite having robust meteorological data, a lack of integration between the Senegalese meteorological service (ANACIM) and the Ministry of Health (MoH) hampered effective early warning systems for heatwaves, leading to a critical information gap that failed to mitigate adverse health impacts during extreme weather events.

Multisectoral coordination in action

The collaborative efforts of ANACIM, national health services and practitioners, and the National Oceanic and Atmospheric Administration (NOAA) resulted in the first Heat Wave Early Warning Bulletin, published in 2022, which included a color-coded map of heatwave-prone zones in Senegal, the specific health impacts of heatwaves, and prospective mitigation measures.

A year after its production, the Bulletin was shared with a cross-functional group of experts from environmental groups and the University of Dakar for feedback and refinement.

Impact

The Bulletin acted as an early warning signal, enabling timely interventions across sectors and response partners like the National Red Cross Society. Health authorities capitalized on existing networks to send the bulletin to all districts and local organizations, who further amplified the information through their respective networks.

The expansion of the Bulletin has encouraged the Senegalese government to create frameworks for joint efforts on various environmental issues. ANACIM and MoH's collaboration underscored the importance of synergy across state departments, drawing on a mutual understanding of climate services and their role in addressing health sector needs.

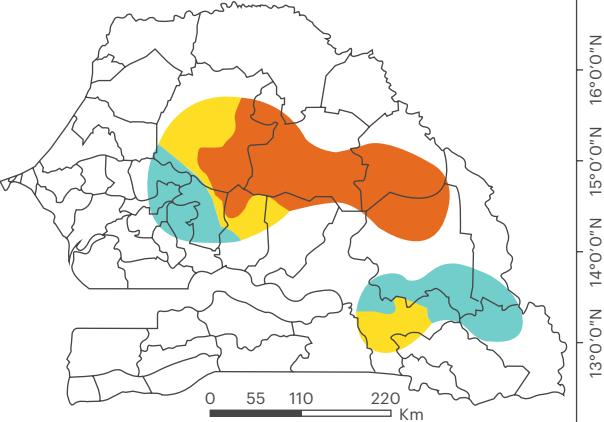
Bulletin d'alerte précoce aux vagues de chaleur et impacts pour la santé

Bulletin n°: 12

Date de diffusion: 26 Juin 2024

Période de validité: du 26 Juin au 02 Juillet 2024

17°0'0"W 16°0'0"W 15°0'0"W 14°0'0"W 13°0'0"W 12°0'0"W



Niveau de vigilance

DANGEREUX
TRÈS INCONFORTEABLES

SURVEILLANCE
DÉPARTEMENT

Niveau de risques sanitaires

Niveau de vigilance	Alerte	Impact sanitaires
	Très Dangereux Coup de forte chaleur possible	Aggravation possible des maladies cardio-vasculaires et pulmonaires
	Dangereux Coup de chaleur possible	Epuisement, syncope, déshydratation sévère, crampes
	Très Inconfortable Attention aux personnes vulnérables	Déshydratation, étourdissements, maux de tête, vertiges
	Surveillance	Négligeable





National policy

National Adaptation Plans (NAPs) and Vulnerability and Adaptation Assessments (VAA) in Uganda

Problem

Uganda ranks among the most vulnerable countries to climate change globally, positioned at 173 out of 185 on Notre Dame's GAIN index for climate vulnerability and readiness. Despite this high level of vulnerability, most sectors, except for agriculture, have not yet developed comprehensive National Adaptation Plans (NAPs). This gap has left many areas, particularly the health sector, exposed to the adverse impacts of climate change.

Vulnerability assessment in action

Recognizing the urgent need to address climate-health risks, the Ministry of Health (MoH) of Uganda identified an opportunity in early 2023 to develop a Vulnerability & Adaptation Assessment (VAA) and a Health National Adaptation Plan (HNAP). These initiatives aimed to better understand the specific health-related threats posed by climate change and to develop plans to mitigate these risks.

