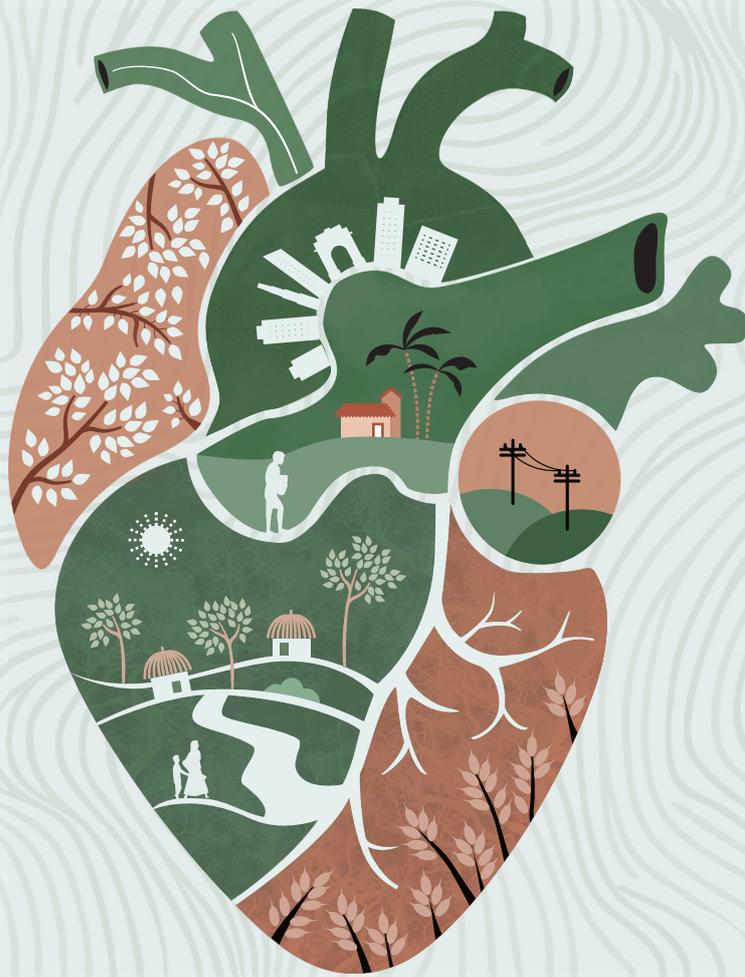


Under the Weather: India's Climate-Health Intersections and Pathways to Resilience



FEBRUARY 2026



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List of Abbreviations

- ABDM** – Ayushman Bharat Digital Mission
AIIMS – All India Institute of Medical Sciences
AMC – Ahmedabad Municipal Corporation
ANMs – Auxiliary Nurse Midwives
AQM – Air Quality Management
ASHAs – Accredited Social Health Activists
ATREE – Ashoka Trust for Research in Ecology and the Environment
AYUSH – Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy
- BS6** – Bharat Stage VI
- CDRI** – Coalition for Disaster Resilient Infrastructure
CHIP – Community Health Integrated Platform
CNES – Centre for North East Studies and Policy Research
CSR – Corporate Social Responsibility
CSWs – Community Health Workers
CSEP – Centre for Social and Economic Progress
CVD – Cardiovascular Disease
- DFCA** – Doctors for Clean Air and Climate Action
DRE – Decentralized Renewable Energy
- GHHIN** – Global Heat Health Information Network
GIS – Geographic Information System
- HAPs** – Heat Action Plans
HMIS – Health Management Information System
HWCs – Health and Wellness Centers
- ICD** – International Classification of Diseases
IDSP – Integrated Disease Surveillance Programme
IEC – Information, Education, and Communication
IHIP – Integrated Health Information Platform
IIPH – Indian Institute of Public Health
IMD – India Meteorological Department
INCCA – Climate Change Assessment
ISA – International Solar Alliance
- Jhpiego** – Johns Hopkins Program for International Education in Gynecology and Obstetrics
- LCF** – Lung Care Foundation
LiFE – Lifestyle for Environment
- MHT** – Mahila Housing Trust
MMU – Mobile Medical Unit
MoHFW – Ministry of Health and Family Welfare
- NAPCC** – National Action Plan on Climate Change
NAPCCHH – National Action Plan on Climate Change and Human Health
NCDC – National Centre for Disease Control
NCDs – Non-Communicable Diseases
NCRB – National Crime Records Bureau
NDMA – National Disaster Management Authority
NGOs – Non-Governmental Organizations
NPCCHH – National Programme on Climate Change and Human Health
- ORS** – Oral Rehydration Solution
- PHCs** – Primary Healthcare Centers
PM2.5 – Fine particulate matter measuring 2.5 micrometres or smaller
PRA – Participatory Rural Appraisal
- SAPCCHH** – State Action Plans for Climate Change and Human Health
SEEDS – Sustainable Environment and Ecological Development Society
SELCAP – Sustainable Energy Led Climate Action Program
- UNEP** – United Nations Environment Programme
UNESCO – United Nations Educational, Scientific and Cultural Organization
- WASH** – Water, Sanitation and Hygiene
WASSAN – Watershed Support Services and Activities Network
WHO – World Health Organization
WHO-ATAACH – World Health Organization's Alliance for Transformative Action on Climate and Health
WRI India – World Resources Institute India

Foreword

I belong to the Mising community, one of the largest tribal groups in Assam. Our life and culture are deeply interwoven with nature, the land, and the waters of the Brahmaputra. However, in recent times, erratic rainfall, extreme heat, and declining fish populations have made farming unpredictable. Despite these challenges, I continue to farm with resilience and faith, embodying the traditional wisdom of the Misings and our deep reverence for the natural world.

We mostly cultivate *Ahu dhan* (rice), mustard, and mati-maah (black gram). Earlier, floods were predictable. We knew that during June, July, and August, the fields would be underwater. It was difficult, but we were prepared. Our *chang ghar* (stilt houses) protected us. Our community possesses great resilience, in our fields, we ploughed together, shared our meals and worked together from sowing of the seeds to bringing the harvest home

The embankments have changed the flow of the river. Crops like *bau dhan* cannot grow without proper water, and the floods that used to nourish the soil now bring more damage. We used to be able to predict monsoons, and the rains that came in the months of *Kati* and *Aghun* guided us in planting and harvesting. But in recent years, nobody can say when the rain will come. The heat has increased, winters are short, and even the nights don't feel cool anymore.

Earlier, even during floods, the air felt fresh. Now, you feel breathless. Women especially find it difficult to work in the fields. We did not have tin roofs before, but now the tin roofs make it hotter inside our homes. We used to sleep in *mukole chang ghar* (open bamboo houses) without mosquito nets. Now, without a net, you can't sleep.

The groundwater level has also decreased. We used to drink directly from the river. Today, even after filtering the water, it's not the same. The fish population has reduced too. There used to be plenty - you could just cast a net and get enough for the whole family. Fish have become smaller and rarer. Imported fish have replaced the local ones, which affects our diet and health. Prices have gone up, but our income hasn't increased.

We still grow vegetables and keep livestock. Some families have started small horticulture projects and diversified their crop production. People now talk more about organic farming and storing water. However, without collective effort and external support from civil society and government bodies, it's difficult.

My hope is that our next generation continues to grow their own food and does not depend entirely on markets. I want to see organic farming flourish. If we protect our trees, our water, and our traditional knowledge, nature will protect us.

Don't forget the ways of your elders. Respect the trees, the rivers, and the soil. They are our teachers. Whenever people complain about the heat or floods, I tell them to look at the trees. When trees are destroyed, humans will be destroyed too. Nature has always looked after us; now it's our turn to look after her.

- Riju Misong

Farmer, Malapindha village in Majuli

I have been farming since I was 10–15 years old, when I first held a *Nangolor Muthi* (plough handle). I started working alongside my father, learning the way of the land.

Back then, we knew from *Kati-Aghun*ⁱ rains when to sow mustard, and even if we cultivated 10 puraⁱⁱ of seeds, we could get good yields. But monsoon patterns have shifted. For six months, we have had no rain, which has made farming unpredictable. This year, for example, we have had very little *Bhado Boroxun*ⁱⁱⁱ which is crucial for our paddy cultivation. Our land and water used to be abundant, but changes in irrigation and flood patterns have deeply affected farming.

Water scarcity has become acute, particularly in remote areas like *Malapindha*, where irrigation facilities are limited. Traditional rice cultivation now requires more water than is readily available. The heat has intensified, and the labor-intensive farming methods of the past, which relied on community participation, are no longer feasible without paid labor, adding to costs. Earlier, during the monsoon months, we could work in the fields and then jump into the river to cool off. These days it is much hotter, and even early-morning work feels exhausting because daytime temperatures often rise to 38 degrees.

We used to rely on local herbs and local foods. I remember my plate always being full of rice, fish, and vegetables. Now, with reduced local food items and more dependence on markets where vegetables are not always organic, I feel health issues such as hypertension and diabetes have increased. Fish is also an essential part of our diet and our nutrition. In the past, every household depended on fish as a main source of protein and energy. But fish populations have declined drastically due to overfishing.

Without sufficient water and adaptation strategies, agriculture and our way of life are at risk. We need context-specific technology, sustainable practices, and support to continue growing our own food. Doing so ensures our health, nutrition, and survival.

I hope to see community-based schemes restore and maintain local fish populations, ensuring that families, especially those who cannot afford market prices, have access to healthy, natural protein. I also think education and awareness about sustainable practices are important. Farmers need to know how to

i Kati and Aghun are months in the Assamese calendar. This period generally falls around October and November.

ii Unit of measurement

iii Rain in the month of Bhado. Bhado is the fifth month in the Assamese calendar, which typically falls around mid-August to mid-September

cope with changing rainfall patterns, shorter winters, and heat increases. Programs could teach water conservation, soil health, and climate-adapted crop cycles, so we don't lose our connection to the land.

We must grow our own food, protect our water, and preserve our community's health and traditions for future generations.

- Prafulla Charah

Malapindha, Majuli, Assam

Executive Summary

This document is an invitation for deeper dialogue, shared learning, and collective action toward co-creating more resilient, equitable, and climate-ready health systems in India.

Methods

The findings of this report were informed by a mixed-methods approach. We floated a pan-India online survey, inviting responses from Indian NGOs working at this intersection. The survey aimed to understand how NGOs are approaching the climate-health intersection and to identify key challenges they face. This was complemented by detailed, semi-structured interviews with 13 other NGOs. The findings were also validated with academics, experts from the government and multilateral organizations, and funders engaging in this space (N = 24).

Why Climate and Health? Why Now?

- 1. Increasing Incidents and Cascading Effects:** India is the sixth most affected country in the world by extreme weather events, according to combined estimates from the last three decades.ⁱ A large share of India's districts – nearly 40% of them – are at a high to very high risk of extreme weather events.ⁱⁱ As climate change accelerates, manifesting as floods, cyclones, heatwaves, and droughts on the ground, it is critical to think deeply about not only the immediate destruction, but also the long-drawn, often invisible cascading effects. The impacts of climate change on public health and health systems are concerning: the rising frequency and intensity of extreme weather events are shifting the country's disease burden (disease occurrence, spread, loss of life) and interrupting the delivery of critical health services (see Figure i and ii). These impacts are not distant or abstract; they have been here, disrupting health systems, undoing community well-being, and impacting economic stability.
- 2. Intensifying Burdens on the most Vulnerable:** These adverse consequences disproportionately impact the most vulnerable communities, the least responsible for the crisis, and the least equipped to withstand it, deepening existing inequities.

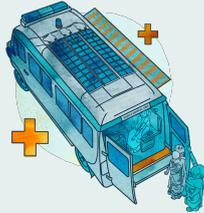
Figure ii

A Year in Climate Events

A record of extreme weather events across India, this timeline offers a snapshot of the scale and spread of disruptions affecting health and daily life.

TORNADO

A tornado struck Mainaguri in Jalpaiguri district, eastern state of West Bengal, causing over 500 injuries



CYCLONE, HEAVY RAINS

Cyclone Remal triggered heavy rain and thunderstorms in North-Eastern India Mizoram, Assam, Nagaland, Meghalaya, and West Bengal

HEATWAVE

Bihar experienced unusually warm nights during the heatwave, causing thermal discomfort and disrupted sleep, a pattern reinforced by declining night-time cooling

FLASH FLOODS

Himachal Pradesh recorded 51 flash floods since the start of the monsoon.

LANDSLIDES

In Southern India, Kerala's Wayanad district witnessed landslides that marked the state's worst natural disaster since the 2018 floods.

DROUGHT

The Andhra Pradesh government declared 54 sub-districts drought-affected during the monsoon cropping season

UNSEASONAL RAINS

1,295 hectares of land in Nashik and Jalgaon districts in state of Maharashtra Western India were damaged due to unseasonal rains



January

COLD WAVE CONDITIONS

Cold wave conditions affected Northern India states Punjab and Haryana, forcing school closures for nearly 10 additional days

February

HEAVY SNOWFALL, FLOODS

Hilly states Sikkim, Jammu & Kashmir, and Himachal Pradesh received heavy snowfall, followed by floods and landslides

March

April

HEATWAVE

National capital Delhi reported its highest-ever temperature of 126° F, marking an unprecedented heatwave for the city

May

SEVERE HEATWAVE

Phalodi recorded 122 °F during a severe heatwave, the highest temperature in Rajasthan

June

LIGHTNING

Madhya Pradesh in central India reported the highest number of lightning fatalities (188) and accounted for 47% of all lightning incidents nationwide

July

August

HEAVY FLOODING

Tripura faced its worst floods in three decades, displacing around 34,000 people who were moved to safer areas

September

HEAVY FLOODING

Heavy flooding in western India state - Gujarat led to the evacuation of 42,000 people and caused 49 deaths

October

November

CYCLONE, HEAVY RAINS

Cyclone Fengal made landfall near Puducherry, bringing heavy rainfall and strong winds to north Tamil Nadu and flooding low-lying areas

December



Source: Dasra analysis based on compilation from multiple news outlets

How is Climate Change Impacting Health Outcomes and Health System Resilience?

The reported extreme weather events, which have become a year-round phenomenon also have implications for the health systems in multiple ways

1. **Demand-side pressures:** The impact of climate change is being felt on the demand side through a shifting disease burden, seasonality, and widening geographical spread. It also has implications for the health-seeking behavior of communities, as floods and cyclones affect the accessibility of facilities, particularly in remote regions. Similarly, the increased incidence of heatwaves has been linked to an increased disease burden, while also restricting access to healthcare facilities.
2. **Supply-side vulnerabilities:** On the supply side, climate change is leading to an increased vulnerability of frontline health workers to extreme weather events, increased caseload, gaps in interdisciplinary knowledge and super-specializations, and supply chain disruptions affecting the timely supply of vaccines and drugs. The second-order effects of extreme weather events are also likely to be felt with increased days of school closures, and dropouts have implications for access to midday meals and nutritional outcomes.^v

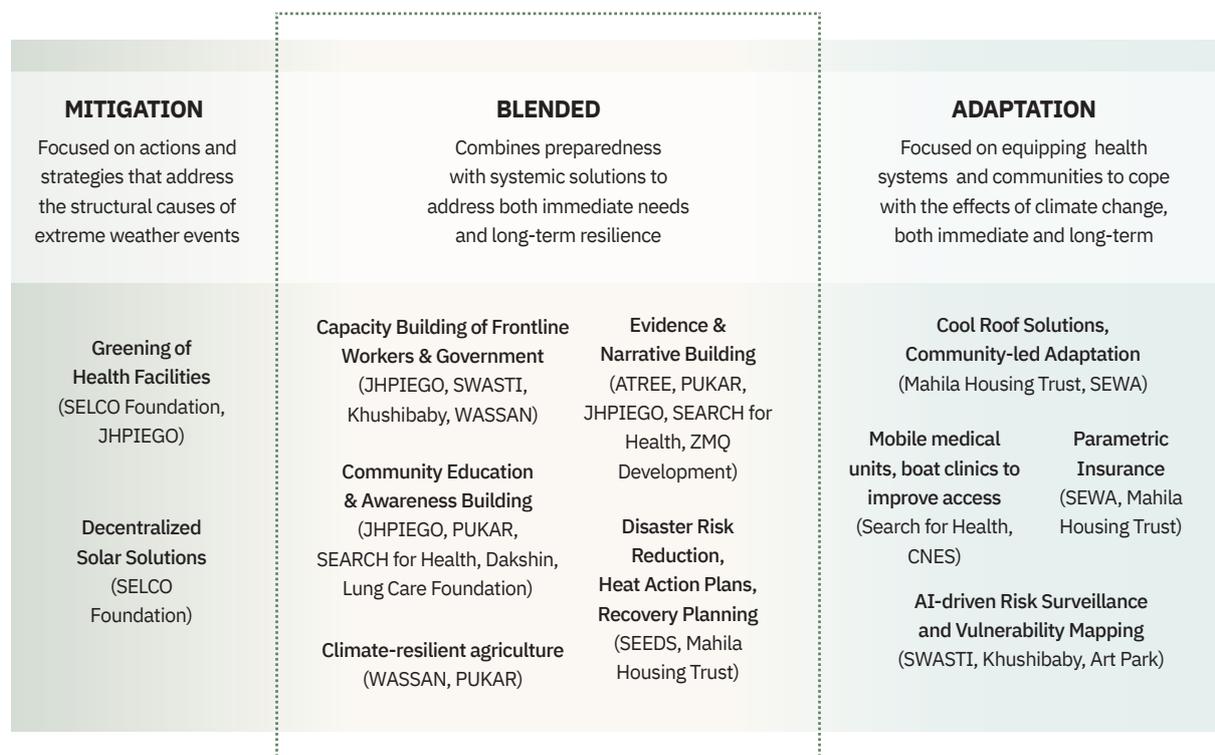
What is the Focus of our Report? Spotlighting NGO Solutions from the Ground

While evidence on the links between climate change and health in India is steadily emerging, this critical intersection still garners limited attention in policy, programming, and philanthropy. Much of the mainstream narrative often focuses on multilateral and government-led efforts.

1. **An NGO Focus:** Given their proximity to the most vulnerable communities, NGOs are uniquely positioned as early responders and trusted partners in addressing on-ground challenges related to the intersection. The report outlines a spectrum of innovative solutions from the NGOs across the adaptation and mitigation continuum that are already making a tangible difference (See Figure iii).
2. **Pathways for Philanthropy:** For the way forward, the report highlights a clear opportunity for philanthropy to scale proven interventions, foster cross-sector collaboration, and direct resources toward underserved priorities - playing a catalytic role in placing health at the center of India's climate response.

Solutions Landscape

Figure iii. Indian NGOs are leading community-adaptation efforts



Source: Dasra analysis based on literature review and detailed interviews. This mapping is indicative and non-exhaustive.

Government Action Meets NGO Innovation to Drive India's Climate-Health Response

- 1. The evolution of policy from broad strokes to a targeted approach:** Over the past decade, there has been a shift in the Indian government's response: from health being a component of multi-sectoral climate action under the National Action Plan on Climate Change, to a targeted recognition of the climate-health intersection. Key milestones include the National Action Plan on Climate Change and Human Health (2018) and State Action Plans, which are enabling locally tailored interventions.
- 2. State-level innovation for systems readiness:** States are approaching the climate-health intersection with integrated climate risk assessments, AI-enabled disease surveillance, frontline worker training, and green, climate-resilient health infrastructure. Heat Action Plans (HAPs) now cover over 130 cities and districts, guided by National Disaster Management Authority protocols and backed by innovations such as cool roofing, urban greening, and predictive outbreak mapping—signaling an evolving policy architecture that increasingly links climate resilience with health system readiness.

3. The critical role of NGOs on the ground: NGOs are critical in translating these frameworks into real-world impact, particularly in reaching vulnerable communities. Across states, NGOs are co-developing HAPs, running early warning systems, driving community outreach, and piloting decentralized solutions such as solar-powered cold chains and telemedicine in climate-stressed geographies.

Insights on NGO solutions from the survey and detailed interviews

1. NGO-led solutions are exemplar of community adaptation efforts in India: NGOs have been responding to emerging crises with innovative solutions across the entire continuum of adaptation-mitigation, with promise to scale to the pan-India level. With the majority of the solutions being blended efforts, they are strengthening community resilience for both the immediate and the long-term.

Figure iv. Classification of NGOs based on their key sectoral focus across climate-health



Source: Compiled based on survey responses (N=26) and detailed interviews. The representation is indicative and non-exhaustive

2. COVID-19 was the trigger moment to foray into climate-health: For 70% of NGOs, COVID-19 was a critical turning point, reflecting on the need to further strengthen and future-proof the health system, signaling a growing movement toward more integrated, systems-oriented approaches.

3. Health-first organizations are leading the intervention efforts: Health-first organizations^{vi} are emerging as pioneers in integrating a climate lens into their work (See Figure iv). Working across diverse areas – Water, Sanitation and Hygiene (WASH), nutrition, and maternal health -- these organizations have piloted and scaled solutions to address emerging challenges and vulnerabilities.

4. NGO solutions are responding to challenges at remote climate frontiers and the mainland: More than half of surveyed NGOs (55%) operate in rural areas, where limited healthcare infrastructure makes communities particularly vulnerable to disruptions from extreme weather events. Another 20% operate in urban/peri-urban areas, while the rest operate across forests, islands, and hilly regions.

- 5. Women and children take center stage in NGO initiatives:** They are followed closely by tribal communities and persons with disabilities—groups disproportionately impacted but often left out of mainstream climate-health planning.

Barriers to Scaling Efforts

- 1. Evidence on inter-linkages between climate and health in the Indian context is still evolving:** There is an absence of adequate datasets and evidence at the disaggregated and hyper-local level, which are critical to improve the understanding of the localized dynamics between weather events and shifting health outcomes.
- 2. Fundraising challenges due to limited awareness and evolving priorities:** There is limited localized evidence on climate-health interlinkages, resulting in attribution challenges, weakening the case for funding. This, combined with limited public discourse, has meant that donor priorities, especially the domestic ones, have yet to fully grasp the urgency of the situation.
- 3. Mitigation efforts are easier to quantify, leading to skewed funding:** Mitigation efforts are more intuitively linked with the broader climate discourse, with visible, emissions-focused issues often perceived as more urgent or investible. This focus on mitigation often crowds out investments in community adaptation efforts, undermining efforts to build long-term systemic resilience.

Opportunities for Philanthropy

- 1. Build NGO-centred evidence infrastructure for the climate–health intersection:** Philanthropy can invest in local, granular data systems that directly strengthen NGO's ability to design, target and deliver climate-health interventions. India's geographical and topographic diversity, and the differing disease burdens across states, require local, disaggregated estimates that are complemented with national averages. Funding today does not always track climate risk. Highly vulnerable states such as Assam have received a small share of mapped CSR flows, while larger states attract a disproportionate share.^{vii} This results in low visibility of risks in remote regions, and compounds barriers faced by grassroots NGOs in accessing grants.
- 2. Consolidate and standardize climate–health data across public and private systems to strengthen NGO action:** Philanthropy can support shared data standards and platforms that pool climate health data across ministries, private platforms, and civil society, making signals actionable for NGOs on the ground. Data collection today is costly and fragmented across programs and methodologies, limiting local planning and frontline response. Strategic philanthropy can enable interoperable systems that reduce duplication. Aggregated pharmacy and telehealth data from platforms like PharmEasy or Practo can track caseload shifts and weather linked spikes.

- 3. Increase investments in climate-health adaptation, where NGOs are already leading:** Mainstream climate finance and philanthropy have largely focused on mitigation, given its clearer linkage to emissions reduction and the relative ease of quantification and investment. However, this emphasis must be complemented by significantly greater funding for adaptive efforts that build community-level resilience to climate shocks. Our analysis indicates that NGOs are at the forefront of climate–health adaptation in India and philanthropic support can enable NGOs to replicate, adapt, and sustain proven solutions across geographies. This will be critical from an equity perspective as well.
- 4. Anchor regional knowledge exchange as a non-state convener and strengthen NGO-led climate–health action:** Philanthropy can play a crucial non-state role by anchoring regional knowledge-exchange platforms that connect government, civil society, and the private sector. This can help proven climate-health mitigation and adaptation practices travel faster and farther. India's engagement with global climate–health frameworks remains cautious, combining selective participation with homegrown initiatives such as LiFE, ISA, and CDRI. This creates space for philanthropy to link India to platforms like WHO Alliance for Transformative Action on Climate and Health and Global Heat Health Information Network, enabling NGO-led exchanges, sub-national peer learning, and localisation of tools, metrics, and protocols for Indian contexts.
- 5. Tap diaspora givers to co-create India's climate–health technology and knowledge commons:** Across India, NGOs are already piloting low-cost, climate-resilient health solutions. These approaches are often highly effective and context-specific, yet remain fragmented, under-documented, and difficult to scale due to limited access to patient capital, product development support, and global knowledge networks. International philanthropists with an India footprint, such as family foundations, family offices, ultra-/high-net-worth donors, and diaspora givers, can create strategic partnerships through the patient, flexible, long-term capital that de-risks this frontier and accelerates knowledge transfer.
- 6. Strategic public–private partnerships to embed climate–health metrics in reporting, budgeting, and procurement:** Philanthropy could build the adoption muscle inside public systems. This can include establishing state cohorts and peer-learning cycles across health, environment, and disaster management, with NGOs and private providers, to align methods and make results comparable. It can fund the localization of global indicators and protocols into Health Management Information System (HMIS) and Integrated Health Information Platform (IHIP) forms, standard operating procedures, procurement templates, and program key performance indicators (KPIs).

CHAPTER 1

Introduction

“Health is the lived experience of climate change. By prioritizing health in every aspect of climate action, we can unlock significant benefits for public health, climate resilience, security, and economic stability.”

- Maria Neira, Director, Environment, Climate Change and Health,
WHO

Across India, extreme weather has moved from the margins to the mainstream. Heatwaves last longer, floods arrive with greater force, and winters bring hazardous levels of air pollution. At the same time, shifting temperatures and humidity are altering how diseases spread, pushing dengue, malaria, and chikungunya into new geographies, while outbreaks of water-borne illness follow in the wake of flooding. Climate change is now inseparable from the country's public-health story, and is shaping how Indians live, work, and stay healthy.

The lived experience of climate change now unfolds in real time, across seasons. A cold wave that leads to school closures in the north is followed by floods in the hills; a record-breaking heatwave in the plains gives way to cyclones along the coast. What once appeared as isolated shocks now form a continuous chain of disruption. The table that follows traces this chain across a single year (2024) - month by month - drawing on a systematic compilation of reported extreme weather events from multiple news sources, to highlight how climate shocks intersect with health, livelihoods, mobility, and safety across regions (See Table 1).

This reality is borne out in the data. India is the sixth most affected country in the world by extreme weather events.¹ The climate crisis is a health-risk multiplier, shaping outcomes across mortality, morbidity, and overall sense of well-being. The increased frequency and intensity of extreme weather days have not only exacerbated the burden on health systems but also led to disruptions in the functioning of the system and adversely impacted the accessibility of critical services (See Figure 1). By one set of estimates, health systems in more than 40% of Indian districts are at high to very high risk resulting from extreme weather events, necessitating urgent efforts to invest in health sector.²



“Climate change affects us all, but it does not affect us all equally. Those who are least able to cope are being hit hardest.”

