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What is the Health Agenda for Climate Adaptation?

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The climate crisis is also a health crisis, yet India's strategy has been more to manage the immediate impact rather than shielding its most vulnerable populations from climate destabilisation.

India stands at the absolute vanguard of the global climate crisis. What was once framed as a projection of the future is now a lived, daily reality. Increasingly frequent and intense heatwaves, storm surges, catastrophic floods, droughts, forest fires, and rapid coastal erosion are systematically dismantling communities, compromising human health, and destroying livelihoods across the subcontinent.

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The numbers speak for themselves. In 2025, 331 out of the first 334 days of the year saw major disruptions from floods, heatwaves, and storms, resulting in at least 2,760 recorded fatalities. The preceding year, 2024, was the warmest year on record, during which India's public health system registered at least 41,789 suspected heatstroke cases and 143 confirmed deaths - figures that likely represent only the tip of a vast epidemiological iceberg.

Looking ahead, the prognosis is grim. The 2023 Lancet Countdown report projected that if the 2°C global warming threshold is breached, India will witness an additional 129,000 heat-related deaths annually among older adults alone.

Beyond these direct impacts, shifting ecologies and rising temperatures are amplifying the transmission of infectious diseases like dengue, malaria, and cholera. Simultaneously, anthropogenic air pollution primarily from industrial activity and rapid urbanization fuels a staggering burden of non-communicable diseases, cutting short over 2 million Indian lives every year.

Hospitals, and the health system more broadly, are at the frontline of these impacts, with each climate-linked event driving a surge in out-patient visits and hospitalizations that place further strain on institutions that are underfunded, lack necessary infrastructure, and are short-staffed.

Even as India's health sector faces this escalating threat from a warming planet, its responses are vastly outpaced by the speed of climate destabilization.

The Failure of Episodic Responses

Faced with this compounding crisis, the Indian state's default strategy has been to double down on managing the immediate fallout of disasters. In the context of extreme heat, this reactive stance is epitomized by the rapid proliferation of Heat Action Plans (HAPs) across cities, districts, and states. HAPs are the primary policy response from the state towards the harms of extreme heat, and outline actions to be taken by cities, districts, and states in response to heat waves. They catalogue key actions to be taken proactively by stakeholders across various sectors such as health system preparedness, dissemination of information for public awareness, and the setting up of cooling centres that could help reduce the impact of extreme heat.

HAPs, however, are poorly characterised with respect to identifying vulnerable populations, how to fund specific solutions, lack focus on long-term solutions, and in many cases do not provide any legal framework to force the kind of inter-departmental coordination needed to respond to a disaster.

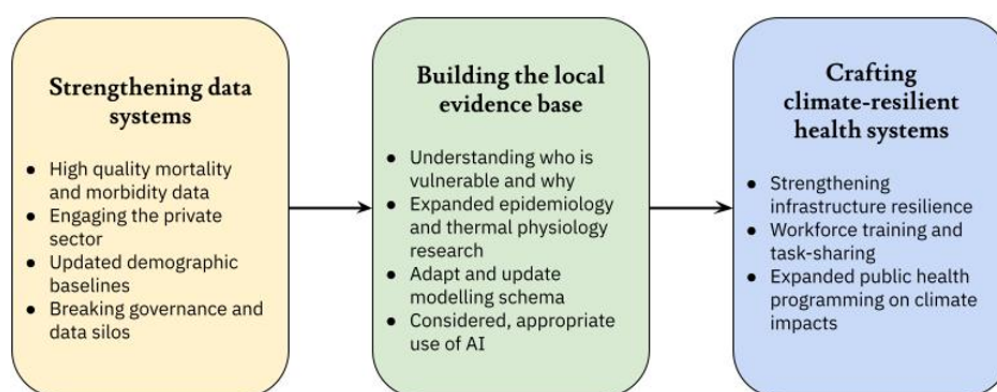
In theory, HAPs are designed to mobilize sectoral stakeholders and fund preventive measures to curb heat-related morbidity and mortality. In practice, however, HAPs have largely failed to build long-term momentum. They remain trapped in a cycle of episodic, seasonal responses, failing to implement structural mitigation measures or effectively utilize local vulnerability assessments.

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This entire climate burden is ultimately backstopped by the health system operating in discrete, disease-specific vertical silos. Geared toward "mission-mode" interventions targeting specific infectious diseases, the health infrastructure is fundamentally design-deficient to handle multi-dimensional challenges like climate change.

While the National Action Plan for Climate Change and Human Health (2018) and the subsequent National Programme on Climate Change and Human Health (NPCCHH, 2019) were welcome attempts to create institutional mechanisms (such as the drafting of state action plans on climate and build workforce capacity (through routine trainings for medical and health system professionals), they remain severely hamstrung. The NPCCHH suffers from low institutional salience within the Ministry of Health and Family Welfare (MoHFW). It is not a major national programme akin to disease-specific initiatives, and is positioned within an ancillary technical agency, the National Centre for Disease Control. It is also starved of the financial resources required to execute its mandate. Pre-existing gaps in primary healthcare delivery, stark inequities in healthcare access, and a pervasive lack of reliable data continue to stall meaningful progress.