The VAA and HNAP were published in August 2024. The next steps involve integrating the HNAP into broader government development and climate policies, including Nationally Determined Contributions (NDCs) and annual work plans and budgets. Additionally, efforts will focus on mobilizing domestic and external resources, such as applying for funds from the Green Climate Fund, to support the implementation of the HNAP.

Impact

The development of the VAA and HNAP has positioned Uganda to effectively address climate-related health risks by leveraging local and external resources.

Four key factors contributed to Uganda's success:

Wide Awareness

There was broad recognition of Uganda's significant vulnerability to climate-sensitive health risks as well as environmentally mediated health risks given Uganda's history with Ebola and other diseases.

Political Will

Strong support and commitment from the national government facilitated the initiatives.

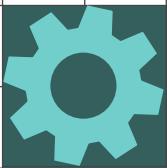
Climate-Health Leadership

The prior appointment of a climate-health lead within the national government ensured focused and dedicated leadership.

National Climate Policy

An established national climate policy underscored the priority of addressing climate issues.





Context: Digital Square Global Goods

Digital Square is an innovative multi-donor initiative that creates a thriving global marketplace for digital health. It coordinates stakeholders and funders to align digital health priorities with country needs, advances scalable and sustainable digital public goods (global goods), and supports countries in adapting and deploying digital health technologies. Since its inception in 2016, Digital Square has mobilized over \$140 million for digital health transformation across 33 countries. By partnering with governments, donors, and the private sector, it improves the design, use, and funding of digital health tools, enhancing healthcare delivery worldwide.

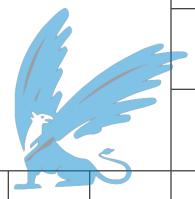


SORMAS – the Integration of One Health to Build Climate-Resilient Surveillance Systems