- Ban Ki-moon, Former Secretary-General of the United Nations

The ramifications of the adverse health outcomes and vulnerabilities are felt far beyond the health system, impacting labor productivity, absenteeism rates, increased healthcare costs, and loss of income. By one set of estimates, India lost an estimated 160 billion labor hours to heat exposure, equivalent to nearly 5.4% of GDP in 2021 alone.³ For every one degree Celsius rise in the temperature, industrial productivity was found to have declined by 2% due to increased absenteeism and decline in productivity from heat stress.⁴ Health-related losses from air pollution claim another 2% of GDP each year.⁵ Similarly, the cost of mental health conditions relating to climate change just among India's youth (15-24 years age) alone constitutes 13.7 billion USD annually (0.35% of GDP).⁶

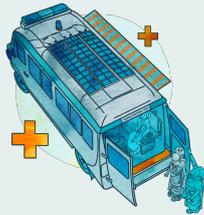
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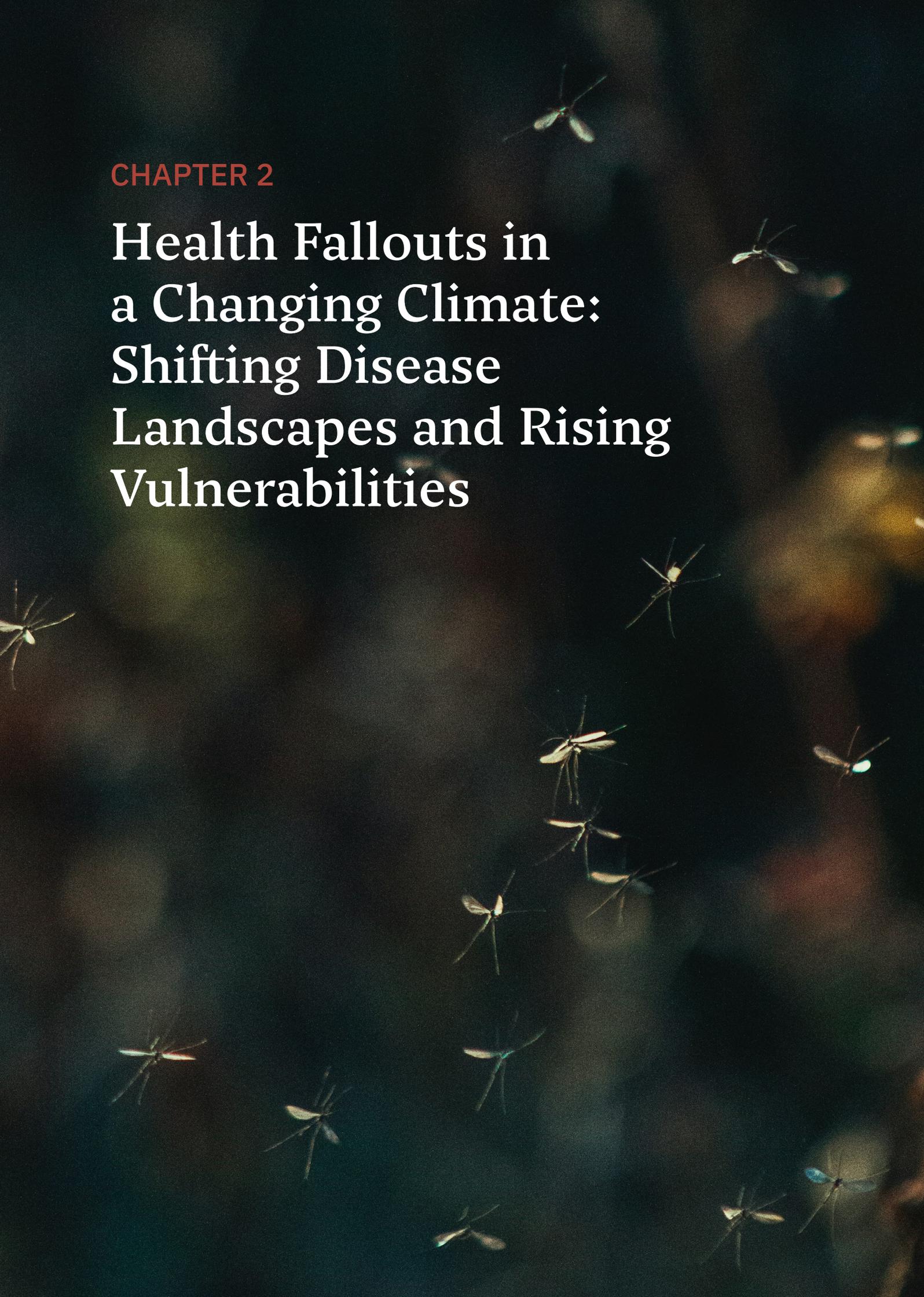
resilience to cope with both the immediate and long-term impact of climate change. The challenges that emerge are extremely diverse, given India's vast geography and the fact that states are at different stages of their epidemiological transition, necessitating more localized efforts.

The evidence shows that without urgent action, the health impacts of climate change will continue to grow, threatening both human and economic resilience. It is time to place health at the heart of India's climate adaptation agenda, building a shared understanding of these risks—and the opportunities to address them.

This report contributes to that dialogue by assessing the climate-health interlinkages in the Indian context and highlighting how Non-Governmental Organizations (referred to hereon as NGOs) are responding with innovation and agility to challenges on the ground. While much of the mainstream effort has focused on documenting and critiquing the state and central government efforts, this report draws attention to the work of NGOs that are most proximate to vulnerable communities and attuned to how climate change is shaping health system responsiveness.

The report documents the spectrum of solutions that NGOs are advancing to strengthen community resilience, addressing both immediate shocks and long-term risks from extreme weather. It also examines the barriers that limit these solutions from being mainstreamed, scaled, or replicated. Lastly, it highlights the whitespace for philanthropic investment, from field-building to directing capital toward underserved priorities. While local evidence on the climate-health interlinkages is still emerging, the lived experiences of extreme heat, cold, and rainfall have become far more omnipresent over the past few years.

This reality underscores the urgency of placing human health and well-being at the core of climate action. This can catalyze more people-centered adaptation and resilience. Global evidence shows that investing in proven solutions, such as heat-health early warning systems, clean household energy, and efficient fossil fuel pricing, not only strengthens climate resilience but also delivers immediate health dividends. Such measures could save nearly 2 million lives annually, while generating an estimated USD 4 in benefits for every dollar invested.⁷



CHAPTER 2

Health Fallout in
a Changing Climate:
Shifting Disease
Landscapes and Rising
Vulnerabilities

Rising Risk of Infectious & Vector-Borne Diseases

India accounts for nearly one-third of the global dengue burden, a challenge that is intensifying with climate change⁸: Research demonstrates that the burden of dengue may change globally, nationally, and locally in response to the continuous increase in global surface temperature and changes in rainfall patterns.⁹ Rising temperatures have led to the encroachment of vector-borne diseases like malaria, dengue, H1N1, kala-azar, and filariasis into higher altitudes, including previously unaffected regions such as the Himalayan foothills.¹⁰ In India, this trend is visible as regions previously unaffected, such as Shimla, northern Himachal Pradesh, and Jammu & Kashmir, are now reporting an increase in dengue cases.¹¹ Pune has also been identified as one of the country's leading dengue hotspots, with dengue-related mortality projected to rise sharply: by 13% by 2040, 23–40% by 2060, and up to 112% by 2100.¹²

Flooding heightens the risk of communicable diseases at every stage of its impact: In the immediate aftermath, exposure to contaminated floodwaters can lead to skin infections and waterborne illnesses such as E. coli, hepatitis A and E, and cholera.¹³ As floodwaters recede, rodent-borne diseases like leptospirosis emerge, transmitted through urine-contaminated soil, water, or food.¹⁴ When displaced populations move into overcrowded shelters, the conditions become highly conducive to outbreaks of measles, meningitis, and acute respiratory infections.¹⁵ Flash floods already claim more than 5,000 lives annually in India, and with rising global temperatures, such events are projected to increase in both frequency and intensity, amplifying health risks for vulnerable populations.¹⁶

Non-Communicable Diseases

Evidence from multiple meta-analyses demonstrates a strong link between heat exposure and cardiovascular mortality: One study found that the risk of cardiovascular death rises with every 1°C increase in temperature, while another reported a 15% increase in cardiovascular mortality during heatwaves. A 2022 meta-analysis further estimated that heatwaves raise the likelihood of cardiovascular-related death by 11.7%, with older adults (age >65) at even higher risk. Since cardiovascular disease (CVD) accounts for nearly a third of all deaths in India, experts warn that ignoring the impacts of climate change on heart health could have severe consequences. Research specifically on India is limited, with most studies focusing on all-cause mortality, but the few that exist show a strong association between climate change and CVD, which is expected to grow in the future. Given India's diverse climate and social conditions, the double burden of heart disease and climate change is likely to intensify unless key risk factors are addressed. However, estimating the overall national impact remains difficult because outcomes are shaped not just by rising temperatures, but also by differences in regional climate, socioeconomic conditions, and individual vulnerability.¹⁷

There is a growing body of evidence suggesting that air pollution may contribute to chronic kidney disease: Exposure to fine particulate matter measuring 2.5 micrometers or smaller (PM2.5) has been strongly implicated, with long-term exposure linked to gradually reducing renal function and ultimately leading to end-stage renal disease.¹⁸ This is especially concerning in India, which houses 17 of the world's 30 most polluted cities.¹⁹ New Delhi has the poorest air quality among global capitals, with PM2.5 concentrations nearly ten times higher than World Health Organization (WHO) guidelines - highlighting the urgent relevance of this issue in the Indian context. The increased incidence of heatwaves is also found to be linked to increased risk of acute kidney injury, especially among vulnerable workers who are exposed to high temperatures for sustained periods of time.²⁰

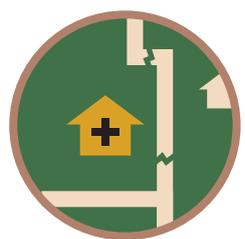
Maternal and Child Health on the Frontlines of Climate Change

Climate change threatens to reverse decades of progress in maternal health, putting women and children at heightened risk.²¹



Certain types of air pollution have both immediate and long-term effects on maternal health:

PM2.5 has been associated with elevated mental stress, prevalence of hypertensive disorders of pregnancy (including pre-eclampsia and gestational hypertension), and increased gestational blood pressure in pregnant people.²²



Climate disasters can damage infrastructure critical to protecting pregnant people:

Damaged or destroyed infrastructure can disrupt access to healthcare services and limit access to hospitals for delivery and postnatal care. Housing instability has been linked to adverse pregnancy outcomes, including preterm birth and low birth weight for newborns.²³



Extreme weather events can adversely affect mental health during or after pregnancy²⁴:

This is especially true in communities already facing housing challenges, food, or financial insecurity. Prenatal stress can also affect maternal health and pregnancy outcomes, including low birthweight and preterm births.²⁵

DID YOU KNOW?

India recorded an average of six additional days of dangerously high temperatures for pregnant women each year over the last five years.²⁶

The term "pregnancy heat-risk days" refers to extremely hot days that are associated with heightened risks of preterm birth (birth before 37 completed weeks of gestation) and complications in maternal health. Preterm birth can have lasting health effects on the baby and increase the risk of maternal health problems after birth. Evidence points to a 16% increase in the odds of preterm birth during a heat wave compared to non-heat wave days, as well as an average increase in odds of preterm births for each 1°C rise in temperature. Heatwaves are also associated with increased newborn hospitalization and stillbirths.



The impacts of climate change are already shaping the world children will inherit. Children are more vulnerable than adults to extreme weather, droughts, and floods. They cannot control their level of exposure in the same way adults can and are less able to survive the impacts of these events.

- **Children and adolescents are more vulnerable to air pollution because their bodies, organs, and immune systems are still developing.** Air pollution is also linked to low birth weight, asthma, reduced lung function, respiratory infections, and allergies in children and adolescents, as well as increased risks of adult chronic diseases.²⁷
- **Infants and young children have a limited ability to regulate body temperature and are more susceptible to dehydration, making them particularly vulnerable during extreme heatwaves.** Newborns are especially at risk due to their immature thermal regulation systems. Exposure to high temperatures in this age group is linked to increased risks of renal and respiratory diseases, electrolyte imbalances, and heat-related stress.²⁸
- **Water scarcity and heat leads to heightened risks of infant undernutrition and mortality:** Water scarcity and variability increase the risk of infant undernutrition and mortality. In regions experiencing high or extreme water vulnerability, limited access to water poses a major barrier to optimal breastfeeding practices. Mothers often need to leave their infants to collect water over long distances, which can reduce or delay breastfeeding episodes.²⁹ In addition, inadequate maternal hydration and the psychosocial stress associated with water insecurity can negatively affect breast milk production. Research also shows that high temperatures further impact breastfeeding. On the hottest days, mothers of infants around four months of age breastfeed 23

minutes less per day for every 10°C increase in mean temperature.³⁰ Infants under three months are also less likely to be exclusively breastfed as temperatures rise. As climate change exacerbates water scarcity and variability, these combined effects on maternal and child health are expected to intensify.

- **More than 400 million students worldwide have been experiencing school closures due to extreme weather since 2022.**³¹ These disruptions widen learning gaps and increase mental health conditions, with many children experiencing long-lasting trauma from climate-related disasters.

DID YOU KNOW?

India's health survey data (2019-21) reveals 13% children were born prematurely, and 17% with low birth weight. Climate conditions, such as rainfall and temperature, were found to have a link with adverse birth outcomes.³²

Climate Change Poses Serious Risks to Mental Health

Climate change is exacerbating existing mental health inequities, disproportionately impacting vulnerable populations who are already facing social and economic disadvantages.

Extreme Heat and the Mental Health Toll on India's Informal Workers

Informal workers are vulnerable to a disproportionate impact of extreme heat. In the absence of safety nets such as access to healthcare, protective equipment, and climate-resilient infrastructure, informal workers, both in rural and urban settings, face heightened psychological risks. Despite multiple systemic barriers, these workers are often compelled to labor under extreme heat without adequate safety regulations. Reports from construction workers in Delhi highlight experiences of fatigue, dehydration, excessive sweating, stress, and anxiety during peak summer conditions. Heat-related illnesses—such as heat exhaustion, rashes, syncope (fainting), and heat stress—are becoming increasingly common due to climate change. Similar challenges extend to urban gig workers, who are frequently required to travel and work in hazardous climatic conditions.

Climate Change and the Erosion of Livelihoods and Cultural Identity

Tribal communities experience unanticipated challenges, including increased heatwaves, erratic rainfall, delayed monsoons, early water depletion, and biodiversity loss. Worries and uncertainties of the rural population have emerged from the experiences of involuntary separation from traditional farm activities, forced adaptation strategies, loss of cultural and religious practices, and reduced self-worth in coping with the deteriorating environment. The resulting detachment from traditional occupations, forced adaptations, and erosion of cultural identity contribute to emotional distress and declining mental health—a phenomenon known as solastalgia, or the grief linked to environmental loss. This experience is not limited to rural areas; coastal communities like the Kolis in Mumbai also report similar distress due to vanishing shorelines from land reclamation.

Food Security & Nutrition

Temperature fluctuations, unpredictable rainfall, and extreme weather events disrupt crops, livestock, poultry, and aquaculture production, reducing food availability.³³ These impacts also lead to loss in income and higher food prices, making it harder for low-income groups to access sufficient nutrition. Indirectly, climate change undermines livelihoods and exacerbates social inequalities, often displacing marginalized communities and further intensifying food insecurity and malnutrition.

DID YOU KNOW?

In six years (2015-21), India lost 33.9 million hectares of the cropped area due to floods and excess rains and 35 million hectares due to drought, which are likely to intensify as various studies predict.³⁴



DID YOU KNOW?



Research on the connection between food insecurity and mental health during the COVID pandemic highlighted that individuals experiencing food insecurity are at a heightened risk of anxiety and depression by about 25%.³⁵

Rising sea surface temperatures are driving many commercially important fish stocks to cooler waters, altering fish distribution and catch. Fisheries and aquaculture are key sources of food, nutrition, and employment in India. Without mitigation, climate change could reduce coastal fish production and economic returns, impacting both the fish trade and national food security. For instance, Bombay duck is found in India's northern coastal waters in both the Arabian Sea and the Bay of Bengal. The species is highly important to small-scale fisheries in these regions and in particular, to the poorest populations. Bombay duck has a low adaptive capacity and is highly vulnerable to climate impacts. If current trends continue, harvests of the species are expected to decline, posing serious risks to the livelihoods of coastal fishing communities and to nutrition security among populations that rely on it as an affordable source of protein.³⁶

Increasing temperatures could reduce milk production by 25% by 2085 in India's arid to semi-arid areas.³⁷ The dairy sector faces significant challenges from heat stress, which is a major impact of climate change on domesticated livestock. When temperatures rise above an animal's thermoneutral zone, heat stress can reduce liveweight gain, milk yield, and fertility.³⁸ Even when productivity impacts are not immediately apparent, animal welfare can still be negatively affected in the short term.

Emerging Challenges

Kallakkadal and the rising impact of climate change on India's coasts: '*Kallakkadal*,' which translates to 'When the Sea Arrives Like a Thief,' has long been used by fisherfolk in Kerala to describe sudden, flooding waves. In 2012, the term was formally adopted by United Nations Educational, Scientific and Cultural Organization (UNESCO) for scientific use. Researchers define *Kallakkadal* as flooding during the pre-monsoon months of April and May, caused by swell waves originating thousands of kilometers away in the Indian Ocean. These waves can rise two to six meters high.³⁹ Once thought to be confined to the Kerala–Tamil Nadu coast, *Kallakkadal* is now being reported along both the eastern and western coasts of India, as well as in Bangladesh. Scientists say ocean currents, rising sea surface temperatures, and the thermal expansion of water in the Arabian Sea are driving these events - clear signs of climate change at work. In 2024 alone, unpredictable high waves battered beaches and fishing villages in Kerala and southwestern Tamil Nadu, damaging boats and homes and flooding low-lying areas in at least three separate incidents between late March and May.⁴⁰ These impacts are already disrupting lives and livelihoods, and with the climate crisis accelerating, they are only expected to intensify.

Climate change is driving a surge in child marriage: It is well documented that climate change disproportionately impacts the majority world, where communities often lack the resources to respond effectively to climate disasters. These crises leave families facing deeper poverty, housing and food insecurity, conflict, and limited access to health care. In times of instability or economic strain, some families turn to child marriage, both as a source of income and to reduce the number of children they must feed, clothe, and educate. The health consequences for girls are severe and well-documented: an estimated 90% of births to adolescents occur within the context of marriage, and complications from pregnancy and childbirth remain among the leading causes of death for girls aged 15–19.⁴¹ Girls who marry before age 15 are also 50% more likely to experience intimate partner violence compared to those who marry later.⁴² The children of young married girls are at higher risk of low birth weight, preterm delivery and severe neonatal conditions, as well as being more likely to suffer from malnutrition and stunting throughout childhood.⁴³

Air pollution poses a hidden risk to the health of girls: Recent studies from the United States and Korea show that girls exposed to higher levels of PM 2.5 during childhood are more likely to experience early menstruation.⁴⁴ Early puberty is linked to increased lifetime risks of cardiovascular disease, Type 2 diabetes, and certain cancers. These findings are particularly relevant for India, where PM 2.5 levels in many areas far exceed those in the US and Korea, potentially putting Indian girls at even greater risk.

Emerging research suggests a potential link between rising temperatures and higher rates of breast, ovarian, uterine, and cervical cancers in women: Emerging research suggests a potential link between rising temperatures and higher rates of breast, ovarian, uterine, and cervical cancers in women. A study across 17 countries in the Middle East and North Africa (where temperatures are projected to increase by 4°C by 2050) found that the incidence and fatality of these cancers increased with each degree of warming.⁴⁵ While the findings indicate that elevated ambient temperatures may be a risk factor, the impact appears to vary across countries, likely due to other modifying influences such as increased exposure to carcinogenic air pollution. Although this evidence is still developing, similar patterns could emerge in India, given its rising heat levels and air quality challenges.

CHAPTER 3

Review of State and Community Action for Strengthening Climate- Resilient Systems



Tracing India's Evolving Response to the Climate–Health Intersection

Over the past decade, climate change has steadily emerged as an area of concern for public health governance in India.

2008

National Action Plan on Climate Change (NAPCC)

What began in 2008 as a broad, sectoral conversation under the National Action Plan on Climate Change (NAPCC)⁴⁶ has since evolved into a more pointed recognition of how climate disruptions directly shape health outcomes, access to care, and system resilience.

2015

The Steering Committee on Air Pollution and Health-Related Issues

took this recognition further, focusing on the mounting health and disease burden caused by deteriorating air quality.⁴⁸ Although the report did not explicitly position air pollution as a climate change issue, it opened the door for framing public health through an environmental lens. The report's emphasis on respiratory diseases, cardiovascular risks, and mortality created new political space for cross-sectoral thinking, even if not all the dots were yet connected.

2010

The real shift began around 2010, when policymakers and scientists recognized that a one-size-fits-all approach would not work in a country as geographically and socioeconomically diverse as India.

Indian Network for Climate Change Assessment (INCCA) workshop

At the pivotal INCCA workshop that year, two key directives emerged: micro-level climate assessments and panchayat-level training to build proximate climate managers.

The workshop accompanied the release of the 4X4 Assessment of the Impact of Climate Change on Key Sectors and Regions of India.

These calls reflected a growing understanding that climate change impacts vary widely across India's coastal regions, mountain belts, and urban centers. It marked one of the first scientific efforts to make the case for regional climate-health planning.⁴⁷

2018

The National Action Plan on Climate Change and Human Health (NAPCCHH)⁴⁹

was officially released, followed by revisions in 2019 and 2021. The plan laid the foundation for state-level adaptation strategies, giving rise to the State Action Plans for Climate Change and Human Health (SAPCCHH), which are now beginning to serve as blueprints for locally tailored interventions.

Mapping India's Public Response: Climate-Health Integration in Policy and Practice

A review of these state plans reveals an intention to address climate-sensitive diseases, strengthen diagnostic and surveillance capacity, and rewire health systems for resilience in the face of climate change and its cascading effects. States such as Delhi, Maharashtra, Kerala, Goa, and Chhattisgarh especially demonstrate some of the most promising practices.



TABLE 2

What India's State Climate-Health Plans Are Prioritizing

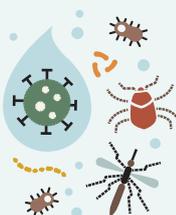
A snapshot of common trends and forward-looking practices emerging across state plans



Strategies include climate-resilient infrastructure like heat-proofing of health facilities, greening of medical supply chains, mass awareness and education campaigns, early warning systems, and capacity-building for frontline health workers.

1

Diseases covered



Most plans address a broad range of climate-sensitive conditions, including vector- and water-borne diseases, heat-related illnesses, respiratory disorders from air pollution, malnutrition, and mental health stressors linked to climate extremes.

2

Vulnerable populations



Many state plans recognize occupational health risks for vulnerable workers, especially in agriculture and construction. Several also emphasize maternal and child health, acknowledging the growing climate burden on these groups.

3

Core strategies

Interdepartmental links

A strong emphasis is placed on fostering cross-sectoral coordination between departments of health, disaster management, environment, and urban planning to break silos and improve integrated response mechanisms.



5

Localized interventions

More advanced plans, particularly from Kerala and Goa, go further by deploying renewable energy in health facilities, using spatial and climate risk mapping tools, and advocating for localized, research-informed interventions.



Source: Author's review from publicly available reports of SAPCCHH

CHHATTISGARH

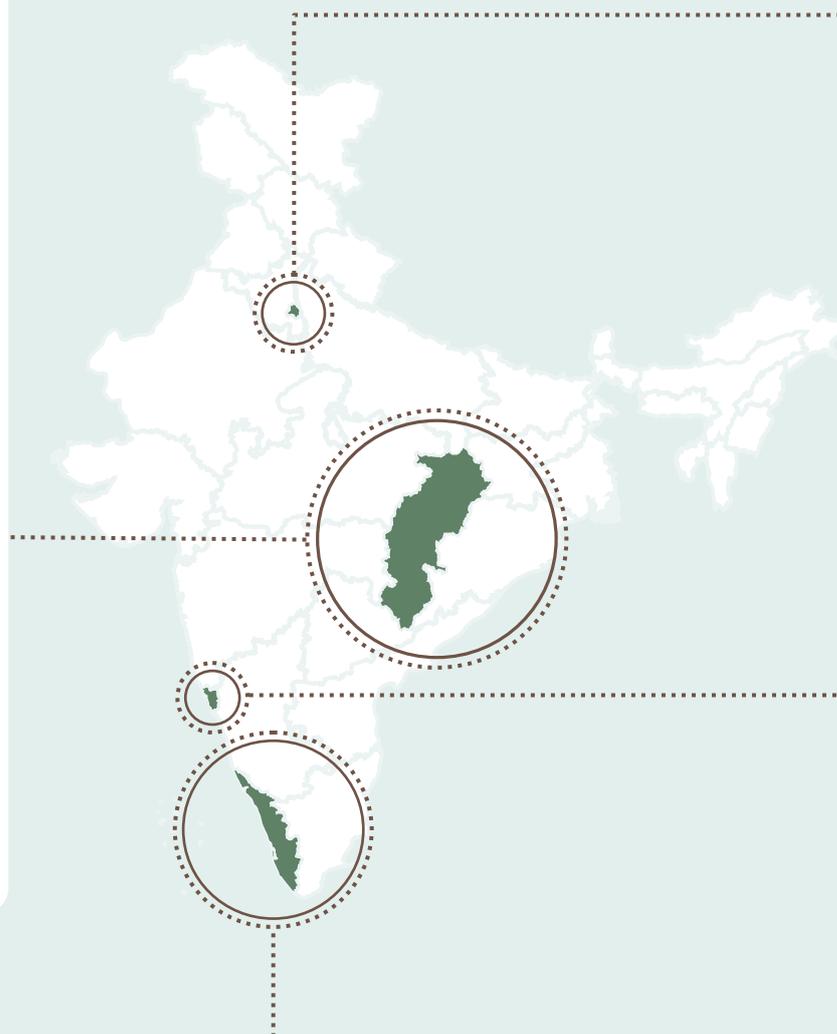


Chhattisgarh's report⁴⁴ is notable for its focus on tribal and rural populations and its call for expanding climate-health research to better understand context-specific vulnerabilities. The plan recognizes that communities living in remote forested areas face dual burdens: limited access to public health services and high exposure to climate-induced disease risks.

Recommendations include:

- ✓ Building **health surveillance systems** for neglected tropical diseases
- ✓ Creating **mobile clinics** for hard-to-reach areas
- ✓ Investing in **research partnerships** with local medical colleges.

State Climate–Health Plans



KERALA

Kerala⁵⁰, for instance, has made considerable strides in linking climate risk to health system readiness. The state's decentralized health system, already considered a model in India, has allowed for stronger local response capacity, especially in coastal and flood-prone districts.