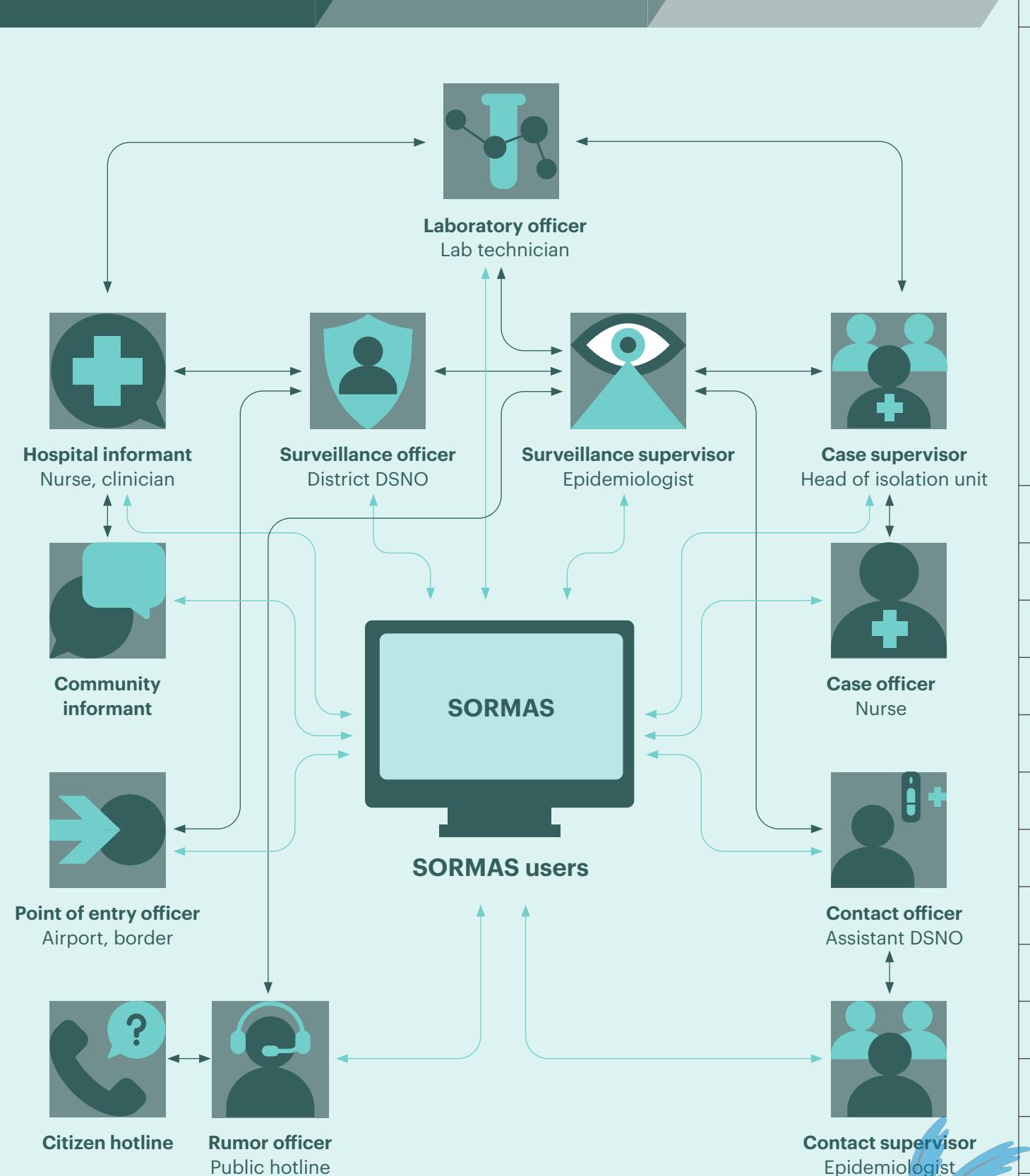
The collaborative efforts of ANACIM, during the 2014-2015 Ebola epidemic, Nigerian authorities identified several challenges in outbreak management, which seriously hindered the appropriate application of disease control and response measures. SORMAS, an open-source platform that enables real-time data sharing and task management, was created to address gaps in surveillance and outbreak management in Nigeria.

With the onset of the COVID-19 pandemic, SORMAS was adapted with a disease-specific module and additional features. Its demand at a global level exponentially increased exponentially, leading to its use in additional countries including Ghana, Ivory Coast, Nepal, Tunisia, Djibouti, Afghanistan, Luxembourg, and Bolivia.

To address the growing threat of climate change-related infectious diseases and emergencies, SORMAS will integrate the One Health approach. As a first step, a new module for environmental surveillance has been created, that triangulates environmental and epidemiological data to make early warning, control, and response efforts more effective.



How SORMAS operates





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Manisha Bhinge
Vice President
The Rockefeller Foundation

Emilia Carrera Herrera
Director
The Rockefeller Foundation

Hassan Damluji
Co-Founder
Global Nation

Lucia Del Zotto
Senior Designer
Ahoy Studios

Gerishom Gimaiyo
Director, Health – Africa Regional Office
The Rockefeller Foundation

Vanshika Goel
Summer Associate
The Rockefeller Foundation

Connie Koch
Founder and Creative Director
Ahoy Studios

Greg Kuzmak
Director, Health
The Rockefeller Foundation

Cara Lew
Deputy Director
Global Nation

Naveen Rao
Senior Vice President, Health
The Rockefeller Foundation

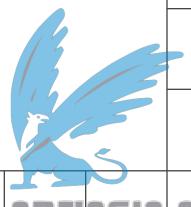
Alex Robinson
Manager
The Rockefeller Foundation

Andrew Sanger
Writer
The Rockefeller Foundation

Denise Sommer
Partner and Creative Director
Ahoy Studios

Alice Westerman
Manager
Global Health Strategies

Estelle Willie
Director, Health Policy
The Rockefeller Foundation





rockefellerfoundation.org

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