Kerala's SAPCCHH integrates:

- ✓ **GIS mapping** of disease hotspots
- ✓ **Climate-linked burden analysis**
- ✓ **Training** for frontline health workers to detect and respond to shifting disease profiles.

Importantly, Kerala's action plan calls for green certification of health facilities and the integration of early warning systems for climate events like floods and heatwaves into routine public health planning.





Delhi's plan⁵¹, though shaped by the unique pressures of a dense urban environment, goes beyond its legacy focus on air pollution.

Delhi's plan proposes:

- ✓ Use of AI-enabled disease surveillance tools
- ✓ Wearable sensors for tracking heat-related morbidity
- ✓ Layered real-time dashboards that link air quality and health alerts

There is also recognition of how housing quality, occupational exposure, and migratory status intersect with vulnerability, particularly among construction workers, informal sector employees, and the elderly population.



Goa has integrated⁵² the disaster management authority, health department, urban local bodies, and municipal planners as part of its planning.

Goa's SAPCCHH emphasizes:

- ✓ Use of solar power in PHCs
- ✓ Development of climate-resilient health infrastructure
- ✓ Greater involvement of school children in early climate-health literacy campaigns.

It also explores the use of local meteorological data to build predictive capacity for outbreaks of water- and vector-borne diseases following extreme weather events.

Together, these developments reflect a steady and discernible shift from siloed responses to an integrated understanding of climate and health. India's evolving policy architecture now increasingly recognizes that preparing for climate futures must involve strengthening disease surveillance, improving diagnostics, embedding climate vulnerability assessments into public health planning, and leveraging data and emerging technologies such as AI for early warning and preparedness.

Despite these promising examples, the SAPCCHHs also make clear that much remains to be done. The diagnostic and surveillance ecosystems are still underdeveloped in many states, with weak data infrastructure, limited epidemiological modeling capacity, and poor integration of climate variables into public health programming. Disease surveillance, for instance, often remains reactive rather than anticipatory. For example, mosquito-borne diseases are still monitored primarily through lagging laboratory reports. Chikungunya appears underreported relative to Dengue, masking its true spread.⁵³ While early warning frameworks reference climate variables, few state action plans operationalize these linkages, meaning public health responses are still triggered months after climate anomalies have occurred.

NGOs, therefore, have a crucial role to play: from co-creating heat action plans and behavior change communication strategies, to testing scalable solutions for decentralized care delivery, to supporting the development of low-cost technologies that improve access and continuity of care in climate-stressed geographies.

A number of initiatives are already leading the way. For example, states like Assam and Bihar are beginning to collaborate with NGOs to build telemedicine capabilities for flood-prone areas, ensuring continuity of care when physical access is disrupted. Rajasthan and Odisha are strengthening the role of Accredited Social Health Activists (ASHAs) and frontline workers to deliver last-mile care during heatwaves, with training and protective protocols tailored to extreme weather. Meanwhile, Goa and Chhattisgarh are testing solar-powered cold chains for vaccines and essential medicines in high-temperature zones where energy access is unreliable.

Maharashtra offers promising examples of climate action plans co-created with NGOs. Solapur's Climate Action Plan was developed in collaboration with World Resources Institute India (WRI India) and shaped by extensive consultations with citizen groups, NGOs, and local experts, resulting in data-driven strategies rooted in community input.⁵⁴ The state-led *Mazi Vasundhara Abhiyan* further mobilized over 22,000 local bodies through a grassroots competition, encouraging participatory climate solutions on themes like air, water, and biodiversity.⁵⁵ NGO networks have also played a key role in advocating for low-carbon mobility across cities, developing city-specific action plans, and building coalitions for policy change.⁵⁶ In Pimpri-Chinchwad, the HAP prioritizes community engagement and capacity-building, ensuring vulnerable groups are involved in shaping and benefiting from heat resilience strategies.⁵⁷

These kinds of innovations, when embedded within public systems and supported by robust financing, represent the future of India's climate-health strategy: one that is decentralized, adaptive, and deeply rooted in community resilience.

Heat Action Plans: A Pillar in Climate–Health Preparedness

As heatwaves grow more frequent and intense across India, heat has become one of the most visible and deadly impacts of climate change, threatening public health, urban infrastructure, and worker safety. In response, HAPs have emerged as one of India's most established climate adaptation tools. While SAPCCHs chart a roadmap for integrating climate into health systems, HAPs form a parallel policy track, initially rooted in disaster management but increasingly aligned with health and urban resilience goals.

India's first HAP was launched by the Ahmedabad Municipal Corporation in 2013, following a 2010 heatwave that claimed over a thousand lives. This pioneering effort became a model for other cities. In 2016, the National Disaster Management Authority (NDMA), in collaboration with the India Meteorological Department (IMD) and health experts, issued national heatwave guidelines aiming to bring down heat-related deaths to zero⁵⁸. Revisions in 2017 and 2019 broadened the focus beyond emergency response to include urban planning, interdepartmental coordination, and built environment adaptation.

Unlike the SAPCCHs, which are nested within the health ministry and focus on climate-sensitive diseases, diagnostic infrastructure, and system-wide resilience, HAPs are explicitly multi-sectoral. As a result, their governance is distributed across multiple administrative levels—national, state, district, and city governments. The broad national framework for heat preparedness is laid out by the NDMA through its 2019 guidelines. These are adopted and adapted to varying extents by different states, cities, and districts as they draft and implement their own HAPs.

In parallel, the Ministry of Health and Family Welfare (MoHFW) and the National Centre for Disease Control (NCDC) also issue sector-specific guidelines focused on health system readiness. During or just before heatwaves, these frameworks are further supplemented by rapid directives from various government departments at the central and state levels, many of which operate outside the formal HAP structures.

This layered setup often results in overlapping mandates. Cities, for instance, may be responsible for executing not only their own HAPs but also those issued by the district or state they fall under. The degree of such overlaps varies across states, and there is limited clarity on how conflicts are resolved or priorities coordinated in real time.

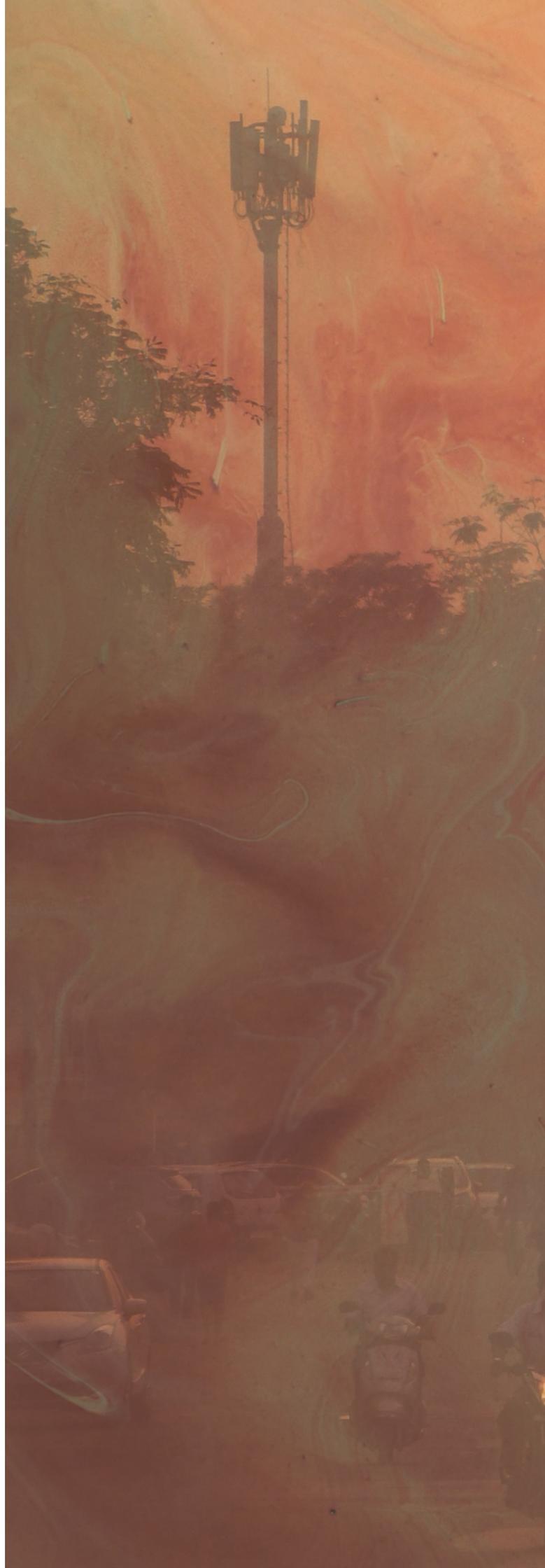
Over the past five years, this model has scaled rapidly. India is now working with over 130 cities and districts in 23 heat-prone states to adopt or refine HAPs, with growing support from NGOs and international agencies. States like Odisha and Rajasthan have begun training ASHAs and Auxiliary Nurse Midwives (ANMs) in heat-stress protocols, distributing Oral Rehydration Solution (ORS) and protective gear in anticipation of extreme heat days. Cities like Nagpur, Hyderabad, and Bhubaneswar have piloted cool roofing technologies, water sprinkling strategies in public spaces, and urban greening interventions to lower ambient temperatures in high-density neighborhoods.

Status, Innovations, and the Road Ahead: Strengthening India's Heat Action Plans

Despite their expansion, HAPs remain uneven in design, implementation, and impact. While early adopters like Ahmedabad have reported improved outcomes, a 2023 analysis found that 95% of existing plans lack granular mapping of vulnerable populations or high-risk areas.⁵⁹ Only eight states currently classify heatwaves as disasters, limiting access to dedicated funds and response mandates.⁶⁰ Without a formal legal foundation or regulatory accountability, most HAPs remain advisory in nature and fragmented in execution.

Recent innovations—such as Delhi’s ward-level land surface temperature maps and AI-based tools like *Sunny Lives*⁶¹ used by Sustainable Environment and Ecological Development Society (SEEDS) and Chintan to assess indoor heat exposure—signal progress, but data quality and spatial resolution often fall short for actionable urban planning. Studies reveal up to 9°C temperature variation within a single ward in Bengaluru, underscoring the need for fine-grained, geospatially informed interventions.⁶²

Experts highlight a critical gap in long-term planning. Most HAPs prioritize emergency response over preventive strategies such as passive cooling infrastructure, social safety nets for income loss, or resilient power grids. Institutional fragmentation remains a major constraint. Historically, the MoEFCC has treated heat as an environmental issue, the MoHFW has focused on health system readiness, and the NDMA has led with a disaster management lens. These parallel approaches have led to siloed planning, overlapping mandates, and unclear accountability, particularly at the state and city levels, where HAP implementation is most urgent. While recent efforts signal some convergence, such as joint guidelines and collaborative training modules, there is still no unified national framework that coordinates heat governance across ministries or ensures horizontal alignment across departments at the local level.



BOX 1

Tech at the Tipping Point: Using AI and Local Innovation to Tackle India's Climate–Health Intersection

In India, technology sits at a crossroad, amplifying both risk and opportunity. While rapid digital expansion contributes to emissions, e-waste, and uneven access, it also offers powerful tools to advance climate and health resilience. From early warning systems and telemedicine to solar-powered clinics, tech can help safeguard lives, if it's used to spot vulnerability early and act with precision.

Nowhere is this more urgent than in the context of extreme heat, where exposure is not evenly felt across a city. In Delhi's Seemapuri, for instance, a waste picker living under a tin roof may endure indoor temperatures soaring to 45°C. While just down the street, a garden-front home stays several degrees cooler. This hyperlocal inequality is invisible to most heat action plans, which are often designed at the city level, and fail to capture what plays out across a single ward or block.

To bridge that gap, a coalition led by SEEDS and Chintan, with technical support from Microsoft, has pioneered an AI-driven model called *Sunny Lives*. Built using satellite data and on-ground monitoring, the model assesses indoor heat risk by recognizing materials like tin, tile, or plastic sheeting from above, and correlating them with how heat builds up inside homes. It also factors in wet-bulb temperature, a measure that combines heat and humidity to assess real danger to the human body, offering a more precise view of thermal stress. Crucially, it allows city planners to identify at-risk buildings without installing costly, large-scale sensors.

This shift, from general advisories like “stay indoors” to targeting the *specific roofs* most in need of intervention, marks a step-change in climate adaptation. According to SEEDS, the AI model can be scaled across cities to inform localized responses such as heat shelters, hydration hubs, or even changes in waste collection timing.

Delhi's 2025 Heat Action Plan has begun incorporating ward-level heat maps, a welcome shift. But as experts point out, many of these maps are based on satellite tools designed for agriculture, not dense, multi-use urban landscapes. They fall short of the resolution needed to guide street-level decisions.

In the climate-health space, India is at a technological inflection point. The challenge ahead lies not just in collecting better data, but in ensuring that this intelligence is used to center the most invisible, and most exposed, in climate response.

BOX 2

Bridging the Gap: Recognizing Socio-Economic Vulnerabilities in Heat Action Plans



While India's Heat Action Plans (HAPs) have broadened in scope, most still overlook how heat risk intersects with poverty, caste, gender, housing insecurity, and informal work. Climate and labor experts warn that without localized vulnerability assessments, HAPs risk missing those most exposed to, and least equipped to cope with, rising temperatures.

A 2023 Centre for Policy Research analysis⁵⁷ found that many HAPs take a one-size-fits-all approach and lack local tailoring. Of 37 plans reviewed, 25 noted occupational exposure, but only a few addressed the compounded risks faced by informal workers, dense settlements, or home-based and gig workers. Recent research also shows marginalized caste groups can face up to 150% higher heat exposure than dominant groups; disparities that remain largely absent from mainstream heat planning.

Cities like Rajkot, Surat, and Bhubaneswar have begun incorporating more nuanced assessments of occupational risk, but truly equitable heat resilience will require disaggregated data, community input, and stronger interdepartmental coordination. HAPs in several states now recognize frontline workers such as ASHAs and ANMs and involve them in heat-related outreach, but this must be paired with safeguards, fair compensation, protective measures, and realistic workloads, given the risks they face.

Experts recommend integrating vulnerability assessments and urban heat-island mapping into all HAPs, allocating disaster-mitigation funds for long-term adaptation, and embedding heat governance within legal frameworks. Participatory processes and rigorous evaluation, including all-cause mortality studies, will be essential for moving plans from paper to meaningful protection for India's most heat-exposed communities.

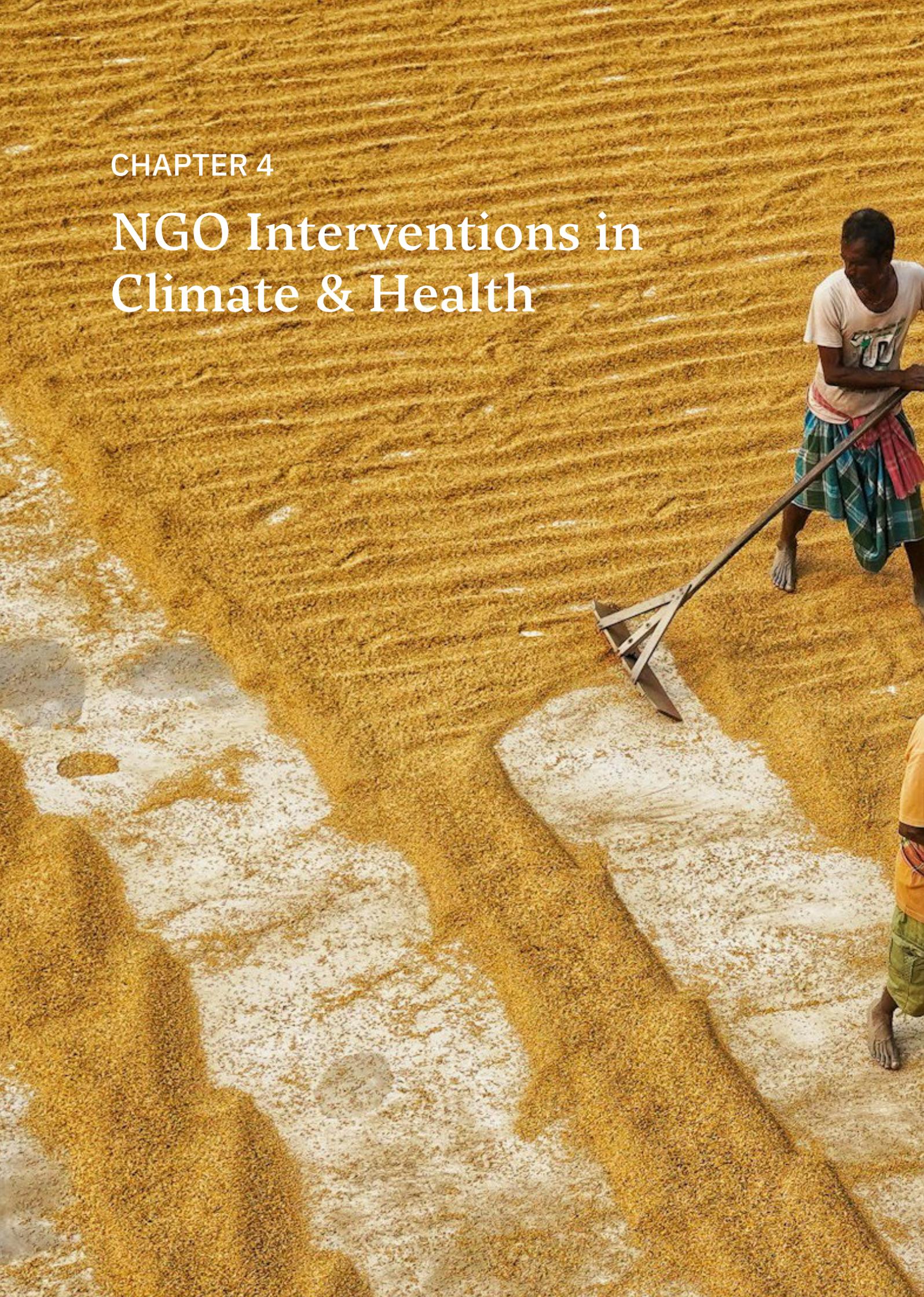
Building Climate-Ready Health Systems by Bridging Policy and Practice

In sum, the landscape of government intervention on climate and health is expanding. SAPCCHs and HAPs reflect growing recognition of climate-linked health risks and together provide a foundation for climate-resilient systems. While progress is evident, implementation remains uneven across states. Some regions are showing what is possible through decentralized planning, interdepartmental coordination, and data-informed strategies. However, fragmented governance, limited local capacity, and insufficient attention to income, caste, and housing vulnerabilities continue to hinder impact.

To move from planning to resilience, India must invest in stronger coordination across health, environment, disaster management, and urban planning. Both SAPCCHs and HAPs need to be anchored in local realities, supported by predictive tools, inclusive processes, and sustained NGO engagement. Only then can public health systems be truly prepared for a changing climate.

CHAPTER 4

NGO Interventions in Climate & Health





NGO Survey Results

In May 2025, an online survey was conducted with NGOs across India to map organizations working at the climate–health intersection and to understand their approaches, critical sectoral needs, and the key operational and fundraising challenges they face in addressing climate-linked health risks for communities. The survey findings presented in this report are complemented by secondary research, as well as insights from in-depth, semi-structured interviews with 13 NGOs. It is also acknowledged that the NGOs included in this analysis do not represent an exhaustive list but rather offer an indicative view of intervention archetypes within the ecosystem.

When did NGOs pivot to the climate–health lens – and who are they centering in their work?

COVID-19 pandemic was a watershed moment: Nearly 7 in 10 organizations began integrating a climate–health approach after 2020, reflecting a larger sectoral shift toward interconnected, systems-driven responses to health and environmental vulnerabilities.

Figure 2. Tracing the Climate–Health Pivot in Organizations and Its Focus Populations



Women and children are the primary focus of climate-health interventions. There is an increased focus on marginalized groups such as tribal communities and persons with disabilities, emphasizing the need for inclusive, multi-dimensional approaches to building resilience.

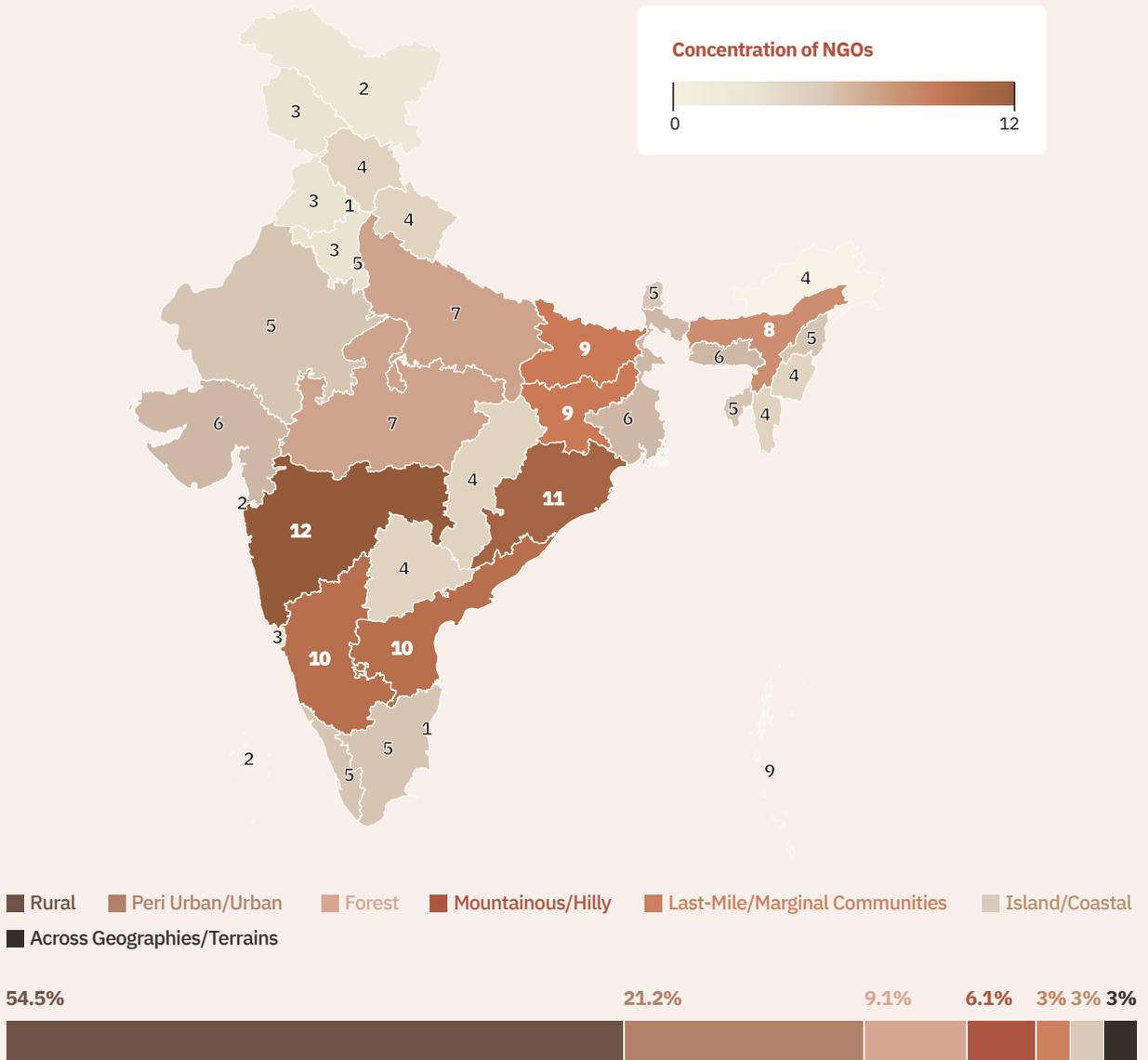


Source: Dasra analysis

Where are NGOs working on climate and health?

The analysis finds that Maharashtra and Odisha have the highest concentration of NGOs actively engaging at the climate–health intersection, often driven by region-specific climate stressors such as drought, heat, and cyclones. In contrast, vulnerable regions, including the Himalayan belt, island territories, and the North-East, appear underrepresented, highlighting critical geographic gaps in interventions. The NGOs surveyed are embedded across diverse habitats in India, with the majority operating in rural areas.

Figure 3. Mapping Where Nonprofits Work on Climate and Health



Source: Dasra Analysis

What is the spread of available solutions?

The survey results, combined with secondary analysis, reveal that two key trends in the spread of available solutions

- NGO-led solutions are an exemplar of community adaptation efforts in India:** NGOs have been responding to emerging crises with innovative solutions across the entire continuum of adaptation-mitigation, with promise to scale to the pan-India level (See Figure 4). With the majority of the solutions being blended efforts, NGOs are strengthening community resilience for both the immediate and the long-term.
- Evidence-building and community awareness efforts have gained momentum, and there remains a need for continued innovation in service delivery:** Alongside the work of existing NGOs on evidence generation and awareness, leading national and international think tanks have contributed to a deeper understanding of the pathways through which extreme weather events affect health outcomes and health system resilience. However, the action landscape for community-led adaptive solutions across regions requires greater encouragement, particularly to address the chronic impacts of extreme weather events.

Figure 4. Indian NGOs are leading community-adaptation efforts



Source: Dasra analysis based on literature review and detailed interviews. This mapping is indicative and non-exhaustive.

What kind of NGOs are taking a lead on the solutions?

NGOs coming from a health-first approach — particularly those working on nutrition, public health, and WASH — are more likely to integrate climate concerns into their programming. This signals a need to re-orient more climate-first organizations toward health-inclusive thinking, and an urgent opportunity for health funders to adopt a climate-health lens in their strategies. Figure 5 provides an overview of the lenses shaping how the interviewed organizations approach climate and health. This is followed by deeper organizational profiles that unpack how these perspectives translate into their approaches, priorities, and interventions.

Figure 5. Classification of NGOs based on their key sectoral focus across climate-health



Source: Compiled based on survey responses (N=26) and detailed interviews. The representation is indicative and non-exhaustive

Jhpiego (Johns Hopkins Program for International Education in Gynecology and Obstetrics)

MODEL

Health system strengthening and building capacity of health workforce

GEOGRAPHY

Pan-India

PROGRAM FOCUS

Training and Capacity Building, Evidence Generation

ABOUT

Jhpiego began in 1970, with the initial aim of providing healthcare workers in the Majority World with the tools to provide life-saving care, especially to women and mothers. Today, it is an international nonprofit organization, offering technical health expertise, training, and capacity building in over 30 countries. Jhpiego’s core agenda is to make quality public health care accessible to all by supporting health care systems with the tools and methods to strengthen their service delivery.

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

A FIELD-BASED APPROACH TO STRENGTHENING PRIMARY HEALTH CARE

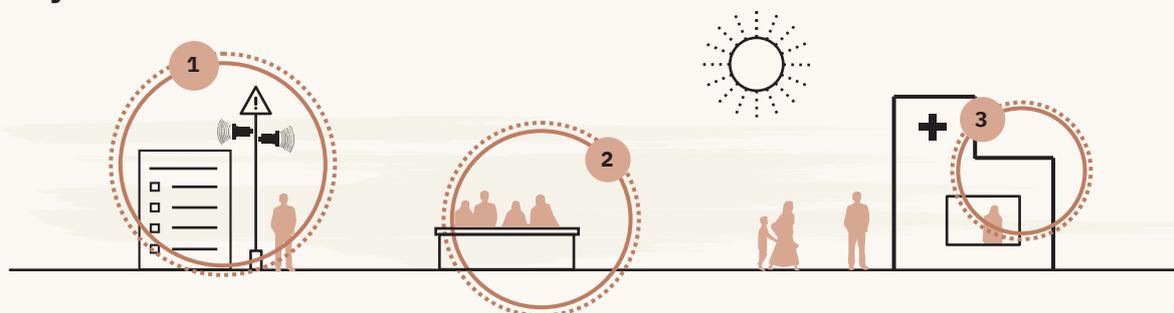
Jhpiego’s model focuses on equipping public health systems in remote and under-resourced areas by building their capacity to deliver life-saving services. Acting as the nucleus of a broad stakeholder network, Jhpiego relies on strong partnerships with local Primary Healthcare Centers (PHCs), government bodies, health departments, and communities. Through training, awareness-building, and frugal innovation, they engage and equip healthcare practitioners, communities, and government officers with the systems, tools, and skills needed to address healthcare challenges effectively.

In India, Jhpiego has a wide reach, working through 60,000 HWCs across 14 states. Their programs place strong emphasis on government partnerships, aligning with public health priorities to strengthen infrastructure, policy, and capacity. Collaborations with local NGOs further extend their reach, improving access to quality healthcare at the last mile.

Originally focused on strengthening reproductive health, Jhpiego has since evolved into a technical implementation partner—addressing service delivery gaps and enhancing health system preparedness.

Trigger Moment	Recognizing Climate-Health Intersections	Strategic Integration
Jhpiego began its focus on climate change-related health impacts through a directive from the NPCCHH. Initially, the ask was for them to develop a district health action plan that would map climate change-linked health challenges that put communities at risk, and prepare an action plan that can be scaled at the national level.	They began studying the climate-linked health risks through a needs assessment. The purpose of this was to inform how investments should differ based on the specific needs of different geographical pockets. They used GIS-based mapping technology to gather data to assess how primary healthcare facilities operate across various aspects, such as audit management, energy, and wastewater	In partnership with the government, Jhpiego recognized the need for the primary care workforce to be equipped with the information, resources, and skills to combat climate-related health risks. It has also been a key partner for state governments in their drafting of State Action Plans. Jhpiego also engages with the private sector to embed climate-health standards in national quality initiatives (e.g., Manyata program with 3,000+ private maternity providers) and through entrepreneurship programs like YEP that support circular economy health innovations.

Key Interventions:



1 Vulnerability Mapping and Early-Warning Mechanisms: Jhpiego conducts climate and disease vulnerability assessments at healthcare facilities. This is done through on-ground assessments and data mapping systems. They train PHC staff to use tailored questionnaires that evaluate infrastructure resilience and climate-sensitive disease risks. They also use GIS-based mapping systems to monitor illnesses, with all facilities up to the PHC level serving as reporting units. The surveillance data tracks daily and seasonal trends, predicts location-specific illness patterns, and enables early detection of spikes or outbreaks. This intelligence is then shared with PHCs to implement targeted measures against risks such as flooding, extreme heat, mosquito breeding, and water scarcity.

2 Community Awareness and Responsiveness: By engaging community members, Jhpiego assists local facilities with disaster planning and preparedness. The organization partners with local PHCs and health experts to first develop roadmaps, work plans, and training modules that build community awareness about climate risk and train them on best practices to adopt in the face of these challenges. Interventions also foreground gender and youth empowerment. Programs like *Baatein Unlocked* mobilized youth agency and contributed to the formation of the Women Climate Collective, underscoring Jhpiego's commitment to building gender-transformative, youth-responsive health systems in climate-vulnerable communities.

3 Green Public Health Facilities: Jhpiego's Green Climate Facilities initiative provides strategic and technical assistance to develop *green model healthcare facilities* that are environmentally friendly, sustainable, and climate resilient. These facilities are designed to maintain robust healthcare delivery during climate-related disruptions through measures such as energy audits, installation of LED lighting and solar panels, water conservation practices like rainwater harvesting, improved waste management, and structural adaptations to withstand extreme weather events. The program aims to upgrade and operationalize over 30,000 Health and Wellness Centers (HWCs) to ensure they are equipped to withstand climatic disruptions.

Measuring Impact

Jhpiego's approach to assessing the effectiveness of its interventions combines a quantitative approach while being informed by the lived experiences of communities.

1.Evidence through participation: Instead of relying solely on facility-level data, Jhpiego uses Participatory Rural Appraisal (PRA) tools to map climate and health vulnerabilities with community members, ensuring local knowledge directly shapes action plans.

2.Frontier Technologies and Digital Innovations: Jhpiego's approach leverages hyperlocal GIS vulnerability assessments, early-warning disease surveillance, and telemedicine redesign to translate data into action for climate-resilient health planning.

Planned and Prepared Primary Health Care: A Future-Ready Approach:

Jhpiego's path to scaling functions in tandem with the government agenda to improve climate resilience within healthcare systems, with their focus being on remote and underserved regions. Their ultimate aim is to create a roadmap for climate resilience that is easily adaptable and translates into a systemic approach for at-risk regions to access and incorporate. They have done so by **establishing field offices in high-need regions** to serve as hubs for expert-led health training, system-level capacity building, and community awareness. They have also focused on **integrating instead of duplicating efforts by strengthening existing government health programs** with cost-effective tools such as disease surveillance, skill development, and climate-health vulnerability assessments, which are amenable to scale and replication by other partners and entities.

Khushibaby

MODEL

Integrating climate-health intelligence into public health systems

PROGRAM FOCUS

Forecasting, vulnerability and early warning systems, evidence generation, capacity building

GEOGRAPHY

Rajasthan, Karnataka, Maharashtra

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

Khushi Baby's integration of climate and health was the outcome of its ongoing research and development efforts. The pivotal moment came when the team began exploring novel ways of leveraging large-scale public health data, a reflection that coincided with the convergence of several key trends and opportunities. On the one hand, geospatial climate data had become widely available; on the other hand, community-level health outcomes were, for the first time, being systematically captured by frontline health workers, creating a valuable new dataset. At the same time, a growing body of literature was highlighting the importance of environmental determinants of health. Recognizing the potential to link these datasets, the team began generating insights to identify which communities were most vulnerable to climate-related health risks and to uncover the specific drivers of their vulnerability. Parallel to this, both central and state governments were instituting climate change and human health committees and drafting action plans that emphasized vulnerability mapping, risk assessment, early warning, and forecasting. Khushi Baby identified clear opportunities to contribute to these areas, which led to the development of analytics tools and dashboards tailored for state and district health officials, marking the beginning of the organization's dedicated work at the intersection of climate and health.

Trigger Moment	Recognizing Climate-Health Intersections	Strategic Integration
Routine field engagement revealed that climate stressors were affecting frontline outreach and community participation, while health data continued to show persistent geographic variation in disease burden that could not be explained by service delivery alone. Decision-makers lacked tools that could connect these realities in a way that was locally meaningful. Most existing climate and vulnerability assessments, developed for high-income contexts, were not designed to inform sub-national planning in an Indian or sub-Indian contexts, prompting the development of a context-specific climate-health framework.	Khushi Baby recognized that climate change was a key determinant of public health outcomes. The availability of geospatial climate data alongside health data collected by frontline workers revealed new opportunities to analyze how environmental factors drive disease burden and vulnerability at the community level. This realization prompted the organization to embed climate-health considerations into its analytics and decision-support tools.	Khushi Baby has included a climate health module within the AI-enabled integrated dashboard, co-developed with the Rajasthan government, allowing health officials to better understand relationships between exposure variables, population health and community adaptive capacities, as defined by machine learning models. The tool enables 350+ block health officials across Rajasthan to better understand local predictors of disease burden and design targeted interventions.

Key Interventions:



Khushi Baby has deployed its Climate Health Vulnerability Index (CHVI) to identify hotspots and impact assessments on local interventions. CHVI builds on Khushi Baby's flagship platform CHIP, which has transformed healthcare delivery for over 50 million people across Rajasthan. This initiative's AI-based tool integrates climate and health vulnerabilities into one platform and delivers granular insights at sub-district levels. CHVI generates a composite vulnerability score based on several factors: exposure to climate stressors such as temperature, air quality, and rainfall; population sensitivity factors such as age and health status; and adaptive capacity, including access to healthcare and socio-economic conditions. CHVI also holds the potential to function as an early warning system for health officials to deploy targeted interventions and reallocate resources swiftly and appropriately to areas where climate-sensitive health risks are the highest.⁶³ This initiative can be broken down into three strategic functions:

- 1 Vulnerability Mapping and Assessment:** This is the first step, focused on understanding which geographic areas are most vulnerable to climate-sensitive diseases and, crucially, why they are vulnerable. This involves both a general, global vulnerability assessment and assessments specific to certain diseases, such as those related to heat, vector-borne illnesses, or air quality. The goal is to create a vulnerability score for each location and climatic condition. Beyond just the score, the strategy aims to break down the composition of that vulnerability. For example, a place might be vulnerable to heat not only because of high temperatures but also because it has a large elderly population or is far from the nearest hospital. By understanding these specific local drivers, local officials and partner organizations can develop tailored solutions to meet the community's needs.
- 2 Forecasting:** The second area involves using data trends to predict and identify emerging hotspots or areas that are becoming increasingly vulnerable. This forecasting relies on both climate and available health data. Practical applications include predicting how many maternal and child health camps might be disrupted by a monsoon season or forecasting the expected areas with ideal breeding conditions for vectors based on climatic conditions and past cases. The primary purpose of this forecasting is to enable the targeted deployment of resources, such as personnel, training, testing, and treatments, to prepare for anticipated events.
- 3 Understanding What Works:** The third component is an evaluation tool designed to determine the effectiveness and impact of different interventions. It addresses which interventions deployed before, during, or after a climate-related event actually make a difference. For instance, during heatwaves, this tool would assess the relative impact of interventions such as opening community cooling centers, issuing targeted heat alerts via mobile messaging, or modifying work hours for outdoor laborers. It would help identify which interventions are most effective for different populations (e.g., elderly residents, urban slum communities, or outdoor workers) and at which stages of a heat event. The overarching goal is to create a continuous feedback loop: mapping the local drivers of a disease to locally tailored interventions and then measuring the impact of those interventions.

Khushi Baby's climate–health work functions as a horizontal strategic area, applied across states through diverse use cases - such as heat vulnerability and mortality in Rajasthan or extreme weather and child malnutrition in Maharashtra. The flexible framework adapts to regional needs, enabling stakeholders to use data interfaces to design and evaluate targeted interventions.

Impact Measurement

Khushi Baby measures impact through a systems change lens, recognising that at the climate–health intersection, traditional outcome metrics (for example, heat-related mortality) are often unavailable, unreliable, or structurally underreported. Rather than relying solely on distal health outcomes, we track whether public health systems are becoming better equipped to anticipate risk, act earlier, and protect the most vulnerable populations.

Our definition of impact is therefore: Enabling public health systems to close the missing feedback loop at the last mile—between environmental exposure, service delivery, and health outcomes.

Our Impact Measurement Framework:

We measure impact across four interconnected pathways of systems change, using a mix of quantitative indicators, qualitative evidence, and documented decision-making.

1. Policy: Climate–health insights inform public health priorities, planning, and resource allocation
2. Programs: Health programs are better targeted and adapted to climate vulnerability.
3. Practice: Frontline health delivery becomes more responsive under climate stress.
4. Partners: Development partners align actions and investments using shared climate–health insights.

Addressing the Climate–Health Measurement Gap

We explicitly acknowledge the sector-wide challenge that prevention is difficult to measure in the absence of historical climate–health data, particularly for outcomes such as heat-related illness and mortality. As a result, early-stage climate–health work often surfaces newly identified cases, which reflect improved detection rather than increased disease burden.

Khushi Baby addresses this by:

- Building transparent, auditable data systems that make underreporting visible.
- Using process, targeting, and decision-use indicators as credible proxies for future prevention.
- Combining quantitative data with in-depth case studies to demonstrate causal pathways from data to action.

Over time, these systems enable governments and partners to shift from measuring detection to demonstrating prevention

Scaling

CHVI has been intentionally designed as a modular, interoperable framework that can be adapted across geographies while remaining grounded in local health system priorities. Once the core technology and methodology are established, datasets can be switched or layered based on state context, allowing CHVI to respond to block-level climatic risks, epidemiological profiles, and government priorities for operationalising State and District Action Plans on Climate Change and Human Health, specifically for heat, air pollution, and vector-borne diseases.

Expansion into new states follows a plug-and-play approach. Khushi Baby works with state governments and development partners to identify priority population groups and geographic hotspots, and integrates state-owned health, climate, and programmatic datasets into the CHVI framework. This enables rapid deployment while ensuring the tool remains aligned with local decision-making processes rather than imposing a one-size-fits-all model.

Scale is further accelerated through partner activation. Development partners can use CHVI insights to target their interventions, align with government priorities, and focus resources on high-risk geographies and seasons. In turn, partners contribute relevant health and programmatic data into CHVI. This allows CHVI to function as a shared decision-support layer across the ecosystem, while maintaining public-sector ownership and accountability.

The CHVI framework is currently undergoing scientific evaluation and validation through a Scientific Advisory Committee, with Maharashtra and Karnataka identified as immediate next geographies. Over time, the model is intended to be extended to other states seeking similar climate-resilient health system strengthening, leveraging Khushi Baby's existing scale across Rajasthan, Maharashtra, and Karnataka.

Lung Care Foundation

MODEL

Integrating climate-health intelligence into public health systems

GEOGRAPHY

Rajasthan, Karnataka, Maharashtra

PROGRAM FOCUS

Forecasting, vulnerability and early warning systems, evidence generation, capacity building

ABOUT

Championing Lung Health at the Intersection of Pollution, Policy, and People Lung Care Foundation (LCF) was born from Dr. Arvind Kumar's first-hand observations as a thoracic surgeon. In the 1980s, he routinely saw pink, healthy lungs in non-smokers. But by the mid-2000s, even non-smoking patients had blackened, damaged lungs—clear evidence of India's worsening air pollution crisis. Disturbed by what he saw in the operating room, Dr. Kumar co-founded the foundation in 2015 with Rajiv Khurana to respond to this silent emergency and care for the "2.8 billion lungs" in India.

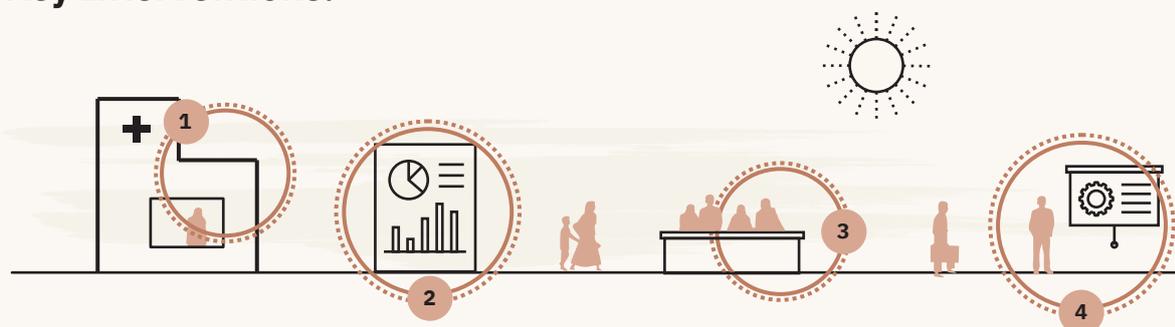
Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

Trigger for Climate-Health Integration

The foundation's climate-health lens evolved over time. Initially focused on air pollution through "Doctors for Clean Air," they soon realized that 92% of doctors did not grasp the full health impact of air pollution. To deepen understanding and shift the discourse from environmental to public health emergency, they reoriented their work as "Doctors for Clean Air and Climate Action." This pivot allowed them to spotlight the intrinsic links between air pollution and climate change, reframing both as interconnected health crises requiring urgent, systemic action.

Trigger Moment	Recognizing Climate-Health Intersections	Strategic Integration
Founded out of Dr. Arvind Kumar's experience with blackened lungs during surgeries, directly linking air pollution to visible health distress. The initiative was rooted in the lived health impacts of environmental degradation.	Initial focus was on air pollution as a standalone issue. Over time, the narrative shifted to framing air pollution as a public health crisis. The renaming of 'Doctors for Clean Air' to 'Doctors for Clean Air and Climate Action' reflected a deliberate move to highlight climate-health linkages.	Lung Care Foundation follows a public health framing to view their work through a climate and health lens. This allows the organization to center human health in climate debates, deepening its advocacy, outreach, and clinical research efforts within the climate-health interlinkage.

Key Interventions:



1 Mobilizing India's Medical Community to Champion Clean Air and Climate-Resilient Health: Launched in 2018 by LCF, Doctors for Clean Air and Climate Action (DFCA) mobilizes India's medical community around clean air and climate resilience. From 40 senior doctors, it has grown to include 21 national medical associations representing over 300,000 professionals. As the health impacts of air pollution became clearer, DFCA expanded its focus to climate change as a major public health threat. Now active in 13 states, it has trained 500+ young professionals and engages a wide range of health workers—from Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homoeopathy (AYUSH) practitioners to chemists. Key milestones include India's first IMA-led Air Pollution Committee in Punjab, DFCA's role in Noida's District Task Force on Air Pollution and Health under the NPCCHH, and a Doctor Orientation Kit that equips medical professionals to take action on air pollution and climate-linked health risks.

2 Ground-Level Evidence for Climate-Health Action: LCF is closing the climate-health data gap by generating local evidence. In a study across 45 villages in Jalandhar (3,000+ individuals), it found that over 70% of households burned biomass in winter, worsening air quality. 40% sought care for pollution-related respiratory issues, with 1 in 4 needing hospitalization. Over 35% faced catastrophic health spending. As climate change intensifies air pollution impacts, such data is vital for equity-driven health and climate action.

3 Scaling Through Partnerships and City Forums: LCF scales its air-pollution and health work by anchoring local leadership and cross-sector collaboration. In cities like Jalandhar, Lucknow, Jaipur, and Delhi, it has established City Forums for Clean Air led by senior doctors who convene diverse local stakeholders to co-create air quality and public health solutions, with LCF serving as a knowledge partner to enable decentralized, context-specific, and replicable action. In Amritsar, with support from the District Administration, DFCA brought health-centered action to Punjab's farmlands through *Saanjhi Hawa te Sehat*. Through farmer engagement, awareness drives, and sustained health dialogue, the campaign has reached more than 2,500 farmers and community leaders—transforming the fight against air pollution into a collective movement for cleaner air and healthier lives. It stands as a testament to what people, science, and the shared will to breathe better can achieve.

Through forums, research, education, and campaigns, LCF builds broad ownership for clean air. Its impact is driven by clinical evidence, trusted medical voices, and partnerships, with support from Health Care Without Harm, a global coalition of 500+ organizations in 53 countries, achieving scale without public funding.

4 Advancing Air Pollution and Health Education in Medical Training: To bridge the critical knowledge gap in day-to-day clinical practice among health professionals, LCF has prioritized air-pollution-centered medical education. In collaboration with NCDC, the Foundation has co-authored an upcoming comprehensive handbook on the health impacts of air pollution—featuring contributions from leading specialists across the country. The handbook details how polluted air affects multiple organ systems, outlining changes from the molecular level to clinical symptoms, disease outcomes, and key takeaways.

Complementing this is the Clean Air Prescription, a practitioner-focused toolkit that equips health professionals with essential knowledge on air pollution, effective communication strategies for patient and community engagement, and data that underscores the urgency of action, ultimately empowering them to become advocates for clean air. LCF actively conducts sessions in medical colleges and trains nursing staff, paramedics, and AYUSH practitioners, with ongoing efforts to extend capacity building to frontline workers such as Anganwadi workers, ASHAs, and ANMs. Together, these initiatives strengthen first-line preparedness and embed air-pollution health understanding within mainstream medical practice.

5 A Focused Initiative on Strengthening Crop Residue Management to Reduce Air Pollution and Related Health Impacts: Under this project, LCF is leading the United Nations Environment Programme (UNEP)-supported intervention in India to develop and implement a comprehensive resource package for strengthening air quality management (AQM) in the district of Jalandhar, Punjab. LCF is implementing the project through the following key objectives:

- **Promoting Circularity and sound Crop Residue Management:** It is assisting in advancing policies and on-ground practices that enable circular, safe, and efficient crop residue management in the identified areas of Jalandhar. This includes efforts to enhance the usability of crop residue as a valuable economic resource.
- **Strengthening Stakeholder Capacities:** It is working to build and enhance the capacities of relevant stakeholders through scalable, district-level programs focused on effective air pollution management.
- **Advancing Understanding of Health Impacts and Promoting Low-Emission Practices:** It is facilitating a deeper understanding of the health and livelihood impacts of crop residue burning, while raising awareness about rural emission reduction practices. These efforts contribute to the evolution of the concept of a non-burning, low-emission Model Village in the district.

6 YES Talks: Empowering Youth as Climate-Health Advocates: LCF launched Youth for Environment Solutions (YES Talks) to engage students from schools and colleges since they belong to an age group they believe holds immense potential to drive behavioral change at the household level. The initiative educates young minds on the connections between environment, air pollution, and health, encouraging them to champion sustainable practices. By aligning the messaging of children with that of doctors, YES Talks fosters intergenerational dialogue and community awareness. Conducted in schools and colleges, across 12 cities of Northern India, the sessions focus on climate change solutions, building a generation of informed and proactive climate-health ambassadors.

Mahila Housing Trust

MODEL

Championing Women-led Climate Resilience

GEOGRAPHY

34 cities in India

PROGRAM FOCUS

Capacity building, service delivery, evidence generation and awareness building, bridging policy- practice gap

ABOUT

Since 1994, Mahila Housing Trust (MHT) has strived to transform urban built environments in underserved communities by harnessing the power of collective action. Its strength lies in bridging the gap between the community and the system, ensuring that policies and programs reach the people they are meant for. MHT has championed a community-based resilience model that is women-led, integrated, evidence-based, and focused on innovative communication strategies to promote a culture of resilience. Its efforts are focused on four climate stressors: heat extremes, flooding, deteriorating water quality, and slow onset diseases which impact vulnerable populations, particularly women, the most.

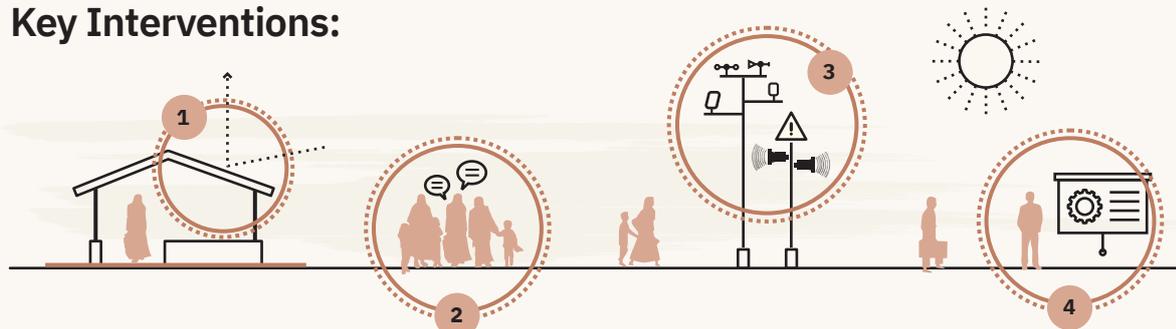
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THE BUILDING BLOCKS OF MHT'S CLIMATE & HEALTH APPROACH

MHT began integrating climate and health lens into its work around 2015. Historically, MHT's focus had been on improving the living conditions of women through better housing, access to clean water, and sanitation facilities - all of which have direct implications for health. To address these compounding risks, MHT began to intentionally incorporate climate considerations into its programs. This integration is not viewed as a departure from their core mission, but rather as an extension of bringing a climate perspective into the infrastructure, human resources, community networks, and government systems they were already working to strengthen.

Trigger Moment	Recognizing Climate-Health Intersections	Strategic Integration
MHT began integrating a climate and health lens into its work around 2015, as they increasingly observed the compounding effects of climate risks on health and well-being.	MHT recognized that climate change manifesting through extreme heat, flooding, and poor water quality, and water storage practices, was exacerbating health vulnerabilities in low-income communities. This realization led to a shift toward intentionally incorporating climate considerations into existing infrastructure, service delivery, and governance interventions.	MHT's approach integrates climate adaptation into its core mission areas, instead of building it as a separate vertical. Its wide-ranging intervention spectrum included cool roof solutions, parametric heat insurance, and the co-creation of Monsoon and Heat Action Plans.

Key Interventions:



1 Low cost solutions to heat stress: Since 2009, MHT has implemented the cool roof initiative to address rising heat stress in low-income settlements, where households with tin roofs, high sun exposure, low electricity usage, and limited space have their roofs painted with solar-reflective paint. This simple yet effective intervention lowers indoor temperatures by 2-5°C, improving comfort and reducing energy use. MHT trains residents to apply the paint themselves, cutting labor costs and building practical skills, thereby reinforcing both resilience and self-reliance. In cities such as Ahmedabad, Churu, Jodhpur, and Varanasi, MHT has worked with local bodies to draft Heat Action Plans that embed climate resilience into city systems and decision-making. Notably, MHT's contributions to Ahmedabad's plan led to the launch of a citywide cool-roof initiative. Cool roofs have improved productivity by 20%, reduced health related expenses by 10% (skin rashes/diarrhea, increased blood pressure, etc.) and promoted well-being amongst women and communities.

2 Strengthening municipal response through community insight: MHT has initiated the co-creation of Monsoon Action Plans in partnership with Municipal Corporations in cities such as Ahmedabad. These plans are designed to mitigate the risks associated with waterlogging and flooding during the monsoon season. The process involves identifying hotspots prone to flooding, ensuring that community members have access to key phone numbers for reporting waterlogging, and conducting pre-monsoon assessments of sewers that are likely to overflow or have not been cleaned. MHT also lean into the deep knowledge of women from the local community and engages them as monitors to report risks to the Municipal Corporation, including uncleared catch pits, dilapidated structures, trees at risk of collapse, exposed electrical wiring, and emerging vector-related concerns. The plans are co-developed and implemented collaboratively, strengthening community resilience and municipal responsiveness.

3 A striking example of the success of this initiative is MHT's work in Vrundavan Park Society, Odhav⁴: As part of their monsoon preparedness efforts, MHT piloted a household-level rain alarm prototype to help residents in flood-prone areas respond quickly when it rains heavily. This simple intervention significantly improved community readiness. When heavy rain hit, residents were more prepared, for instance, those living on the ground floor moved their valuables upstairs in advance. The local corporator was promptly contacted, which led to timely water pumping efforts. Unlike previous years, residents did not have to miss work for multiple days, preventing the loss of daily wages and income.

4 Building the capacity of front-line workers: As part of its climate-health initiative, MHT trains ASHA workers (last-mile government community health workers) in Ahmedabad, Churu, and Jodhpur to strengthen their capacity in addressing climate-exacerbated health issues. For example, building awareness to address the specific vulnerabilities of lactating mothers during periods of extreme heat and flooding. Importantly, the training bridges a critical knowledge gap among health professionals and government functionaries, where structured guidance on the links between climate change and health outcomes is currently lacking. ASHAs are also trained to assess the readiness of health infrastructure, such as the availability of ice bags and other emergency provisions in heat wards, to better respond to heatstroke and related conditions.

⁴ <https://www.mahilahousingtrust.org/knowledgehub/pre-monsoon-action-plan-vrundavan-park-society-odhav/>

5 Risk transfer solutions for extreme heat: In 2024, MHT launched an innovative climate resilience initiative by introducing a parametric heat insurance product tailored for women in low-income communities. MHT developed this index-based insurance as a simple, affordable, and effective risk transfer mechanism. The solution is grounded in a parametric model, where payouts are triggered automatically when heat levels cross a predefined threshold, eliminating the need for claims processes. By linking this financial tool to women-led cooperatives, MHT aims to protect livelihoods from the residual impacts of climate change and empower women to invest in long-term resilience measures for their families and communities.

MHT's Evolving Approach to Impact measurement

MHT has systems in place to measure the impact of its programs. At this stage, the organization primarily relies on qualitative data, including feedback and lived experiences shared by beneficiaries. Additionally, MHT reflects on the outcomes of its training sessions, particularly in terms of knowledge gained by participants and perceived improvements in overall well-being. For example, women residing in homes equipped with cool roofs have reported feeling healthier and experiencing increased productivity.

To complement these qualitative insights, MHT has introduced select quantitative indicators to assess the impact of its cool roof program. Temperature loggers are installed in targeted homes, and women are trained to record indoor temperature readings. These are then compared with readings from a nearby home without a cool roof, recorded simultaneously, to evaluate the extent of heat reduction.

One of the central challenges the organization faces is in clinical indicators (e.g., changes in blood pressure). While MHT acknowledges the linkages between climate and health and has initiated work on specific health-related issues (e.g., reducing fluoride levels in drinking water), it is still in the process of developing appropriate methodologies to assess health outcomes. Establishing robust mechanisms for measuring such impacts remains a key priority for the organization moving forward.

Challenges in Mainstreaming Climate-Resilient Solution

While MHT has expanded its presence to several states, it has encountered challenges in scaling its climate-resilient interventions. For example, climate insurance, currently led by individual agencies, requires integration into government social security systems/ adoption by other financial institutions, to ensure broader adoption. Therefore, climate insurance options remain limited despite their similarity to existing schemes for life, accident, or crop insurance. This is especially true for non-agricultural communities vulnerable to flooding or extreme heat.

On the demand side, even though affordable cooling solutions such as solar-reflective white paint exist, many women aspire to more permanent and aesthetically appealing roofing options that often necessitate loans, leading to reluctance in adopting lower-cost alternatives that require periodic reapplication. Additionally, the cultural association of air conditioning with affluence reduces the acceptance of traditional, sustainable cooling methods. Supply-side constraints also hamper scale. For instance, startups offering preferred technologies like modular design (MoD) or bamboo roofs face delayed deliveries and disruptions, deterring adoption by low-income households.

Heat /climate stressors, have not yet, been declared legally, a disaster by the Government, therefore, budgetary allocations from the Government, are a constraint. Since climate change is a cross cutting theme, philanthropists are taking time investing in the sector.

Some of the successes however are:

- The national disaster management authority has recognized heat and flooding as a disaster. MHT and several other think tanks etc. have been preparing Heat Action Plan, Climate action Plans, and MHT specifically has been ensuring that the plans get implemented led by the communities and cities where they are working.
- Several States including Telangana, Tamil Nadu and others have cool roof policies, now.
- MHT has developed over 16000 climate specialists across India to take forward the community driven eco-system change approach.
- The prime-Minister of India has now recognized Heat as a disaster in 2024.

SELCO Foundation

MODEL

Ecosystem development through decentralized solar energy solutions for sustainable and inclusive development and ensuring reliable healthcare services

GEOGRAPHY

Pan-India

ABOUT

Recognizing that real change requires more than just technology, Harish Hande founded SELCO Foundation in 2010 to bridge the systemic gaps between energy access and poverty alleviation. The Foundation serves as an open-source platform to catalyze innovation, build local ecosystems, and nurture last-mile energy solutions.

PROGRAM FOCUS

Training and Capacity Building, Evidence Generation

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

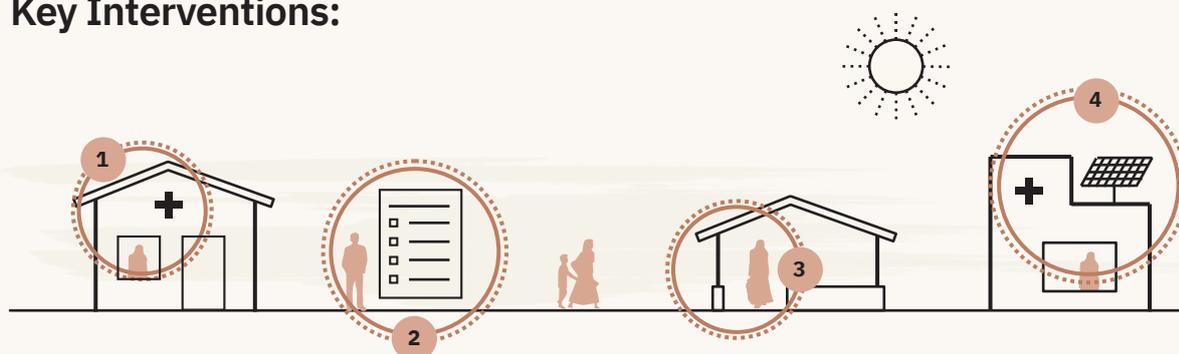
SELCO'S ETHICAL AND SYSTEMS-LED APPROACH TO IMPACT ASSESSMENT

What sets this approach apart is a design process rooted in working not just for communities, but *with* them. In order to ensure longevity of solutions, the process must involve end-users from the get go. Dignity, inclusion, and local relevance are values that are embedded as design principles across interventions, from health to livelihoods. SELCO adopts a systems-thinking approach to impact assessment, blending qualitative and quantitative methods to measure social, environmental, and economic outcomes. Guided by an Ethical Framework⁶⁴, their evaluations focus on *proximal, actionable metrics*, like increased footfall at health centers, improved staff conditions, and reliable energy access, triangulated with service data and stakeholder voices. Success is defined through local ownership, partnership with state actors, and long-term ecosystem change. With a clear understanding that health and climate outcomes unfold gradually, SELCO emphasizes continuous learning and adaptation to ensure resilience, equity, and sustained impact.

EMBEDDING CLIMATE INTO RURAL HEALTH SYSTEMS

Trigger Moment	Recognizing Climate-Health Intersections	Strategic Integration
The COVID-19 pandemic exposed critical structural gaps in rural healthcare and was a wake-up call for decentralized, climate-resilient health systems—prompting SELCO Foundation to embed energy access at the heart of public health delivery.	SELCO adopted a people-first, systems-thinking approach—contextualizing solutions to rural needs, integrating climate vulnerability into design, and treating health not as a silo but as a cross-sectoral outcome linked to energy, food, and environment.	Solarizing health facilities through Energy for Health, embedding climate vulnerability mapping into rural development through Sustainable Energy led Climate Action Program (SELCAP), and designing energy-optimized built environments for housing, livelihoods, and public infrastructure in climate-stressed areas.

Key Interventions:



1 Resilient Energy Systems for Reliable Rural Health Care: Through its flagship *Energy for Health* program, SELCO Foundation in partnership with MoHFW, Government in India aims to strengthen healthcare delivery across 25,000 health facilities in 12 states in India through integrating decentralized renewable energy and appropriate technology and looking at efficient built environment especially for climate vulnerable last mile regions.⁶⁵ Approximately 8,000 facilities have been solarized (system size ranges from 1kWp to 15 kWp), ensuring uninterrupted operation of vaccine refrigerators, baby warmers, and diagnostics. The initiative has improved healthcare access for 9 million people, projected to reach 170 million, and enabled maternal care in remote regions of Assam, Manipur, Meghalaya, Mizoram and Nagaland. Facilities report 50–70% energy savings and over 80% drop in vaccine spoilage. In 2023, the Ministry of Health urged 12 states to adopt clean energy. The program is jointly implemented with state and district authorities, backed by philanthropy and COVID-19 funds. Technologies, such as fans and coolers, to reduce heat stress by up to 40%. These innovations ensure continued livelihoods and resilient rural health–agriculture linkages, even during extreme weather.

2 Using Climate Vulnerability Mapping to Power Equitable Health and Livelihood Solutions: SELCO embeds climate vulnerability assessments across its programs to understand both shifting disease patterns and disruptions to healthcare access. It launched the Sustainable Energy Led Climate Action Program (SELCAP)⁶⁶, supported by the Lemelson Foundation. SELCAP integrates decentralized renewable energy into rural development, health, and livelihoods, addressing poverty and climate risk simultaneously. Working with small farmers, entrepreneurs, NGOs, and funders, SELCAP adopts a community-first approach, offering need-based financial products aligned with local business cycles. In agriculture, it deploys decentralized solar-powered cold storage, like a 5MT unit used by a Farmer Producer Organization in Jharkhand, saving 150MT of produce and \$5,000 annually. Also customizes technologies like solar-powered bio-fermenters and digital soil testing kits that guide cropping decisions and improve soil health. In healthcare, it designs renewable-powered, terrain-sensitive facilities with battery backups and climate-responsive design, as seen in Meghalaya and Assam, improving vaccine cold chains, safe deliveries, and reducing diesel costs by ₹3,000/month.

3 Developing Energy-Optimized Built Environments: In a climate-stressed world, poor and underserved communities often inhabit ad-hoc built environments that are thermally inefficient, poorly ventilated, and increasingly unlivable. SELCO Foundation addresses this by integrating decentralized sustainable energy with energy-efficient design to transform homes, livelihoods, and institutions. Their interventions span: (1) climate-resilient housing across tenure types — from temporary shelters for migrant and nomadic communities to permanent structures for settled households; and geographies; (2) productive workspaces for agriculture, livestock, and crafts that improve income and resilience; and (3) essential public infrastructure like health centers, schools, and community facilities. These innovations reduce recurring costs, enhance comfort, and break the cycle of climate-induced poverty.⁶⁷

Swasti Health Catalyst

MODEL

Building integrated & partnership-led climate-health models

PROGRAM FOCUS

Training and Capacity Building, Evidence Generation, Ecosystem and Health systems Strengthening, Early Warning & Surveillance, community systems resilience.

GEOGRAPHY

Pan India, 24 countries in the majority world⁵

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

THE FOUNDATIONS OF SWASTI'S CLIMATE-HEALTH STRATEGY

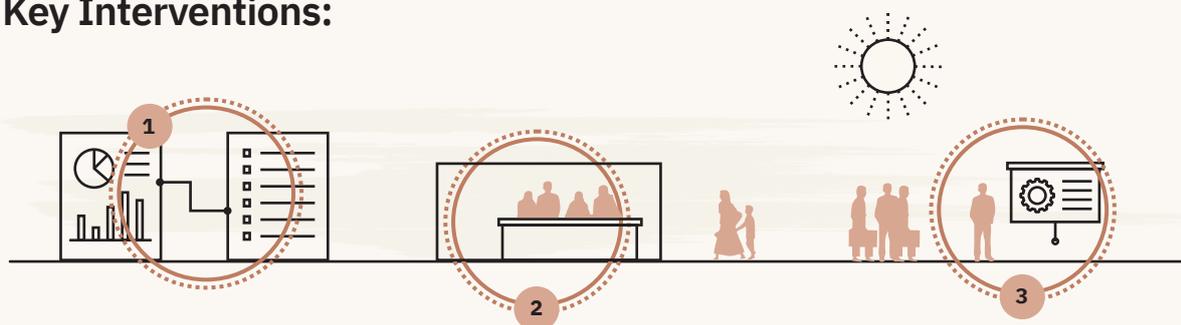
Swasti has been engaging with climate and health issues well before formally defining them as part of its strategic focus, through efforts to address recurring challenges such as monsoon flooding and vector-borne diseases. A more intentional approach emerged with the Wastewater Surveillance under the Precision Health Platform - a public health preparedness initiative implemented during COVID-19 across five Indian cities. Designed to support local municipal administrations in tracking community-level infection trends, the system served as an early warning tool by detecting sentinel signals in wastewater. This initiative marked a foundational step in Swasti's strategic engagement with climate and health.

Early investments from funders in the wastewater surveillance initiative were instrumental in advancing this portfolio. This support also provided Swasti with the flexibility and confidence to accelerate progress in the emerging space. Recognizing the nascent nature of the field, Swasti brought together a diverse mix of expertise, including technical specialists, government stakeholders, and systems leaders, to guide strategic planning. The organization has also embedded a strong learning orientation throughout its implementation process, enabling continuous reflection and real-time adaptation based on evolving insights and needs.

Trigger Moment	Recognizing Climate-Health Intersections	Strategic Integration
Swasti had long addressed climate-sensitive issues like vector-borne diseases and monsoon floods as the communities they serve are most adversely affected, but the launch of a wastewater surveillance program during COVID-19 solidified the need for a formal climate and health strategy.	Swasti acknowledged that recurring challenges like monsoon flooding, heat and vector-borne diseases were deeply linked to climate, and began intentionally exploring these linkages, supported by early funder investments	Swasti embedded climate adaptation into existing health systems using practical, community-led models (e.g., Heat Action Plans, Climate Care Champions) while emphasizing co-development with governments and scaling through trusted local partners.

⁵ Nepal, Bangladesh, Bhutan, Sri Lanka, Maldives, Afghanistan, Pakistan, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia, Timor-Leste, China, Papua New Guinea, Philippines, Ethiopia, Kenya, Zambia, South Africa, Eswatini (Swaziland), Nigeria

Key Interventions:



Swasti's climate and health work centers on adaptation, grounded in the belief that interventions must be localized and community-led. Their approach looks at adaptation through three lenses - *absorptive, adaptive, and transformative*. This framework considers how individuals, communities, and systems build resilience to changing climatic events. It includes understanding vulnerabilities and the capacity to absorb shocks, respond to them, and recover - whether from extreme events like floods or from gradual shifts such as prolonged summer heat.

Swasti's solutions are designed as adaptable blueprints that integrate seamlessly into existing systems, reducing duplication and increasing relevance across diverse settings. Instead of fixed models or standalone programs, Swasti takes an agile, context-responsive approach - layering climate adaptation into existing health services through practical archetypes.

“We're not trying to build yet another app - frontline workers already have too many. Instead, we're creating practical, interactive tools from our tailored IEC (Information, Education, and Communication) materials, backed with human-in-the-loop support to make fieldwork easier and more effective.”

- Nymisha Herrera Nimmagadda, Khushi Baby

1 Piloting scalable climate-health solutions in Andhra Pradesh: In collaboration with the state government, Swasti, piloted models in Ananthapuramu district that link climate data with health planning. These include a predictive model for typhoid incidence enabling block-level forecasting, and a district-specific Heat Action Plan vetted by the National Program on Climate Change and Human Health, which now serves as a model for other districts.

2 District-led action for climate and health preparedness: Swasti has established District Climate and Health Action Committees (DCHACs). These dedicated committees act as coordination hubs, bringing together key stakeholders for integrated decision-making and effective on-the-ground implementation. Complementing this governance mechanism, Swasti also emphasizes the deployment of early warning systems and community education programs to enhance preparedness. Together, these interventions aim to raise awareness, improve responsiveness, and align climate and health systems at the district level - where the intersection of local leadership, health infrastructure, and climate vulnerability is most critical.

3 Building a Climate-Ready Community Health Workers (CHWs): The Climate Care Champions program addresses a critical gap in climate preparedness by equipping CHWs with the knowledge, tools, and skills to prevent, prepare for, and respond to climate-related health risks. The program focuses on enhancing the ability of frontline workers to screen, detect, refer, and prevent adverse climatic effects on vulnerable populations. It also builds their capacity in strategic risk communication, enabling them to act as trusted messengers within their communities. In 2024, the Heat x Health pilot trained over 300 frontline workers and reached more than 30,000 individuals across six heat-prone states in India. In 2025, the program scaled up to train 90 master trainers and 2,266 frontline workers across 51 Primary Health Centers and 25 Urban Primary Health Centers, achieving full district-wide coverage in Ananthapuramu, Andhra Pradesh.

A Context-Driven and Evolving Approach to Impact Measurement

Impact assessment in the climate and health space remains a complex and evolving area for Swasti. Given that health outcomes resulting from climatic events often manifest over an extended timeframe, demonstrating measurable impact in the short term can be challenging. Swasti takes a deliberate approach to expectation-setting with partners and funders, clarifying what outcomes are feasible within the first year, and what may only emerge over the longer term. The initial year typically focuses on establishing processes, streamlining mechanisms, and setting up foundational structures, with more substantive progress anticipated from the second year onwards.

Swasti employs a combination of measurable indicators to assess progress. These include exposure-based indicators (such as whether communities are experiencing reduced frequency or severity of climate-related health risks), systems-level readiness (such as the number of primary health centers equipped with response plans), and simple behavioral outcomes (such as improved hydration practices during heatwaves or increased use of protective masks during periods of air pollution). While Swasti has been engaged in this work for five years, it acknowledges that its approach to measuring outcomes and impact continues to evolve.

Scaling through Partnerships

Swasti adopts a *partnership-first* approach, grounded in the belief that collaboration with existing stakeholders is essential for achieving long-term sustainability and scale. Rather than independently entering communities to implement programs, Swasti positions itself as a technical and implementation partner—supporting organizations that already have deep-rooted relationships and trust within the community. This strategy ensures both broader applicability and deeper local integration.

An example of this approach is the Precision Action Towards Climate and Health (PATCH) program. PATCH is a flexible, data-driven early warning system designed to help governments respond proactively to the health impacts of climate change. It was launched in collaboration with the city government of Tabaco in the Philippines (with a focus on typhoons and earthquakes) and with the state government of Andhra Pradesh in India (where the emphasis has been on addressing heat-related risks). Swasti is now engaging with other Indian states to scale PATCH and adapt it to address climate-linked challenges such as heavy rainfall, scrub typhus outbreaks, and landslides, particularly in contexts where these events disrupt access to essential healthcare as well as countries in South and South-East Asia. Similarly, Swasti's Climate Care Champions Program, which builds the capacity of frontline workers to respond to extreme heat, is being implemented with the intention of generating learnings that can inform scale-up across states.

SEEDS (Sustainable Environment and Ecological Development Society)

MODEL

Building community resilience through sustained, participatory climate-health strategies

GEOGRAPHY

India (26 Indian states and union territories), Nepal

PROGRAM FOCUS

Service Delivery, Training and Capacity Building, Evidence Generation

ABOUT

Founded in 1994, SEEDS partners with communities to build resilience against disasters and climate change. SEEDS partners with the most vulnerable and marginalized families, providing continuous support before, during, and after disasters. Their approach is holistic and sustained, extending beyond immediate crisis response. SEEDS partners with communities through participatory approaches, leveraging innovative technologies, capacity building, and collaborative networks.

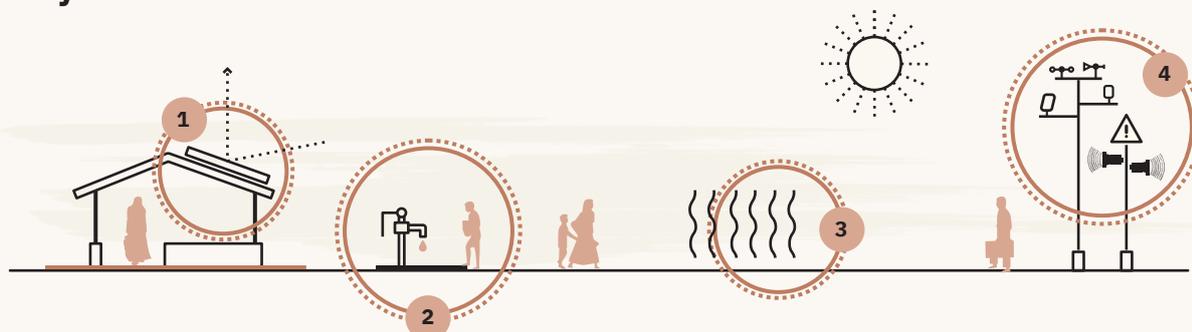
Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

INTEGRATING HEALTH INTO CLIMATE-RESPONSIVE DISASTER RECOVERY

Since its inception, SEEDS has focused on improving community health in the context of post-disaster recovery, with particular attention to water, sanitation, and hygiene. However, the 2004 tsunami in the Andaman and Nicobar Islands brought into sharp focus the urgent need to strengthen preparedness in this area. The adoption of an integrated climate-health lens was not prompted by a single tipping point but evolved gradually through ongoing observations and emerging challenges. Around 2018, SEEDS began addressing mental health issues, especially in Wayanad, Kerala, after floods. They found that even communities with strong traditional coping methods were struggling due to more frequent and intense extreme weather events disrupting their way of life. This prompted SEEDS to bring in a public health expert to guide their response.

Trigger Moment	Recognizing Climate-Health Intersections	Strategic Integration
The integration of a climate-health lens at SEEDS emerged gradually through its post-disaster work in water, sanitation, and hygiene. The 2004 tsunami underscored gaps in health preparedness, while the 2018 Kerala floods revealed growing mental health impacts from recurring climate shocks. This prompted SEEDS to broaden its focus on health within its resilience approach.	SEEDS acknowledged the growing link between climate change and health outcomes due to increasing frequency and intensity of extreme weather events. This led them to expand their focus beyond immediate disaster relief to include long-term, integrated climate-health interventions across vulnerable regions.	Innovative cooling solutions, health camps, community awareness campaigns, enhanced early warning systems, and co-creating the Heat Action Plan, supported by digital platforms and networked partnerships to strengthen community resilience

Key Interventions:



1 Community-led cooling solutions: In Kishan Kunj, SEEDS has equipped households with innovative cool roofing technology. These roofs, featuring reflective insulation sheets, significantly reduce indoor temperatures, offering a comprehensive solution to enhance comfort during heatwaves. SEEDS also conducts regular district-wise health camps in the most vulnerable geographies during extreme heat days. It has created a cooling shelter made from eco-friendly materials, where community members like rickshaw pullers and construction workers can find respite from the heat.⁶ SEEDS has also empowered women from the community to tackle high temperatures by repurposing old sarees and plastic bottles to create street shading structures.

2 Reaching the frontlines of heat vulnerability: In 2024, SEEDS intensified its heat mitigation efforts through the 'Under the Umbrella' campaign, which aimed to raise awareness about rising temperatures and their impacts on health, livelihoods, and the economy. To reach a wider population across the NCR, the campaign shared messages on practical risk reduction measures. It also encouraged the use of cool roof paint and the installation of water points for both people and community animals. It also set up Information, Education, and Communication (IEC) installations and distributed informative handouts on cool roofing solutions and guidelines for extreme weather events at Anganwadi Centres, PHCs, and within local communities.

3 Building a five-step framework for heatwave preparedness: SEEDS aims to leverage learnings from the past decades to identify strategies for strengthening community resilience across vulnerable regions, including Delhi, Bhopal, Chennai, Varanasi, Bagraich, and Bhubaneswar. The 2025 Heat Action Plan is structured around four key pillars: emergency response, nature-based solutions, innovative finance, and housing and infrastructure. It is designed to address heat vulnerability through a comprehensive resilience framework - *Anticipate, Survive, Recover, Adapt, Thrive* - which will guide all activities and ensure a holistic approach to heatwave management.

4 Translating warnings into early actions: SEEDS is working to improve first-mile connectivity in early warning systems, with a key focus on enhancing the clarity and relevance of warnings issued by agencies such as the Indian Meteorological Department (IMD). The aim is to ensure that communities can better interpret information, such as rainfall predictions, to make informed decisions regarding evacuation or the protection of their belongings. SEEDS also disseminates early warnings directly to citizens, NGOs, citizen welfare groups, construction contractors, and Resident Welfare Associations to help them prepare for the upcoming heat season.

⁶ <https://www.indiawaterportal.org/climate-change/climate/climate-action-urban-spaces-seeds-cool-roof-solutions-delhi-slums>

Impact Measurement

SEEDS views resilience through five interconnected dimensions: the ability of communities to anticipate climate impacts, survive them, recover, adapt through change, and ultimately thrive despite ongoing challenges. A community is considered more resilient when there is improvement in any three of these areas. SEEDS is in the process of developing indicators for each of these dimensions. This process is guided through the following ideas:

People as Participants. Rather than relying solely on historical data or top-down assessments, the approach centers the lived experiences of the community, allowing them to define, describe, and interpret their own resilience.

Capturing new data dimensions: SEEDS recognizes that climate change produces new forms of distress and disruption that fall outside traditional surveillance frameworks (for example, feelings of helplessness or fear, that may not be recorded traditionally). To capture these emerging signals, they are exploring the use of technology and AI tools, such as Apurva AI, to gather and analyze these insights in a structured and meaningful way.

Observing changes in lifestyle and living conditions: To identify early signs of resilience or vulnerability, SEEDS is examining shifts in lifestyle and living conditions in climate-impacted areas, using unaffected communities as control groups. It uses indicators such as rising monthly medical expenses (particularly as a share of income in low-income households) and increased school absenteeism during periods of extreme weather.

Scaling Resilience: SEEDS's Vision for 2030

SEEDS has a bold strategy for 2030⁷, focused on reaching the bottom 1% most vulnerable to climate emergencies. It seeks to enable them to withstand shocks and secure their future potential, and, in turn, that of the larger community. To enable this, SEEDS has initiated operations in 100 high-risk districts, leveraging a network of partners and young ambassadors to drive action on the ground.

The organization's scaling journey is made possible through a strategy anchored in three core pillars.

- First, SEEDS is building an inclusive digital platform that fosters learning and enables the widespread exchange of knowledge and practices.
- Second, implementation is powered by a “network of networks”: a broad ecosystem of individuals, organizations, volunteers, and staff working collaboratively across all 100 identified districts to ensure delivery capacity. In particular, SEEDS seeks to strengthen grassroots and community-based organizations.
- SEEDS is also exploring innovative financing models and strong partnerships with local and international organizations, to ensure that resources reach those most vulnerable to climate emergencies.

⁷ <https://www.seedsindia.org/strategy-2030/>

Society for Education, Action and Research in Community Health (SEARCH)

🔧 INTERVENTION ARCHETYPE

Adaptation/Service delivery

📍 LOCATION

Gadchiroli, Maharashtra

👤 TARGET GROUP

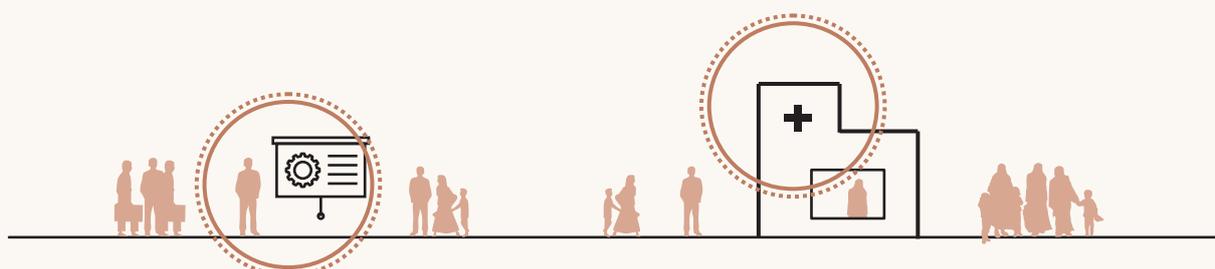
Tribal population

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

Established in 1986, SEARCH focuses on providing last-mile delivery of health services to vulnerable communities in the tribal district of Gadchiroli, Maharashtra, a region where dense forest covers over 70% of the land. The district has a high concentration of tribal population, constituting nearly 38.6% of the total population, compared to the state average of 9.4%. This population is especially vulnerable to climate change, as their livelihoods are deeply tied to the natural resources of the region. The aspirational district has historically been grappling with low accessibility to formal health services due to its topography of dense forests, where the availability of public health facilities has been limited.

Key Interventions:

The interventions focused on vector-borne disease control programs, improving accessibility of services through their village-level education and awareness programs supported by Community Health Workers (CSWs), Mobile Medical Unit (MMU), and a Hospital. The organization has been focused on tackling the resurgent burden of malaria emanating from climate change and also confronts the broader health impacts of industrial developments, such as the steel industry, which significantly contributes to climate change. On the service delivery front, there are two critical ways in which they are responding to climate change. First, by altering the timings of their medical visits, starting early sunrise around 6 am/7 am and wrapping up first shift till 11 am, followed by post-4 pm visits till late evening. This was to ensure protection from peak summer hours around 12 to 3 pm for both their healthcare workers and ensure accessibility of services for the general population. SEARCH's work is driven by the model of Participatory research with communities to ensure that they are not just recipients of aid but active partners in Research. SEARCH's direct outreach serves 230 tribal villages of Dhanora Block, and through the Muktipath initiative, SEARCH is engaged in 1500 villages with Block Federations and women's federations. Furthermore, SEARCH for Health has focused on greening of its health services by its emphasis on frugal and sustainable living on the campus of 150 employees. The campus has been transformed into a carbon-positive unit.



Watershed Support Services and Activities Network (WASSAN)

🔧 INTERVENTION ARCHETYPE

Adaptation/ Evidence building and research, Capacity building, Networking, Policy engagement

📍 LOCATION

Hyderabad, Telangana

👤 TARGET GROUP

Smallholder farmers, farm workers, tribal communities, and women

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

Established in 1996, WASSAN aims at promoting ecological security and prosperity in rainfed areas by fostering multi-stakeholder collaboration with state governments, NGOs, and research institutions. Its work spans across promoting agricultural resilience through a systematic exploration of the landscape in the three aspects, i.e, Natural resource, Production Systems, and livelihoods will provide a basis for economic growth. It is the Resource Support Agency for NABARD's JIVA program, supported by GIZ, being implemented in 16 states, and was a PMU for National Mission on Natural Farming, Program Secretariat for Shree Anna Abhiyan, Odisha, and it's a resource organisation for Rythu Sadhikaratha Samstha (RySS), AP, which aims at promoting agro-ecological farming to build resilience to climate change and improve income, food, and nutritional security.

Key Interventions:

This has entailed supporting farmers with branching away from monocropping, growing varieties that are adaptable and preferred by farmers, reducing the usage of chemical pesticides and fertilizers, and integrating livestock into the production systems. The shift to agro-ecological farming has translated into multi-fold impact in terms of improving soil health, the quality of diverse agricultural produce, nutrition, and improving the income of the smallholder farmers. This increased agricultural resilience in response to climate change, in turn, has direct implications in terms of improved dietary diversity and nutrition. Similarly, the emphasis on the growth of millets and the extensive role in building state and local capacity and community education in Odisha has been critical in improving household income through boosting production. The *Poshan Vanitha* model, where women entrepreneurs create demand by providing nutrition education like food festivals training, recipe trainings, and competitions, so on, while selling the agroecological farming inputs like diverse crops and traditional varieties seeds, bio-inputs, and products is being considered for large-scale implementation by state governments. It is also an area where sort policy engagement is required to streamline it further.

Expanding farmer and women-led enterprises, strengthening capacity-building platforms, and fostering market linkages for diverse, climate-resilient crops will ensure sustainable adoption. By bridging research, practice, and policy, WASSAN can continue to shape resilient farming systems that secure livelihoods, improve nutrition, and address climate challenges in rainfed areas.

Centre for North East Studies and Policy Research (CNES)

🔧 INTERVENTION ARCHETYPE

Adaptation/Service delivery

📍 LOCATION

Assam (Brahmaputra river islands)

👤 TARGET GROUP

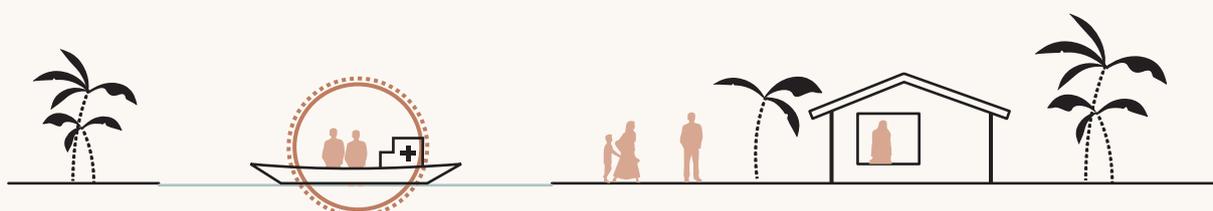
Island-dwelling communities

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

C-NES, established in 2000, works on governance, health, environment, gender, livelihoods, communication, and regional cooperation, positioning itself as a bridge between field realities in the North-east and national policy. Among its most significant contributions is health care delivery to the vast population living on the shifting sandbars and islands of the Brahmaputra. These islands, called chars, are home to about 2.5 million people, nearly seven percent of Assam's population, which for generations has lived with minimal access to communications, electricity, schools, drinking water and health services. Frequent floods and annual erosion add to the hardships, cutting off entire settlements from basic facilities. Assam is one of the most climate-vulnerable states in the Indian Himalayan region. The island communities along the Brahmaputra including Majuli, the world's largest river island, face increasing exposure to these changes. Rising rainfall, floods, and erosion are driving waterborne diseases, respiratory illnesses, and skin infections, particularly during the monsoon months. Loss of livelihoods and displacements have worsened health risks for communities already struggling with scarce services.

Key Interventions:

In 2004, CNES responded by designing the first 'boat clinic,' a mobile health unit that travels by river to these isolated communities. Starting in Dibrugarh district, the model expanded across the valley and in 2008, was scaled up through a public-private partnership with the National Health Mission, Government of Assam. Today 16 boat clinics operate across 15 districts, supported by partners such as UNICEF, Blockchain For Impact (BFI) and private donors such as the columnist Swaminathan S Aiyar. Each carries a team of doctors, nurses and health workers providing immunization, antenatal and postnatal care, family planning, treatment of common illnesses, disease screening, nutrition counselling, and emergency care. As extreme weather and shifting channels complicate access, C-NES has strengthened early warning systems, developed solar-equipped boats and used them for rescue and relief. The program now reaches 18,000-20,000 people every month and has contributed to marked reductions in maternal and infant mortality—Assam's MMR has fallen from 493 in 2003-04 to 125 in 2020-22.



Ashoka Trust for Research in Ecology and the Environment (ATREE)

🔧 INTERVENTION ARCHETYPE

Adaptation & Research and Evidence

📍 LOCATION

Multi-state presence, with HQ in Bengaluru, Karnataka

👤 TARGET GROUP

Indigenous and rural communities, smallholder farmers, urban and peri-urban populations in ecologically vulnerable areas

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

ATREE, founded in 1996, is a research institution that integrates ecology, social science and local knowledge to advance environmental conservation and equitable development.

Key Interventions:

Its work spans biodiversity conservation and restoration, water governance, sustainable resource use, climate change adaptation, and livelihood resilience. ATREE also trains researchers, placing community needs and evidence at the center of long-term work in fragile geographies. ATREE's research illustrates the deep connections between ecosystems, climate, nutrition and health. Projects on water focus on who gets access, the equity of distribution, and the quality of groundwater and surface water. Studies of microbial contamination, industrial effluents and agricultural chemicals have highlighted risks such as antimicrobial resistance and unsafe drinking water, especially in peri-urban and rural settings. Through its work on biodiversity and food systems, ATREE documents wild foods, edible insects, medicinal plants and forest produce that form the basis of diets among indigenous communities. This evidence shows how monocultures – briefly explain and loss of agrobiodiversity reduce nutrition diversity, while integrated farm systems and pollinator conservation can improve resilience and micronutrient intake. Research in these landscapes also highlights the gendered nature of food insecurity and decision-making, particularly in rural and peri-urban households. A “One Health” lens informs research on how climate variability and land-use change drive zoonotic diseases and affect vulnerable populations, particularly *adivasi* communities with limited healthcare access. Work in these regions highlights how shifting ecosystems and extreme climate events place forest-fringe communities at the frontlines of emerging health risks. ATREE's approach emphasizes long-term field-based evidence to shape policy and community practice. While the health impacts of this work are not the mainstay of ATREE's mission, their findings on water security, nutrition-sensitive agriculture and ecosystem resilience provide a foundation for adaptation strategies that link climate and human well-being and inform both local governance and national research priorities.

Dakshin

🔧 INTERVENTION ARCHETYPE

Research and evidence, ecosystem building, awareness building, service delivery

📍 LOCATION

Odisha, Andaman and Nicobar Islands, Lakshadweep, Tamil Nadu, Karnataka, Maharashtra

👤 TARGET GROUP

Coastal communities

Adaptation	Blended	Mitigation
Focused on equipping populations affected by climate change to address their health needs and avail relevant healthcare	Combines preparedness with systemic solutions to address both immediate needs and long-term resilience	Focused on reducing the worst outcomes of climate change and public health issues by improving community or systemic preparedness in vulnerable geographies

Dakshin has adopted an intersectoral approach to address the complex socio-ecological crises faced by small-scale fishers and coastal communities.

Key Interventions:

Through its flagship program *SeaChange*, Dakshin seeks to create systemic change by interlinking interventions in conservation, fisheries, governance, health, and livelihoods. At the core of Dakshin's *SeaChange* engagement is the recognition that ecological uncertainty, poor health, and the absence of role models or pathways for what? perpetuate cycles of vulnerability. Through this platform, Dakshin has created safe spaces for adolescents to bring mental and emotional health into focus while addressing critical issues such as food insecurity, WASH infrastructure, gender dynamics, and academic and social pressures, fostering a more holistic view of well-being. In Odisha and the Andamans, interactive workshops are led by youth leaders from fishing communities, whose deep community ties make the conversations more relatable and trusted. Furthermore, Dakshin's outreach efforts in the Sindhudurg district of Maharashtra have raised awareness of responsible seafood consumption among over 400 students through school workshops on the nutritional significance of small fish such as sardines, anchovies, and lizardfish, while also fostering interest in marine animals through educational materials. Similarly, in Odisha, Dakshin's Community Wellbeing and Environment team has worked to improve community health by addressing the rising burden of non-communicable diseases (NCDs). Through recurring health screening camps in cyclone-prone villages, the team has increased access to hypertension and diabetes testing and promoted regular health screenings in an area where distance poses a barrier for communities to avail government health system benefits. Creative methods, such as involving children in skits to spread awareness about early detection and the risks of alcohol consumption on blood pressure, further encouraged community participation. Dakshin's work in the Lakshadweep Islands illustrates how sustainable fisheries can safeguard both livelihoods and health. Home to about 90,000 people dependent on the surrounding seas, Lakshadweep's primary fishery is the inherently sustainable live-bait pole and line tuna fishery, which targets skipjack tuna through selective, low-impact methods. This fishery reduces pressure on fragile coral reef ecosystems and also secures nutrition and livelihoods for many islanders. Since 2012, Dakshin has worked with local communities to preserve this practice, buffer it from unsustainable transitions, and build participatory, rights-based governance structures. Today, Dakshin is helping establish a fisheries co-management platform in Lakshadweep, bringing together fishers, government, and NGOs to collaboratively manage resources at the local level. This interdisciplinary approach highlights how fisheries management is not only about conserving ecosystems, but also about protecting livelihoods, food security, and ultimately, community health. Dakshin's long-term goal is to create inclusive, holistic, and scalable models of resource governance that strengthen resilience against climate change and can be replicated across India and globally.

CHAPTER 5

Breakpoints – Bridging the Gaps

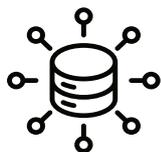
IN THIS SECTION

In every system, there are moments when established ways of working no longer keep pace with the scale or urgency of the challenge. We call these breakpoints - key defining challenges within a category that are also posited as opportunities for the future.

Understanding where these breakpoints lie is only the first step. To act on them, we examine what they reveal about the realities faced by those working closest to the problem. The experiences of nonprofits and proximate leaders of communities show how these challenges play out on the ground, and where the most immediate opportunities for change may lie.

Each breakpoint captures the challenge as it exists on the ground and in the system. Based on this, this section creates an evidence-led map of where targeted action could have the greatest effect. This opportunity is expressed as its catalytic impact—the strength it holds to unlock systemic change if addressed.

Research and Evidence



Integrate health, climate, and community data, strengthen local capacity to generate and use it, so as to move beyond siloed correlations and build the causal evidence needed for stronger climate–health action

India's climate–health research base is expanding, but its real potential is held back by the absence of integration across datasets and levels of governance. Today, information sits in silos. Health data is separated from air quality monitoring, IMD datasets, water management, and urban planning records. This prevents the generation of cross-sectoral insights that can guide more resilient health systems and public health responses. The first and most urgent step is to build pathways for integration; linking existing repositories, creating interoperable platforms, and fostering collaboration across ministries, research institutions, and local governments.

On the research front, specialists are increasingly able to identify correlations between climate factors such as air pollution and a range of health outcomes. Yet the evidence base must move beyond correlation to establishing causation. Integration is what allows this leap: only when health, environmental, and socio-economic datasets are connected can policy and funding decisions be grounded in stronger scientific proof.

Air pollution provides a clear example. Its impacts extend far beyond contributing to climate change, posing a staggering public health burden in India. However, the mainstream narrative often stops at linking air pollution to global warming, missing the more immediate and devastating consequences for people's health. India's large population, often lacking adequate healthcare or nutritious food, faces compounded vulnerabilities from the combined effects of extreme weather events and polluted air.



***“While headlines often focus on deaths from air pollution, the more widespread reality is its non-fatal but debilitating impacts — from reduced capacity to work and high medical costs to the need for caregiving that strains household income.*”**

Air pollution is linked to heart disease, diabetes, chronic respiratory conditions, stroke, lung cancer, and asthma, and Indian studies also show impacts on children such as stunting, anemia, low birth weight, and premature births. Yet these findings rarely filter into public awareness; many still see persistent coughs or breathlessness as seasonal or general sickness rather than pollution related.”

- Pallavi Pant, Health Effects Institute

The scientific community has already generated robust data, from ground-based monitoring and low-cost sensors to satellite-derived estimates, and has identified the leading national sources of air pollution: residential solid fuel use, transportation, energy production, industrial emissions, waste burning, and construction. Solutions for each of these are known, and progress has been made in some sectors (such as the transition to Bharat stage VI (BS6) vehicle standards, incentives for electric vehicles, and expanded household access to LPG). But the overall challenge remains vast, requiring more aligned and sustained action across stakeholders.

At the local level, the challenge is even more acute. Vulnerability mapping has begun in some regions, but districts and blocks often have limited tools and skills to independently carry out this work. Existing datasets are frequently underutilized because local administrations are not well-equipped to translate them into actionable climate resilience planning. Equally important is the absence of systematic community-level data on lived vulnerabilities, perceptions, and adaptation practices. This kind of information is critical for tailoring interventions to ground realities, yet it is not frequently collected in a structured way.

“There is a real dearth of information in communities about climate change and environmental health risks. Without awareness, resilience is almost impossible to build, especially in informal settlements where exposure is high. Civil society has a critical role in bridging this gap, engaging people directly, and enabling local governance to have meaningful conversations on climate risks and resilience”

- Sandeep Thacker, UNICEF

Catalytic Impact: This is precisely why integration matters. When research is siloed, the narrative remains fragmented and fails to mobilize wider support. Integrating sectoral and community-level data can reframe air pollution and other climate-linked hazards as public health crises rather than only environmental challenges. Such reframing is essential to broaden stakeholder buy-in, align policy priorities, and catalyze more coordinated responses that reflect the lived realities of communities. Equally important is building local capacity. Strengthening the ability of blocks and districts to conduct and apply vulnerability mapping would allow them to plan proactively instead of reactively. This must also reduce duplication: multiple institutions, such as Indian Institute of Public Health Gandhinagar (IIPH Gandhinagar) and IMD, currently run parallel models that often overlap without clear pathways for local uptake. A more streamlined approach that equips local administrations to access, adapt, and apply knowledge is vital.



With integration underway, the next step is attribution; health data systems must capture climate triggers with granular local detail to guide effective planning and response

Health data systems are improving but still lack robust attribution of climate–health impacts, and the absence of granular local data limits planning and response. India has made important strides in strengthening health information systems through initiatives such as the Ayushman Bharat Digital Mission (ABDM), the Integrated Disease Surveillance Programme (IDSP), and the Integrated Health Information Platform (IHIP). These platforms have improved how health data is collected, stored, and used, and have introduced real-time outbreak tracking and better decision-making tools.^{68 69}

This is where attribution becomes the crucial next step after integration. Without attribution, data integration risks remaining descriptive rather than diagnostic. Heat-related deaths, for example, are not frequently categorized as such, leading to a fragmented picture of their true scale. These vulnerabilities are compounded by systemic blind spots in data. Medical records in India, following the International Classification of Diseases (ICD), generally record only the immediate cause of illness or death, without noting climate-related triggers or contributing factors. Without this level of classification, it is difficult to quantify the true burden of climate-induced illness and mortality, or to identify which facilities and populations are most affected. This under-reporting creates a skewed impact narrative.⁷⁰

Even when reported, the numbers vary widely between government agencies. The IMD, the National Crime Records Bureau (NCRB), and the Health Ministry's IDSP all track heat-related fatalities, but they use different definitions, data sources, and collection methods, resulting in inconsistent and sometimes contradictory figures.⁷¹ This makes it hard to build a reliable national picture of the scale of the problem.

Granular and localized data are also essential for attribution. Hyperlocal detail on climate–health interlinkages, including ward-level data, environmental stressors, and even the chemical composition of air pollutants, is often unavailable, especially for populations served by Primary Health Centers in high-exposure areas like informal urban settlements. These areas are also where vulnerability is already high and adaptive capacity is low. Without this level of detail, it becomes difficult to design interventions that address both the environmental drivers and the health impacts they cause.



The sector lacks sufficient evidence to identify tangible solutions within India's diverse context. While felt impacts like heatwaves and floods are increasing in frequency and intensity, significant knowledge gaps remain on the exact nature of these challenges and where efforts should be focused. Hyperlocal data is crucial to capture how problems manifest differently across geographies. Responses must therefore be context-specific—what works in one place, such as a digital app for heat warnings, may not work elsewhere. Civil society has begun experimenting with localized interventions like green-blue infrastructure and cooling solutions, but the reality is that we need many, many more such hyperlocal innovations.”

- Dr Neethi V. Rao, Fellow, Centre for Social and Economic Progress (CSEP) India

Catalytic impact: Focusing on granular climate and health datasets and aligning methodologies across sources would improve program accuracy. This would strengthen the evidence base for targeted interventions, allowing for proactive prevention rather than reactive response. This will also enable hyperlocal targeting of resources to the most vulnerable populations. Attribution turns integrated data into actionable intelligence, providing the clarity needed for policy, programming, and investment decisions that genuinely reduce climate–health risks.



Disease surveillance systems exist, but lack the capacity to generate predictive forecasts of climate-sensitive disease patterns and healthcare needs

India's health systems have established disease surveillance platforms and collect a growing volume of health data. However, these systems are not yet equipped to explicitly link health outcomes with climate drivers, leaving a gap in both data classification and analysis. Tools for forecasting how climate change will shape future disease patterns are largely absent. Without these, healthcare administrators cannot anticipate seasonal surges, such as a rise in dengue cases, or plan for the growing need for climate-sensitive specializations like lung cancer specialists, asthma specialists, and intensivists as air pollution worsens.

Technical and institutional capacity for predictive modelling remains low. Research to develop robust forecasting tools that are capable of projecting patient loads, specialist requirements, and resource

needs at the facility level is limited. At the clinical level, while climate health risks are generally understood in broad terms, there is insufficient depth in training on how climate change and extreme weather events affect specific health pathways. This includes impacts on patients with pre-existing conditions such as post-bypass cardiac patients, those with end-stage renal disease linked to poor water quality, or those vulnerable to heat- and pollution-related respiratory illness. The absence of targeted approaches for the “untapped, unreached, and most vulnerable” communities compounds the gap.

Catalytic impact: Equipping health systems with climate-informed forecasting tools and strengthening clinical understanding of climate–health pathways would transform preparedness. Administrators could anticipate and allocate resources before crises peak, ensuring adequate staffing, equipment, and specialist care. PHCs could plan for the specific needs of their catchment populations, reducing preventable morbidity and mortality. Linking surveillance and predictive modelling with targeted training would shift the system from reactive crisis response to proactive, risk-informed healthcare delivery.



Global–local data misalignment and limited open access impact community-level action

NGOs developing parametric tools and other community-focused interventions face a dual challenge - the absence of open-access, high-resolution local climate data and the mismatch between global and local datasets. The IMD remains one of the most credible national sources, yet key datasets are not publicly available. As a result, implementers often rely on global weather datasets that, while incorporating variables such as humidity, do not always align with IMD’s dry bulb temperature readings reported in local media.

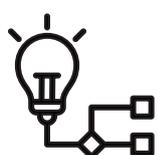
This misalignment can create confusion and impact the trust of the communities. For example, under Mahila Housing Trust’s heat insurance scheme, payouts are triggered using a global dataset. When local newspapers declare a “heat event” based on IMD data, community members may expect payouts—only to find the global dataset did not register the same trigger. Differences in measurement methods, coupled with limited community understanding of insurance as a risk transfer tool, widen the gap between program design and beneficiary expectations.



“Without open access to local weather data, we rely on global datasets that don’t always match what the IMD reports. So when the local news calls a heatwave, women expect their insurance to trigger, only to find it hasn’t. That mismatch can be hard to explain and even harder for communities to trust.”

- Bijal Brahmhatt, Mahila Housing Trust

Catalytic impact: Making high-quality, local-level climate and health datasets openly accessible, including those from credible sources like the IMD, would enable far more precise, trusted, and timely interventions. When such datasets are open and harmonized, communities can better interpret risks, align expectations, and engage with tools such as climate insurance or early warning systems in ways that feel credible and responsive. This would not only improve accuracy and transparency but also build trust in climate–health services, creating a stronger foundation for locally driven resilience.



Turn evidence into action by piloting community-led adaptation models with built-in pathways to scale

India now has far more climate–health data, vulnerability maps, and policy frameworks, yet far less clarity on what an integrated response actually looks like in communities. For people on the frontlines, such as in dense settlements, PHC catchments, or informal workplaces, this vision remains largely undefined.

A next frontier could be piloting community-led adaptation pathways for vulnerable settlements, PHC catchments, and worker clusters. Here, evidence is used to co-design and iterate concrete models. This could include, for example, bundling early warning systems with work–rest scheduling, shade and cooling infrastructure, occupational health protocols, social protection linkages, and local health outreach – all tested together in one geography rather than as isolated schemes. Frontline workers, informal worker collectives, women’s groups, and local governance institutions must be at the center of this process, not only as implementers but as co-designers and evaluators of what works.

For such models to be meaningful, they must be anchored in strong learning systems. Each pilot needs a simple but robust measurement framework that tracks multiple outcomes – health, livelihoods, time savings, reduced out-of-pocket costs, and changes in risk perception – using both quantitative indicators and qualitative narratives. This requires flexible, risk-tolerant capital that allows for iteration, recognizes that some ideas will fail, and prioritizes learning over short-term “success stories.” Equally important is building early pathways to embed promising models into public systems, so that they are not impacted once project funding ends.

Catalytic impact: A deliberate focus on community-based adaptation model testing can turn fragmented pilots into a pipeline of proven, scalable archetypes. By linking hyperlocal experimentation with rigorous but practical evaluation, funders and governments gain clearer evidence on which combinations of interventions deliver meaningful climate–health benefits, for whom, and at what cost. This, in turn, de-risks adaptation investments, builds confidence in bottom-up solutions, and creates a menu of tested models that can be adapted across cities, districts, and states. Over time, such an approach can shift the system from isolated, short-lived projects to a learning-oriented ecosystem where communities, practitioners, and public institutions co-create the next generation of climate–health responses.

Philanthropy Landscape



Evolving donor priorities and limited awareness and recognition of climate–health intersections

Donor interest in climate–health is growing, especially after COVID-19 served as a watershed moment in revealing how deeply health systems and environmental risks are connected. Yet many funders still approach these as separate domains, supporting either direct health services or climate-focused initiatives, but rarely the space where they intersect.⁷² Public health understanding often centers on service delivery, while climate action is viewed through visible, emissions-focused issues. As a result, the lived realities of climate-linked health risks remain less visible in public discourse and philanthropic narratives.

This emphasis makes long-term, integrated investments, such as research or preventative climate–health measures, less likely to be funded at scale, leaving the root causes and co-benefits of intersectional work largely unexplored. This pattern extends to other overlaps, such as climate and gender, where opportunities for combined impact can be missed.

Data and narrative gaps reinforce this hesitancy. The lack of localized data and compelling impact stories makes it harder to build a strong investment case, slowing donor response. Some funders also perceive large-scale challenges like worsening air quality or rising temperatures as particularly difficult to address, given the structural and governance complexities involved, further complicating efforts to mobilize funding for integrated climate–health solutions

Given the field's relative newness, most funders are in the early stages of shaping their climate–health strategies. This creates an opportunity to surface evidence-backed stories and practical models that show how climate–health interventions deliver measurable, multi-dimensional impact, expanding the scope of what is seen as both urgent and investible.

Catalytic impact: As donor interest in climate–health accelerates, there is a window to shape the field's trajectory before funding patterns calcify. Strategic investments in generating high-quality, disaggregated evidence, coupled with compelling narratives that link climate risks to tangible health outcomes, can broaden what funders view as urgent and investible. Demonstrating co-benefits, such as how heat action plans reduce both morbidity and economic productivity losses, or how clean energy in health facilities improves care quality while cutting emissions, can appeal to both climate- and health-focused funders. Building a pipeline of integrated, scalable interventions and fostering cross-sector alliances will position climate–health not as a niche cause, but as a core pillar of resilience and development finance.

Unclear success metrics and long timelines make impact hard to demonstrate

Climate–health interventions often unfold over several years, with meaningful changes in health outcomes, such as reduced climate-related morbidity, emerging gradually rather than within a single reporting cycle. This can make it harder to communicate progress in ways that resonate with traditional donor expectations, such as through tangible outcomes (“X lives saved”), especially when early results are best reflected through proxy measures like the uptake of tools or integration into public systems. Limited availability of high-quality health data, particularly for under-reported outcomes like heat-related mortality, adds to the complexity.

In this context, funders are still aligning on what success looks like and how best to measure it. While some are comfortable taking a longer-term view, others—especially smaller domestic funders—may be less inclined to commit without clearer interim markers. Strengthening shared metrics, improving data systems, and highlighting early wins alongside longer-term goals could help build confidence and sustain investment in the space.

 *“Climate-related health outcomes take years to manifest, making it difficult to align impact assessment with funders’ expectations for short-term, tangible results. Unlike other public health interventions where a one-to-one correlation can be shown quickly, programs such as heat capacity building may not demonstrate lives saved in a single season, even though they significantly reduce long-term risks. This disconnect leaves many grounded climate–health initiatives struggling to demonstrate the kind of impact that unlocks sustained funding”*

- Nymisha Herrera Nimmagadda, Swasti

Catalytic impact: Developing a shared set of climate–health indicators that balance short-term signals of progress with longer-term health outcomes could help align funder expectations with the realities of the field. Strengthening data systems to capture under-reported outcomes, such as heat-related mortality, and communicating interim achievements, like policy uptake, system integration, or improved service readiness, can demonstrate momentum while longer-term impacts take shape. This approach can build funder confidence, encourage sustained engagement, and position climate–health as a viable, high-impact investment area.



Preference for mitigation over adaptation

Despite adaptation's critical role in building long-term climate–health resilience, Climate finance in India, like much of the world, remains heavily weighted toward mitigation, where outcomes such as reduced emissions are easier to quantify and communicate. In 2022, global climate action stood at USD 1.4 trillion, with more than 90% of activities focused on mitigation, and debt instruments dominating, signaling a need for greater equity investments and deeper private sector involvement. In India, USD 22.5 billion was raised for climate action in 2022, with roughly 70% directed toward mitigative projects in energy systems and transportation.⁷⁰

While valuable, these efforts may not always address the most urgent adaptation needs, such as systemic policy reform or building resilience in vulnerable communities. The challenge is compounded by the abstract, people-driven nature of adaptation impact, which unfolds over longer timelines and is harder to measure than the clear, metric-driven results of mitigation, making it less visible and less investible in the eyes of many funders.



“There’s a huge and stark difference in how much funding goes to mitigation versus adaptation, especially in India and across the Global South. Mitigation attracts more finance because it can show sizable outcomes and a clear return ratio, like emission reductions or renewable energy capacity added. Adaptation relies on the theory of social change. It’s transformational, it takes years, and it doesn’t have very quantifiable indicators, so it’s harder to sell to funders looking for immediate, tangible returns. The irony is that India’s climate–health priorities are largely adaptation-driven, early warning systems, disaster risk reduction, yet the finance rarely flows to the bottom-up approaches that actually build community and institutional resilience.”

- Aparna Roy, Observer Research Foundation

Catalytic impact: Meeting the scale of the climate–health challenge will require a decisive shift in adaptation financing, away from reactive, short-term fixes and toward anticipatory, strategic action. This demands targeted investments in small-scale, proof-of-concept demonstrations that can build confidence and crowd in further capital. Establishing a standardized framework with clear, consistent, and robust methodologies for assessing climate–health and adaptation interventions is critical. Transparent, outcome-focused measurement is essential. It should be grounded in standardized metrics that capture both immediate progress and long-term health gains. This approach can help de-risk adaptation for funders and align stakeholders. It can also channel resources into interventions that strengthen resilience where it matters most, in vulnerable communities.

Operational and Partnership Ecosystem



Healthcare infrastructure is expanding, but remains physically and operationally vulnerable to climate risks

India's health system spans over 200,000 healthcare facilities, many of which are located in districts facing high climate risk.⁷³ A study indicates that over 40% of these districts face risks that could affect such facilities; in Maharashtra alone, 11% of facilities are already in flood-prone areas, a figure expected to triple by 2050.⁷⁴ While large public hospitals, such as All India Institute of Medical Sciences (AIIMS), are increasingly built with green design principles and resilience features, PHCs, often serving the poorest and most climate-vulnerable communities, remain the least protected. The private sector is generally better positioned to invest in measures like backup power, water reserves, and green building certifications, but resource constraints make similar upgrades in the public system harder to achieve.

Similarly, the healthcare workforce itself is unprepared for the specific demands of climate-sensitive care. The current medical education curriculum touches only lightly on climate and health, mentioning a handful of risks without delving into clinical pathways or management strategies. Staff are also personally vulnerable: exposure to heat waves and air pollution, or inability to reach facilities during floods, can disrupt service delivery when it is needed most.

Catalytic impact: Targeted resilience upgrades for high-risk facilities, paired with climate-informed workforce training and data systems, would create a health system capable of withstanding both acute shocks and long-term climate pressures. Resilient infrastructure would keep critical services running during floods, heatwaves, or power outages. A workforce equipped to anticipate and treat climate-sensitive diseases would reduce preventable morbidity and mortality in vulnerable populations, ensuring continuity of care.



Workforce gaps affect continuity and quality of service delivery

Ensuring that NGO led climate–health solutions function effectively at the community level often depends on having skilled technicians who can deploy, maintain, and troubleshoot them. In many areas, especially rural areas, this technical capacity is either limited or unevenly distributed, which can slow implementation and reduce the reliability of services.

In public health facilities, high staff turnover presents an added challenge. When trained personnel leave, they take with them valuable institutional knowledge about systems, processes, and local needs. This loss can disrupt the continuity of care, especially in underserved regions where replacements may take time to onboard. Over time, these workforce gaps can weaken the long-term effectiveness and sustainability of interventions, even when initial deployment is successful.

“One of the realities we encounter is that people in health facilities often change roles or locations over time. Someone who has been trained to manage specific equipment or processes may not remain in the same place after a year or two, which naturally raises the question of how knowledge and systems continue to function beyond the individual. This challenge is further compounded in rural areas, where it is not always easy to attract and retain staff for long periods. To address this, we are focusing on building continuity through multiple layers of training for people at different levels of responsibility, while also digitizing these processes. In doing so, we aim to ensure that critical knowledge is systematically preserved and accessible, so that the effectiveness of solutions does not depend on any one person but is embedded within the institution.”

- Ishita Roy, Selco Foundation

Catalytic impact: Strengthening local technical capacity, through targeted training, retention strategies, and partnerships with vocational networks, could help ensure solutions remain operational and responsive. At the same time, investing in knowledge transfer systems within public health facilities can safeguard institutional memory, reduce service disruptions and improving continuity of care.



Government buy-in is essential for scaling climate–health solutions from pilots to nationwide programs

For climate–health interventions to achieve sustained, nationwide impact, programs initiated by individual agencies or nonprofits ultimately need to be integrated into government systems. This is especially true for initiatives linked to social security or large-scale service delivery. While there is often openness to adopting frameworks or guidelines, translating these into full-scale, operational programs can be a gradual process. The challenge lies in bridging the gap between pilot success and institutional adoption, ensuring that promising solutions are not only recognized on paper but embedded into policy, budgets, and implementation pathways.

A central need going forward is to strengthen political and institutional prioritization. International experiences show how high-level commitment can accelerate resource allocation, monitoring infrastructure, and action at scale. For example, when China “declared a war on air pollution” in 2014, strong political commitment translated into rapid gains: by 2021, Beijing’s PM2.5 levels had fallen by 63 percent from 2013, averaging an 8 percent annual reduction.⁷⁵ In India, where multiple development imperatives compete for attention, climate and health concerns are most likely to gain traction when framed in alignment with national priorities such as inclusive growth, domestic innovation, and improved service delivery.

Equally important is shifting how the narrative is built. Rather than focusing on gaps in evidence building and research, one can highlight how tackling climate-related health risks directly supports flagship initiatives such as *Swachh Bharat* or *Make in India*. A positive, solutions-oriented framing can create the reinforcing story needed to mobilize broad-based support across government, private sector, and NGOs.

Catalytic impact: Building stronger evidence on cost-effectiveness is central to convincing policymakers and funders that climate–health interventions deliver value not only in health outcomes but also in economic productivity, reduced household burdens, and more efficient service delivery. Demonstrating how interventions align with government priorities further anchors them in the national development agenda. Early and continuous dialogue with public institutions is equally critical. Engaging government stakeholders from the outset helps ensure that pilots are designed with eventual adoption in mind, reducing duplication and increasing consistency across different models. Over time, this iterative partnership can smooth the path from pilot to policy, embedding proven solutions into budgets, implementation pathways, and long-term planning. Such an approach accelerates scale-up while preserving the integrity and effectiveness of interventions, ensuring they remain impactful when transitioned from small-scale innovation to nationwide programs.

CHAPTER 6

Emerging Opportunities in the Climate-Health Ecosystem

IN THIS SECTION

This section reviews the current climate–health funding landscape in India and identifies key white spaces for philanthropic investment.

It highlights disease priorities that are likely to be significantly affected by climate-related events but remain underrepresented in mainstream funding and policy discourse. Finally, the section outlines intervention areas where strategic philanthropic direction can help steer civil society's efforts toward underserved and emerging priorities.

Mapping Financing Landscape for Climate and Health in India



Insufficient public and private funding

One set of estimates points to India needing about 16B USD annually to address climate-related health risks through 2030.⁷⁶ The government's total allocation towards the National Action Plan on Climate Change was at USD 1.57 billion in 2024-25, constituting merely 9.8 of the requisite 16B USD.⁷⁷

The initiative comprises nine missions spanning agriculture, energy efficiency, Green India, the Himalayan ecosystem, human health, solar energy, strategic knowledge on climate change, sustainable habitat, and water.

While each mission generates co-benefits for the health sector, direct funding for the National Programme on Climate Change and Human Health (NPCCHH) remains limited. Between 2020 and 2025, NPCCHH received USD 28.8 million under the National Health Mission—equivalent to just USD 5.8 million annually. This amounts to only 0.4% of total climate change expenditure and 0.002% of the overall USD 16 billion allocation, underscoring the need for significantly higher public investment.



Experts note that health departments at the national, state, and local levels often struggle to access funds from climate-focused ministries. Limited financial integration constrains holistic, cross-sectoral action. Under the NPCCHH, funding is largely confined to capacity building, health worker training, and facility retrofitting, such as solarization. However, the scale and complexity of climate-related health risks demand a much broader and more ambitious intervention landscape.

Heat Action Plans have gained increased attention in recent years and draw part of their funding from the National Action Plan on Climate Change. Additional public financing is available in states where heat is officially classified as a disaster, enabling governments to access up to 10% of allocations under the State Disaster Management Fund.⁷⁸ Overall, while Heat Action Plans have been rolled out rapidly, financing remains weak. One analysis found that only 30% of plans explicitly outline funding mechanisms, with most relying on departments to self-allocate resources—highlighting the need for more dedicated and predictable financing.⁷⁹

Funding from overseas development assistance and private sector investments together constituted about 1B USD, necessitating the need for unlocking greater private and domestic philanthropy investments. Funders consistently noted that India lacks strong climate–health evidence and narratives, has limited technical capacity, faces misaligned funding cycles relative to on-ground outcomes, and experiences fragmented coordination across portfolios. These constraints collectively slow the flow of resources toward integrated climate–health work. This mirrors broader literature, which identifies weak sectoral knowledge on climate–health linkages and the absence of reliable predictive models as major reasons for underinvestment in this space.



“The absence of technical knowledge makes it difficult to evaluate the complex proposals in climate-health in terms of their effectiveness to achieve the stated objectives.”

- Strategy Lead CSR, Leading Indian firm



We also observed that while most NGOs leading work in climate-health are health-first NGOs, it is domestic environment- and climate-focused funders who are currently more engaged with climate–health work. This creates a clear opportunity to build similar momentum among domestic health funders. Strengthening this interest is especially important given that the global pool of major health-focused philanthropies remains relatively small, concentrated among a few actors such as the Gates Foundation, Wellcome Trust, Rockefeller, and Packard.

Mitigation-focused climate action, despite the urgent need for adaptation

There is limited publicly available data on the adaptation–mitigation split of climate-health financing in India. However, nearly 90% of overall climate funding is directed toward mitigation.⁸⁰ Our conversations with funders suggest a similar pattern. With the exception of air pollution, emission reduction has received greater attention than health system adaptation.

The case for strengthening investment in adaptive priorities is strong, both in terms of returns and equity outcomes. One analysis shows that health sector investments generate the highest returns among adaptation options, averaging approximately 78%. Forestry and nature-based solutions follow

at a distant second, with an average return of 39.5%.⁸¹ Despite these findings, actual allocations to adaptation remain limited. A key constraint is the difficulty of quantifying benefits, which continues to steer funding toward mitigation.

Adaptation efforts in climate and health focus on building immediate community resilience and preparedness for extreme weather events. These interventions can significantly reduce morbidity and mortality. However, they are resource-intensive and slow to mature. Investments such as early-warning systems for disease outbreaks require sustained financing, administrative capacity, and long calibration periods before they inform decision-making. Estimating lives saved through such efforts is also challenging.⁸² This uncertainty underscores the need for patient, risk-tolerant philanthropic capital.

Moreover, adaptation interventions are highly context specific. They often require coordinated action across multiple sectors. This makes evaluation complex and fund tracking across financing streams difficult.

The need to direct greater funding towards adaptation over mitigation also stems from the fact that India ranks lowest on the per capita emission burden associated with the health sector among a group of 43 developed and developing countries. Even as India ranks 7th highest in terms of overall emissions relating to health, on a per capita basis, India's emissions are lowest at 0.03 metric tons, against the group average of 0.28 metric tons (9.3x that of India). For the sake of comparison, the USA's health sector was the highest emitter, producing 1.72 metric tons per capita, 57x that of their Indian counterpart, as per estimates by Health Care Without Harm.⁸³ Even this low per capita emission number masks the vast inequities in emissions, as reported by multiple independent estimates.

Given that those impacted by the extreme weather events are least likely to contribute to the same, there is a need to redirect our focus towards adaptation, because of its direct implications for vulnerable communities and exacerbating inequalities. In the Indian context for instance, the north-east region in the country ranks among the most vulnerable to adverse impact of climate change, despite its relatively much lower contribution to the emission burden. One set of estimates identified Assam as one of the world's top 50 regions most vulnerable to climate-related damage to built infrastructure by 2050.^{viii} Thus, in the wake of these considerations, it is critical to have an integrated approach and focus on both adaptation and mitigation to safeguard the immediate concerns while building long-term resilience.



“I don't think there are such neat buckets that we need to look at, in terms of adaptation and mitigation. If I do mitigation today, I become more efficient, lean, and also devise ways in which I can, in case of a weather event, respond appropriately. If I adapt to the climate health issues that I'm facing today, I become more resilient tomorrow because I've got institutional knowledge built in. The adaptation of today is the resilience of tomorrow.”

- Karan Thakur, Apollo Hospitals Group



Opportunities for Investment in Evidence-Building

More than one funder highlighted the need for rigorous, scientifically validated evidence as essential to unlocking investment in climate–health. As one funder noted, this has created a classic chicken-and-egg problem: limited contextual evidence leads to low awareness of the scale and urgency of climate-related health risks, which in turn suppresses funding. Yet the lack of funding also constrains the generation of robust evidence, further reinforcing low awareness and slowing progress.

Domestic CSR funders noted that the pressure to spend quickly and meet annual compliance requirements makes it difficult to allocate substantial resources to evidence-building, which is inherently long-term. R&D-oriented projects also disburse funds more slowly than capital-intensive interventions, affecting the volume of funding they attract. Although there is broad agreement on the value of evidence-based decision-making, the lack of visible impact in the early years further deters investments in research and evidence generation. This underscores the need for stronger dialogue on why sustained evidence-building is essential for informed climate–health decision-making.



Focus on improving the availability of disaggregated data on disease burden and health system preparedness

Given that health is a state subject in India, a state-wise mapping of the increased health risks associated with climate change, as well as the preparedness of the existing health system infrastructure to deal with the increased caseloads, and the direct exposure to different climate risks, is an important input for resource planning. Currently, evidence on both these indicators seems to be lacking. Even as there are some estimates at the all-India level regarding the increased morbidity and mortality associated with climate change, there is a dearth of disaggregated data to understand the impact of climate change on the disease burden. While a state-wise mapping of these estimates is an important starting point, there is a need for more localized estimates, given that weather patterns unravel differently even at an intra-district level. Local-level evidence is crucial for convincing local health departments why they should work on Climate-health, as has been noted by one of the leading intermediaries working in public health.



“Healthcare officials predominantly approach heat-related, respiratory, and infectious diseases from a clinical standpoint, with limited recognition in many cases of how climate change is exacerbating these health outcomes.”

- Mrunmayee Velukar, Consultant – Climate Health, PATH



“Even within 5 kilometers in a district, the climate is entirely different. We want to develop something at a more localized level, at least at the taluka level. Our aim is to focus on the microclimate part, because we already have district-level heat action plans and disaster action plans.”

- Kerala State Nodal Officer, National Program on Climate Change and Human Health



“With regards to the gap, whether in terms of research or what is hindering implementation and effective outcome generation, the lack of granular, disaggregated data across socioeconomic groups, geography, and gender dimensions is the issue. In the absence of such, the policies will not answer to or address the real needs of the communities. Whether it needs new creations of health infrastructure, or whether we need to retrofit existing ones to address the changing, intensifying climate risk. The data sets are critical for targeting the limited resources to the specific needs or where the money is required, instead of duplicating efforts.”

- Aparna Roy, Observer Research Foundation

There is potential to build on the existing efforts of the government relating to extreme weather events vulnerability mapping and build more localized estimates. These estimates can, in turn, be linked to local disease outbreaks, and model more accurately the impact of these events on the shift in the incidence and the frequency of the disease burden. The Hazard Atlas of India, developed and maintained by IMD Pune, for instance, has district-wise mapping of the 13 most hazardous meteorological events to facilitate planning for disaster management events.⁸⁴ This can become a crucial basis for forecasting health risks emanating from extreme weather events and providing estimates at a disaggregated level.

Similarly, evidence on the health-system preparedness, specifically on the supply side, is also limited, and there is a need to get a baseline understanding of the status of current preparedness of both the physical infrastructure and human resources to deal with the climate risks in the short run as well as the long run. This is especially critical given the overall infrastructure deficits, as well as there being widespread intrastate and interstate inequities in the availability and accessibility of these health services. One set of estimates, on the overall assessment of the health sector preparedness, found the states of Andhra Pradesh, Kerala, Uttarakhand, Himachal Pradesh, and Jammu & Kashmir had the highest number of districts, where health systems were at very high risk of disruption due to extreme weather events.⁸⁵ There is a need for similar estimates, with further disaggregation of both demand-side and supply-side vulnerabilities of the health systems.



Focus on improved understanding of select disease profiles that affect a sizable population in India

Evidence on the interlinkages between extreme weather events and disease burden is evolving in the Indian context. While there is greater availability of evidence in the context of vector-borne diseases, food security, air pollution, and heatwaves, our expert conversations revealed select disease priorities where there is a need for more work in terms of understanding the disease dynamics that unfold in the Indian context.



1. Chronic impact of heat stress and complications in management of NCDs:

There is a need for improving our understanding of the chronic impact of heat stress, as separate from the impact of heat waves. The former results from extended exposure to high temperatures across multiple days and nights.⁸⁶ The geographical differences in humidity levels further complicate our understanding of the heat exposure and its impact on public health.



“Our problem is not just the temperature alone, but the humidity is very high. So, it’s not just the actual temperature; 45 degrees Celsius will feel like more than 50 degrees because of the humidity. Clinical diagnosis of heat-related illness remains difficult for us because we usually do not see clear cases like those in Gujarat or elsewhere. Heat-related illnesses may include minor conditions such as heat rash, heat cramps, or syncope, but not everyone may recognize these as heat-related. Our problem is the unpredictability; today it might rain, tomorrow it might be different. So, that’s a challenge.”

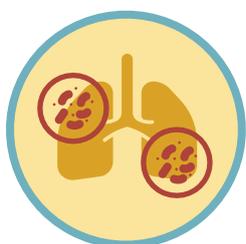
- Kerala State Nodal Officer, National Program on Climate Change and Human Health

The extended exposure to high temperatures across multiple days also complicates the management of existing chronic diseases. Specifically, this includes cardiovascular, cardio-pulmonary diseases, renal diseases, oncology, and respiratory illnesses, where there is insufficient understanding of the

dynamics in the Indian context. Similarly, clinical management of diabetes and hypertension as a result of ambient heat exposure is a critical area of concern and needs greater attention.⁸⁷ The focus on non-communicable diseases is critical given that they constitute 62% of the disease burden and are the leading cause of mortality.⁸⁸ The discourse on how heatwaves, for instance, impact the management of these diseases is also missing from the current public health advisories relating to heatwaves.⁸⁹



Reproductive and Maternal Health: Expert consultations have also highlighted increased obstetric complications emerging from increased heat stress and the inadequacy of the existing clinical protocols to deal with the same. Studies at the global level have found that increased heat exposure in pregnant mothers has been linked to increased risk of preterm births, low birthweight, stillbirth, and miscarriage.^{90 91 92} Another meta-analysis based on a global review of the evidence linked increased temperatures with an increased risk of gestational diabetes, hypertension, preeclampsia, and mental illness among expectant mothers.⁹³ The exacerbated challenges in the under-resourced settings like India, with the absence of adequate cooling solutions,⁹⁴ and a high burden of paid and unpaid work, make it critical to generate greater local-level evidence to understand the impact on women's reproductive health. The need for greater investment in building localized evidence also stems from the biological differences across populations. For instance, certain genetic characteristics in the Indian population heighten the local population's vulnerability to pollution-related health risks and pregnancy complications, a dynamic that may be absent in other populations.⁹⁵



Tuberculosis: While evidence is emerging on the linkages between climate change and tuberculosis at a global level, there is a dearth of India-specific evidence. It also remains neglected in the global agenda, and there is a need to position it as a climate-sensitive disease. India accounts for 1/4th of the global TB cases, and climate change is likely to exacerbate both underlying risk factors and treatment outcomes for tuberculosis.⁹⁶ Increased temperature is linked with increased under-nutrition and food insecurity, which are leading risk factors for TB.⁹⁷ Similarly, climate change is also linked to increased prevalence of poverty, overcrowding, indoor air pollution, and diabetes, which are other risk factors linked with tuberculosis.⁹⁸ The at-risk population for TB typically also belongs to the most vulnerable sections of society, implying an equity argument for assigning greater priority.

Opportunities to encourage interventions

Need for encouraging solutions for mitigating air pollution



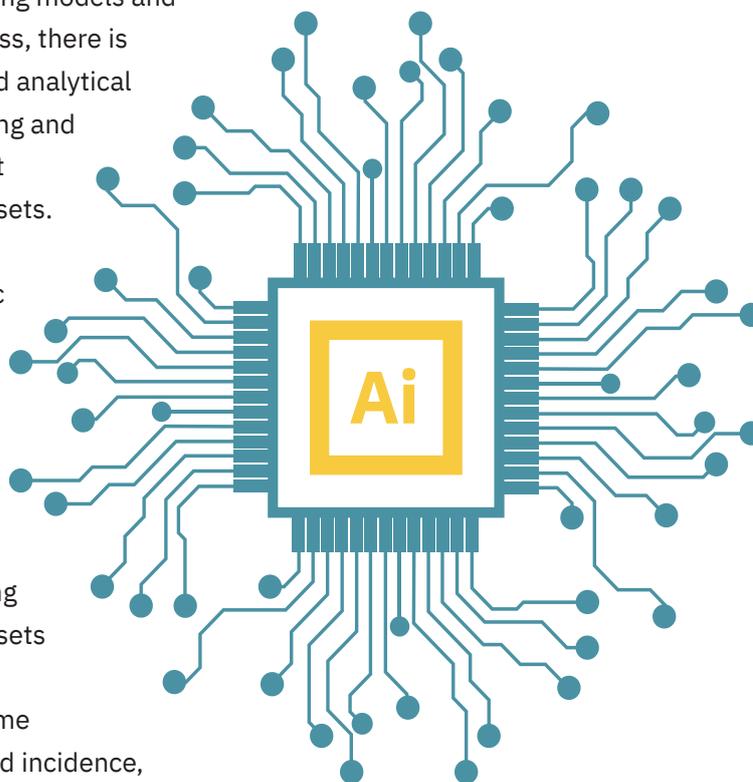
In terms of investments towards encouraging greater participation from NGOs, there is a need for greater focus on sourcing and scaling solutions aimed at directly tackling air pollution. From our primary data collection, it was evident that NGOs were barely present, and much of the current presence was restricted to evidence building and awareness. Global evidence reveals that this is an area where philanthropy has been successful in the past in terms of fostering multi-stakeholder collaboration. Clean Air Fund⁸ partnered with the UK government to create and/or expand eight Clean Air Zones. This had implications in terms of improved air quality and an additional five million Londoners breathing clean air.⁹⁹ While the political economy around interventions on air pollution is difficult due to entrenched political interests, the health impact linked to air pollution, in fact, provides a renewed case for greater intervention in the reduction of air pollution.¹⁰⁰ Similarly, the attribution of adverse health outcomes to air pollution by individuals is still an evolving narrative, necessitating greater dialogue and awareness. The limited philanthropic and NGO focus on air pollution is also partly due to the solutions relating to air pollution lying beyond the scope of interventions by the traditional health system, involving urban planning, design, automobile, and the construction sector.

⁸ Clean Air Fund, though founded by organizations with a climate and environment lens, has reframed air pollution in terms of its adverse impact on human health.

Leveraging analytics and AI-driven solutions on existing datasets

While efforts are underway to generate more real-time and granular data to support forecasting models and strengthen health system preparedness, there is significant scope to leverage advanced analytical approaches, including machine learning and other modelling techniques, to extract actionable insights from existing datasets.

Large, nationally representative public health datasets with long time series—such as the National Family Health Survey (NFHS), National Sample Survey Organisation (NSSO) surveys, and the India Human Development Survey (IHDS)—offer valuable opportunities for training machine learning models. These datasets can be used to extrapolate trends and predict the potential impacts of extreme weather events on disease profiles and incidence, even in the absence of real-time surveillance systems.



Realising this potential will require concerted philanthropic investments in building technical capacity, interdisciplinary training, and institutional infrastructure across academic institutions and NGOs. Strengthening the ability to design, execute, and interpret such modelling efforts is essential to ensure that analytical outputs translate into meaningful policy and programmatic action.

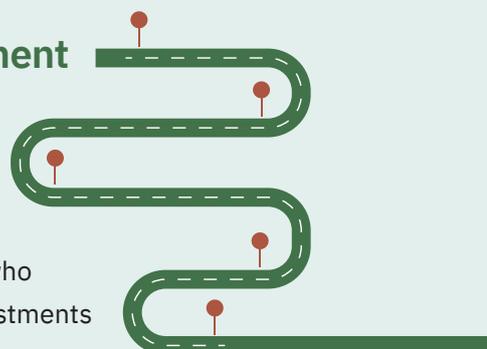
A case in point is the Wadhvani Institute for Artificial Intelligence, which applies machine learning techniques to improve healthcare outcomes in areas such as tuberculosis and maternal, newborn, and child health. Such initiatives illustrate how strategic investments can catalyse innovation at the health-technology interface. Importantly, philanthropic engagement in this domain extends beyond sustained financial support. It also entails stewardship, agenda-setting, and acting as a convening force—bringing together data custodians, researchers, policymakers, and implementers to ensure that analytical advances are aligned with public health priorities and equity considerations.

BOX 3

Approach towards Impact Assessment

Even as the ecosystem grapples with the absence of limited on-ground evidence, coupled with the complexity of health outcomes that are likely to unfold over a multi-year timeline, funders who have started their work in this area have begun investments in evidence-building, forecasting, and surveillance over longer time periods.

Funding has been tied to achieving specific milestones, which have been jointly decided upon, in collaboration with NGOs and subject-matter experts. And organizations will progress towards a subsequent milestone only after a current one has been fulfilled. Funders who are advanced in their journey for giving towards climate-health are also witnessing gaps in coordination and integration at the ecosystem level, whereby hazard and vulnerability mapping exercises are being undertaken in parallel by multiple institutions. This duplication of efforts needs to be replaced by a multi-player collaborative. These can build on successful pilots, rather than a proliferation of fragmented approaches that may not be suitable for the stated purpose.



CHAPTER 7

Pathways to Strengthen India's Climate and Health Ecosystem

IN THIS SECTION

We outline a list of action-oriented recommendations for NGOs, government, and philanthropy to further progress towards climate-resilient health systems.

These recommendations are based on triangulation of insights from literature review, expert interviews, and other stakeholder conversations. These recommendations are drawn up in the background of the structural characteristics of the larger health and development ecosystem in India.



Firstly, the landscape of interventions is fragmented, spanning multiple government departments and a wide spectrum of NGOs. In this context, the report focuses on integrating a climate lens into health system responses, and a health lens into climate action, rather than creating a separate climate–health vertical. The emphasis is on integration and consolidation of existing efforts, as opposed to verticalization and the duplication of effort.

Second, the slow but steady uptake of this intersection is directly correlated with the current status and distribution of the health infrastructure in the country. One of the overarching themes that emerged in our conversations was the reason that the climate lens was only starting to become part of conversations and interventions being designed by NGOs was because of the existing inter-state inequities in the availability and accessibility of health infrastructure. As NGOs and funders continue to grapple with this, climate resilience becomes a second-order priority. Thus, climate-proofing of health systems can be addressed only after adequate health infrastructure is in place.



“There is a lack of direct health linkages with climate change, even as the disease burden is increasing. This is because communities continue to grapple with age-old issues like malnutrition, anaemia, and poor sanitation, all of which have been likely to be only exacerbated further by climate change.”

- CSR lead of a leading Indian firm

Lastly, we emphasize prevention as the first line of climate defence. Social and environmental determinants of health such as education, economic security, housing conditions, and occupation play a critical role in shaping community vulnerability and resilience. Strengthening these determinants can enhance public health capacity and reduce health inequities by better protecting vulnerable populations from climate shocks. This highlights the importance of preventive approaches, including investments in early warning systems, preventive healthcare, and resilient infrastructure, to mitigate risks before they escalate while simultaneously strengthening health systems and improving overall community well-being.

Government



Bridge the evidence-policy gap: There is a need for greater investment in evidence building to better understand the interlinkages and the dynamics of health outcomes being impacted by extreme weather events. India's geographical and topographic diversity, combined with the varying disease burdens across states, emphasizes the need for more localized estimates to better understand the linkages between climate change and health outcomes at a disaggregated level. Both government and philanthropy have a pivotal role to play in building this evidence base to inform policy and financing of various adaptation and mitigation interventions.

Enable public access to climate and health data: Currently, large volumes of weather and health-related information are not publicly available, compelling NGOs to collect and build their own datasets. This duplication of effort strains limited resources and leads to fragmented data systems that weaken collective responses to climate-health challenges. This gap also hampers the calibration of forecasting products, which often rely on global datasets that may not capture local realities. For instance, SEWA and MHT use a parametric insurance model where payouts are triggered by pre-defined weather events, such as extreme heat, rather than individual loss assessments. While this enables faster and more efficient compensation, the precision of these models depends on access to granular, community-level data. This points to an urgent need to release unit-level data collected by government departments into the public domain.

Leverage climate data for proactive health protection: To address climate-health priorities, the public health sector needs to form an active partnership with meteorological agencies to access and acquire climate data and develop the services needed to increase awareness and build capacity. As an example, the UK Health Security Agency works in partnership with the national meteorological service to provide specific weather health alerts as an early warning system to the health and social care sector, when adverse temperatures are likely to impact the health and well-being of the population.

Integrate spatial risk analyses into municipal and regional planning processes to strengthen climate adaptation: As communities face growing heat stress and extreme precipitation events, spatial planning has become critical for building resilience. However, competing demands on land use often complicate decision-making. Spatial risk analyses can generate evidence-based justifications for prioritizing adaptation measures and provide guidance on where and how to implement them most effectively. These analyses must go beyond hazard data alone, incorporating information on population vulnerability and the exposure of specific areas. Such an approach will ensure that planning decisions are both risk-informed and responsive to the needs of the most affected populations.

Scale and replicate existing efforts on climate proofing rural and urban infrastructure to advance resilient infrastructure planning: Ensuring climate resilience of infrastructure helps protect lives and livelihoods, reduces direct losses from extreme weather events, and plays a key role in meeting both the mitigation targets of the Paris Agreement and national development aspirations.¹⁰¹ Evidence of such efforts is already visible, for instance, the Cool Bus Stop in Ahmedabad, led by MHT in partnership with the Ahmedabad Municipal Corporation (AMC), provides shade and relief to commuters waiting in scorching heat. Similarly, cool roofs using reflective materials such as white reflective paint coatings are being implemented in numerous states to deflect sunlight, lower indoor heat transfer, and reduce household temperatures. The Ahmedabad Municipal Corporation has formally integrated these measures into the city's Heat Action Plan. With greater government buy-in, such initiatives can be scaled nationwide and adopted as public commons, in partnership with NGOs already leading these efforts.

Build the capacity of the health workforce through climate and medical education: It is crucial that both clinicians and frontline workers are prepared for the novel health effects that climate change brings to the communities they serve. Currently, many cases go underreported because the impacts of extreme events, such as heatwaves, are not always immediately visible. For instance, doctors may not always be able to recognize the symptoms as heat-related illness, instead recording them as secondary complications such as dehydration or dizziness. By using climate and health data, health practitioners can be trained to improve diagnosis, routine planning, and surveillance, enabling them to recognize and respond to conditions. Training should also equip health workers with knowledge of climate-sensitive health issues, build capacity for digital monitoring and surveillance, prepare them for climate-related public health emergencies, and develop context-specific curricula that strengthen both current and future workforce readiness.

Strengthen frontline health systems for climate resilience: As climate change intensifies, frontline health workers face rising workloads, putting their physical and mental health at risk. ASHAs play a vital role in climate–health responses: raising awareness, identifying vulnerable populations, recognizing symptoms, and reviewing cases. This requires continuous capacity building, institutional support, and resources to match their expanded responsibilities. However, training modules for emerging climate–health challenges are often lengthy, technical, and delivered too late, making them difficult to absorb for those without formal medical education. Classified as volunteers rather than formal employees, ASHAs also receive modest monthly honoraria and performance-based incentives, leaving them largely outside formal protection systems. Despite their critical role, they are ill-equipped to cope with the growing scale and complexity of climate-related health demands. While ASHA workers are part of the public health response as part of the Heat Action plans, there is no advisory to safeguard their health in event of these extreme weather events. Strengthening the response to climate–health emergencies requires a strong frontline workforce—simplified, timely training; full integration into the health system with fair pay and protections; mental health and rest provisions; and easy-to-use tools to enable effective community support without overburdening them.¹⁰²

Need for greater and dedicated financing for climate-health: In its current form, financing for climate-health is limited and is spread across multiple ministries. This spreading of resources across multiple ministries also makes it difficult to track the exact quantum of resources. Even in the context of heat action plans, only a small proportion of the Heat Action plans explicitly mention the dedicated funding resources. Even where financing is mentioned, it's routed largely via the State Disaster Management Authority, and not the MoHFW and MoEFCC, with funding being contingent on the heatwave being classified as a disaster. This necessitates the need for greater dedicated resources towards building climate-resilient health systems.

Need for greater investments in adaptation efforts: As our preceding analysis has revealed, the bulk of the funding has been directed towards mitigation efforts, when the adaptive priorities are in urgent need of greater mobilization of funds. The focus on scaling community adaptation efforts has far-reaching welfare implications in terms of safeguarding the interests and livelihoods of the vulnerable communities, who are often directly and disproportionately impacted by the uncertain impact of extreme weather events. Governments can lead on this front by identifying solutions on the ground that have shown the greatest promise and then inviting philanthropic support to further scale and calibrate these efforts in response to the hyperlocal context.

Need to promote greater inter-ministerial coordination: Currently, MoHFW alone is focused on the efforts directed under the National Program on Climate Change and Human Health. This lack of coordination with other ministries has implications for the efforts towards working with other sectors beyond health that have implications for climate-health as an intersection. For instance, much of the work in the context of air pollution would necessitate coordination with the power sector, urban affairs, built-environment design, and automobile regulation. An absence of this coordination and a common indicator framework, tracking different sectors, has implications for the extent of co-benefits unlocked for climate and health, and for the nature of solutions being funded by both government and philanthropy.

While literature has propagated for inter-ministerial coordination with departments relating to urban development, energy sector, agriculture, etc.,¹⁰³ our expert conversations revealed that this process in reality is fraught with institutional and financial barriers due to limited state capacity in the Indian context. Instead of a singular overarching department set up at MoHFW or MoEFCC, separate units can be established in each of the ministries to specifically tackle the drivers of the diseases linked to their respective departments.¹⁰⁴ This coordination mechanism has the potential to work well at the district level.

NGOs



Renewed focus on mainstreaming indigenous wisdom: While the scale of the challenge societies are grappling with today has multiplied manifold, emerging evidence has revealed the promise of indigenous wisdom in addressing some of these aspects.¹⁰⁵ NGOs are well-placed to re-ignite and mainstream this lost native understanding and traditional practices (e.g., using onions for electrolytes, specific garment choices) that historically aided heat resilience. Similarly, design choices relating to architecture and the built environment, particularly in terms of materials used for both high-rise and affordable housing, are another specific area where India can tap into its indigenous wisdom and mainstream this.



“With respect to building design and building code, there’s potential to do a lot. Existing organizations working in these areas need more funding and support to identify solutions that can be adopted by municipal corporations and local governments.”

- Nachiket Mor, The Banyan Academy of Leadership

Information, Education, and Communication (IEC) materials must go beyond disaster-focused messaging to highlight under-recognized health impacts of climate change, such as those arising from abrupt temperature spikes and extreme humidity. By linking these risks directly to health outcomes, livelihoods, and cultural norms, funders have emphasized the need to break down climate-health silos and present an integrated picture, with a greater emphasis on compelling storytelling. This approach can inspire stronger public engagement and attract more funding. Intermediaries have also acknowledged that lived realities of the climate–health nexus remain poorly documented, with limited granular and open-source local data. Such local evidence is essential for persuading health departments to engage on climate–health issues.



“It’s alarming—but it’s not their fault. The language of climate change is often out of reach for underserved communities. It’s full of carbon counts and rising temperatures, but rarely speaks to their lived realities—of housing, water, or safety. That’s why we created the Urban Climate Handbook—to make climate change a conversation rooted in everyday experience.”

- Bhawna Jaimini, Centre for Urban Commons

Participatory communication methods—tailored to local contexts—have proven effective in helping communities understand climate–health linkages.¹⁰⁶ Tools such as pictorial stories, causal loop diagrams, and listing and ranking exercises helped participants connect shifting climate patterns with household and village-level health changes, generating actionable insights for community adaptation.

Promote cross-collaboration – At the systemic level, our research also revealed a need for increased coordination and collaboration among different stakeholders to prevent duplication of efforts, particularly in terms of vulnerability and hazard mapping, as well as climate risk profiling. Current efforts, especially with respect to heat index and extreme weather events, are specifically where different groups have generated multiple estimates. An environment that fosters collaboration across academia and civil society has the potential to generate more accurate estimates, as well as enable better utilization of the scarce financial resources available for the sector.

Philanthropy



Build NGO-centred evidence infrastructure for the climate–health intersection: Philanthropy can invest in local, granular data systems that directly strengthen NGO’s ability to design, target and deliver climate-health interventions. India’s geographical and topographic diversity, and the differing disease burdens across states, require local, disaggregated estimates that are complemented with national averages. Funding today does not always track climate risk. Highly vulnerable states such as Assam have received a small share of mapped CSR flows, while larger states attract a disproportionate share.¹⁰⁷ This results in low visibility of risks in remote regions, and compounds barriers faced by grassroots NGOs in accessing grants. Philanthropy can address this gap by supporting district-level

vulnerability and fund-flow mapping that NGO's can use to spotlight underfunded high-need areas, paired with direct support for locally led climate–health action plans. Strategic philanthropic capital can close this foundational gap by funding the data, attribution, and forecasting infrastructure that enables NGO's and their partners to make better decisions at the climate–health intersection. Priority investments include strengthening consistent recording of heat illness and mortality, introducing climate tags in diagnosis and case sheets to capture climate as a contributing risk factor, and establishing open, state-level climate–health dashboards that publish timely, anonymized data for NGO's, researchers and operational stakeholders.

Consolidate and standardize climate–health data across public and private systems to strengthen

NGO action: Philanthropy can support the creation of shared data standards and platforms that pool climate-health data across ministries, private platforms, and civil society. This can help as then climate-health signals are not only comparable and reusable, but also actionable for NGO's working on the ground. At present, data collection is financially and administratively costly, and fragmented across ministries, programs, and methodologies, limiting its usefulness for local planning and frontline response. Strategic philanthropy could enable the integration of these datasets into interoperable systems that reduce duplication and lower access barriers for community stakeholders and NGOs. For example, aggregated pharmacy and telehealth transactions from platforms such as PharmEasy or Practo can help track shifts in caseloads and weather-linked spikes, while NGO-generated data—such as vulnerability maps, household surveys, and community-level surveillance—can add local granularity that public systems often miss. By bringing public, private, and NGO data into a common architecture, philanthropy can help ensure that grassroots organisations are active users of integrated climate–health intelligence. This can support more targeted interventions, stronger funding proposals, and better alignment between community needs, service delivery, and public budgets.



“Companies like PharmEasy and Practo hold valuable data on patient footfalls and medicine procurement that, if analyzed, could generate powerful insights. Partnering with such companies offers a significant opportunity for philanthropic investment to build stronger health databases and improve our understanding of disease patterns across the country—ultimately enabling better response mechanisms.”

- Nachiket Mor, Visiting Scientist, The Banayan Academy of Leadership

Anchor regional knowledge exchange as a non-state convener and strengthen NGO-led climate–

health action: Philanthropy can play a crucial non-state role by anchoring regional knowledge-exchange platforms that connect government, NGOs, and the private sector, helping proven climate-health mitigation and adaptation practices travel faster and farther. India's engagement with global climate–health frameworks has been cautious, combining selective participation with homegrown

initiatives such as Lifestyle for Environment (LiFE), the International Solar Alliance (ISA), and the Coalition for Disaster Resilient Infrastructure (CDRI). This opens space for philanthropic actors to connect India with international platforms like the World Health Organization's Alliance for Transformative Action on Climate and Health (WHO-ATACH) and the Global Heat Health Information Network (GHHIN), while convening sub-national peers to localize tools and metrics for Indian contexts. Philanthropic support can enable NGO-led exchanges with above-mentioned platforms, while supporting sub-national peer learning to adapt tools, metrics, and protocols to Indian contexts.

Involve diaspora givers in co-creating India's climate–health technology and knowledge commons: Across India, NGOs are already piloting low-cost, climate-resilient health solutions. These range from community heat-response protocols and decentralized cooling innovations to last-mile surveillance, mobile health delivery, and locally adapted behaviour-change tools. These approaches are often highly effective and context-specific, yet remain fragmented, under-documented, and difficult to scale due to limited access to patient capital, product development support, and global knowledge networks. India is well placed to co-create a shared climate-health technology and knowledge commons, drawing on its scale, technology depth and rich ecosystem of NGO-led innovation. International philanthropists with an India footprint, such as family foundations, family offices, ultra-/high-net-worth donors, and diaspora givers, can create strategic partnerships through the patient, flexible, long-term capital that de-risks this frontier and accelerates knowledge transfer. Diaspora and cross-border family offices are especially well-suited to anchor this agenda. They understand Indian operating contexts. Evidence shows diaspora philanthropy is a durable channel for health and development in India; organized vehicles and peer networks can help convert that intent into sustained support for NGO-led climate–health programs.¹⁰⁸

Strategic public–private partnerships to embed climate–health metrics in reporting, budgeting, and procurement: Philanthropy could build the adoption muscle inside public systems. This can include establishing state cohorts and peer-learning cycles across health, environment, and disaster management, with civil society organizations and private providers, to align methods and make results comparable. It can fund the localization of global indicators and protocols into Health Management Information System (HMIS) and Integrated Health Information Platform (IHIP) forms, standard operating procedures, procurement templates, and program key performance indicators (KPIs). It can also set up a regional repository and helpdesk for climate–health playbooks, case studies, costing models, and monitoring and evaluation (M&E) templates that states and municipalities can use, and sponsor short secondments and fellowships that embed technical experts in state health societies and municipal corporations to speed adoption.

Increase investments in climate-health adaptation, where NGOs are already leading: Mainstream climate finance and philanthropy have largely focused on mitigation, given its clearer linkage to emissions reduction and the relative ease of quantification and investment. However, this emphasis must be complemented by significantly greater funding for adaptive efforts that build community-level resilience to climate shocks. Our analysis indicates that NGOs are at the forefront of climate–health adaptation in India. However, these efforts remain underfunded and difficult to scale. Philanthropic

support that enables NGOs to replicate, adapt, and sustain proven solutions across geographies is therefore critical. This will be critical from an equity perspective as well. This equity case is particularly stark in the Indian context. Despite the scale of climate-related health risks, India's per capita emissions, including those attributable to the health sector, remain among the lowest globally. At the same time, the impacts of extreme weather events are immediate and disproportionately borne by vulnerable communities who have contributed least to global emissions.

CHAPTER 8

Conclusion

This report examines the interlinkages between climate and health in the Indian context and maps the range of solutions implemented by the government and civil society to address challenges arising from the increasing frequency and intensity of extreme weather events. Indian NGOs have played a leading role in responding to community needs for adaptive action, demonstrating ingenuity in addressing some of the most critical vulnerabilities emerging across climate frontiers - both in rural India and the mainland. These efforts span health system strengthening initiatives, evidence generation and community engagement, and the design of new financial risk instruments. NGOs have also shown promise in integrating AI-driven surveillance and risk assessments to strengthen health system preparedness, while providing critical technical inputs to state governments. Collectively, these interventions offer innovation models with strong potential for scaling and replication across the Majority World.

The report makes a clear case for integrating a climate lens into health system responses, and a health lens into climate action, to build both short-term and long-term community resilience. While progress on mitigation efforts within the climate–health agenda has been encouraging, there remains a pressing need to deepen investments in community-level adaptation to address the inequitable impacts of extreme weather events. Existing NGO interventions and state-led efforts represent important steps in the right direction; however, greater and more targeted funding is required to expand the geographical reach of adaptive solutions. Concurrent investments in both adaptation and mitigation are essential to safeguard the immediate and long-term well-being of communities.

The report further argues for increased philanthropic investment at the climate–health intersection, particularly among existing climate-focused and health-focused funders within the ecosystem. Philanthropy plays a critical role in evidence building by financing the consolidation of efforts across the public sector, private sector, and civil society, thereby reducing duplication and freeing up scarce resources for complementary interventions. Sustained, long-term investments in data, evidence, and narrative building are central to India's response to challenges at the climate–health interface. Given the dynamic nature of extreme weather events and their implications for shifting disease burdens, it is imperative to invest in integrated disease surveillance and forecasting infrastructure and ensure that these systems inform the design of future health systems. Similarly, philanthropy has a vital role to play in identifying and advancing new technological frontiers, including med-tech innovations and the application of AI to enhance health system preparedness.

Finally, this report serves as a starting point for broadening our understanding of on-the-ground challenges and emerging solutions at the climate–health intersection in India. As climate-linked adverse health outcomes are expected to intensify in the coming years, bringing with them significant complexity across the Indian subcontinent, continued and complementary efforts will be critical to sustaining and deepening dialogue on this urgent priority.

Afterword

The climate crisis is not a standalone issue; it is interwoven with the sectors that shape India's development. We are already seeing health systems emerge as one of the earliest and the most tangible frontlines of the climate crisis. This is where investment, action, and dialogue are beginning to take shape. ***Under the Weather: India's Climate-Health Intersections and Pathways to Resilience*** builds from this reality.

This report is an invitation to stakeholders across the ecosystem. It calls on state actors, civil society, academia, the private sector, multilateral institutions, and philanthropy to come together around a shared understanding of the critical gaps and underserved priorities. Its intention is clear. Consolidate ongoing efforts. Surface what remains overlooked. Enable more effective targeting of scarce resources toward climate-resilient health systems for India's future.

Much of the response to the climate crisis has been reactive. However, there is a pressing need to think beyond immediate interventions and explore ways to strengthen underlying infrastructure. Nearly 60% of India's districts are already at high to very high risk from extreme heat. These districts house 76% of the population. Rising humidity is turning heat exposure into a direct and escalating health threat. How can we improve the way cities prepare for and respond to disasters? The burden of these effects is not evenly distributed. Globally, an estimated 3.6 billion people already live in contexts that are highly vulnerable to climate change impacts on health. In India, this vulnerability is widespread, but its consequences are not evenly borne.

As climate change intensifies multiple, overlapping health threats, it is the communities that absorb the greatest losses. Urban poor, informal workers, women, children, and older adults face heightened exposure and fewer buffers. Many lack safe housing, reliable cooling, accessible healthcare, and social protection. For instance, around 75% of India's population lives in areas where PM2.5 levels exceed WHO limits. This includes the vast majority of urban slum dwellers. Among these populations, air pollution now drives 7 in 10 chronic obstructive pulmonary disease (COPD) deaths and nearly 1 in 3 lung cancer cases in India. The result is higher exposure, deeper and more persistent inequity in health and livelihood outcomes. Building their capacity to anticipate, absorb, and respond to such shocks is not just an immediate priority; it is also a critical pathway to lasting resilience and impact.

Indian nonprofits are long recognized for their ingenuity and ability to innovate with limited means. They have consistently been at the forefront of responding to emerging community needs and remain central to the country's climate-health journey. As nonprofits lead community adaptation, philanthropy has a timely opportunity to step in with stronger investments in adaptation alongside mitigation. Greater engagement from domestic and diaspora philanthropy will be pivotal. This begins

with building the evidence infrastructure for climate–health action. Philanthropic capital can support the generation of local, granular data and forecasting tools that enable timely public health responses. India's geographical and topographic diversity, and the uneven distribution of disease burdens across states, demands disaggregated, place-specific estimates, complemented by national averages. There is also a need to strengthen systems that can pool data across ministries, private platforms, and civil society, under shared standards. Doing so would ensure that climate–health signals are comparable, reusable, and embedded within planning and budgeting processes. At a systemic level, greater coordination across stakeholders is essential to prevent duplication of effort, particularly in vulnerability mapping, hazard assessment, and climate risk profiling.

Our aspiration is to move beyond a false binary. Adaptation and mitigation cannot be treated as competing priorities. They must be understood as a continuum, requiring financing approaches that can support both immediate resilience and long-term transformation. This reframing is still evolving and embracing it is essential for meaningful progress.

Dasra will continue its efforts to spotlight grassroots NGOs and the innovative practices they are driving as they navigate the multiple, overlapping crises unfolding on the ground. Given India's geographical diversity, varied health vulnerabilities, and the need for hyperlocal responses, discovering and nurturing new solutions will remain indispensable.

The case this report makes is straightforward: climate–health must be embraced as a lens that cuts across funding priorities. Embedding this lens is not a matter of programmatic fine-tuning. It is central to strengthening health systems that are resilient, inclusive, and capable of withstanding the increasingly frequent and unpredictable shocks of a warming world.

- Neera Nundy

Co-founder and Partner, Dasra



ANNEXURES

ANNEXURE 1

Methodology & Limitations

This report draws on a mixed-methods approach to understand the interlinkages between climate-health in the Indian context. The initial literature review included a review of both mainstream academic literature as well as policy briefs, government budgets, reports, and grey literature such as working papers and media articles from national and international sources. As the evidence in the Indian context is emerging and is limited in the context of NGO interventions, primary data collection was undertaken to capture a range of perspectives and to validate findings.



Quantitative analysis: Both secondary and primary data sources were utilized to better understand the NGO intervention landscape and its operational and fundraising challenges. A pan-India online survey was disseminated to NGOs working at or adjacent to the climate–health intersection. The survey aimed to map how organizations conceptualize and operationalize work at this nexus, as well as the challenges they face in doing so. This helped in mapping the geographical spread of NGOs, their target groups, and their priority areas, which proved to be a critical starting point in understanding the overall intervention landscape in India.



Qualitative analysis: To complement the survey, in-depth semi-structured interviews were conducted with 13 other NGOs. The qualitative data enabled us to go beyond broad trends and capture further nuances of on-ground challenges and innovative practices. The findings from both the survey and the interviews were further validated through consultations with 22 stakeholders representing academia, government agencies, multilateral institutions, and philanthropic organizations. These validation interviews offered external perspectives on the emerging evidence, helped refine interpretations, and ensured that the analysis resonated with broader sectoral realities.



Limitations: While this study provides valuable insights into how Indian NGOs are approaching the climate–health intersection, certain limitations should be acknowledged. First, the survey relied on voluntary participation, which may have introduced self-selection bias, as organizations already engaged or interested in this intersection may have been more likely to respond. Second, although efforts were made to reach NGOs across India, the findings cannot be considered representative of all organizations working in the sector. Finally, the study reflects the context and knowledge available at the time of data collection, and emerging developments in the rapidly evolving climate–health space may not be fully captured here.

ANNEXURE 2

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The ClimateRISE Alliance is advancing work at the intersection of climate and public health, an urgent but under-addressed priority. This includes generating knowledge, sharing powerful narratives, and mapping nonprofit actions that link climate impacts with health systems.