To protect lives under escalating climate stress, India's climate adaptation agenda must recognize that true resilience requires systemic reform. We must completely transform our approach to prevention, workforce readiness, data integrity, and governance. This transformation relies on three interconnected pillars that build sequentially upon one another:



Strengthening Health Data Systems

We cannot manage what we do not measure. While India has made [some progress](#) in [digitizing data](#) and [enhancing surveillance](#) for climate-sensitive illnesses, deep systemic data limitations severely handicap our ability to generate indigenous, actionable climate-health research.

To build a robust data foundation, we must urgently address these critical barriers, ranked by their immediate, systemic urgency:

? Substandard mortality and morbidity data: True epidemiological assessments depend on high-quality vital statistics. Currently, civil registration systems fail to fully document mortality across many cities and rural areas, and routinely collected outpatient morbidity data remains largely unavailable or poorly coded. This missing data represents the most immediate gap in our ability to understand climate fatalities.

? The private sector black box: The private sector delivers approximately 60% of all in-patient care in India, yet it remains outside of national climate-health surveillance efforts. Private providers are not mandated to collect or share data on climate-sensitive illnesses. Furthermore, a widespread lack of standardized health records means that even when this data is collected, it cannot be aggregated into the large, representative datasets needed for rigorous analysis.

India must integrate the climate-health agenda into the 16th Finance Commission's devolution framework, embedding dedicated climate-health outcomes into health sector grants & disaster management allocations.

? An outdated demographic baseline: India's last census was conducted in 2010. In the intervening 16 years, radical shifts have occurred in demography, urbanization, livelihoods, and health profiles. Without accurate demographic denominators, calculating true disease burdens or identifying moving clusters of vulnerability is impossible. The upcoming census planned for 2027 is a critical, overdue prerequisite for accurate epidemiology.

? **Fragmented governance and data silos:** Conducting comprehensive climate-health research requires extracting data from a patchwork of multiple agencies across different levels of government. Each agency operates under its own restrictive data-sharing protocols. Unifying these streams on a single, open platform is essential.

Resolving these data bottlenecks requires a mix of minor regulatory tweaks, profound shifts in institutional mindsets, alongside addressing challenges with accessing public weather data from the IMD and critical deficits in clinical training and diagnostic coding for physicians. For instance, mandating that the private sector report aggregated, anonymized climate-relevant health data into national registries is a straightforward legislative step, the infrastructure for which was already successfully piloted during the Covid-19 pandemic.

Moving beyond passive administrative overhauls also requires confronting the political economy of data scepticism. The mindset that has fuelled denialism with respect to deaths from air pollution and heat or delayed release of highly relevant and important national surveys has stalled timely action for far too long. Championing data integrity and democratizing its access to academia, civil society, and local communities must be the cornerstone of a revitalised data ecosystem, especially when such resources are publicly funded.

Building the Local Evidence Base

A reliable stream of health and climate data directly enables the second phase of adaptation: building a locally grounded, contextual evidence base. Global research platforms provide excellent macro-level guidance, but they cannot account for India's vast diversity of geographic exposures, socio-economic vulnerabilities, and localized health outcomes. Variations in human physiology, regional acclimatization to extreme heat, and micro-level adaptive capacities introduce layers of uncertainty that can only be decoded at fine spatial scales.

Currently, our policy instruments are blunt. For example, India's thresholds for declaring heatwaves are strictly environmental rather than epidemiological; they are dictated by raw ambient temperatures that fail to reflect real human exposures. Vector-borne disease models are similarly oversimplified, frequently ignoring local histories of public health interventions. To transition toward precision policy, our research agenda must prioritize several key areas:

? **Redefining vulnerability:** Existing Heat Action Plans rely on crude, broad categories of risk, focusing generically on the elderly, pregnant women, young children, and outdoor labourers. This approach misses the deeply intersectional nature of climate risk, influenced by various factors including but not limited to where we work, what kind of housing we live in, what basic services we have access to, and what social protection measures secure us from the economic harms of climate-linked disasters. Furthermore, our obsession with outdoor meteorological measurements masks a severe shortage of data on indoor heat exposures, leaving us blind to how local building materials and dense urban planning choices amplify thermal stress.

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? **Bridging epidemiology and thermal physiology:** Relying entirely on ambient temperature is a poor metric for human health. We must build an operational bridge between epidemiology and thermal physiology to examine the synergistic, deadly effects of simultaneous heat and humidity. Wet heat denies the body its ability to self-regulate through sweat, causing core temperatures to rise. Currently, our heat thresholds focus only on temperature and do not adequately account for this physiological phenomenon. Incorporating metrics like wet-bulb temperature that measure the impact of both heat and humidity or other such comprehensive heat indices into our public alerts will give a much more accurate picture of actual physiological strain.

? **Evolving models and embracing uncertainty:** Building pristine data pipelines takes time. In the interim, our modelling schema must adapt to work effectively with existing, imperfect data. When forecasting long-term vector-borne disease burdens, current models lean on simplistic models that solely link increasing temperatures to increased transmission. These models ignore the complex interplay between weather, vectors, local infrastructure, human settlements, and changing biological systems. Doing so risks mis-estimating the spread of vectors under various climate scenarios and thereby misallocating resources that are already scarce.

? **Communicating projections safely:** While Artificial Intelligence (AI) tools offer immense potential to map these complex relationships, we must train researchers in their safe, appropriate application. Crucially, climate modellers and health researchers must stop treating uncertainty as a flaw to be hidden. Instead, they must develop formal, transparent mechanisms to communicate confidence

intervals and ranges of potential outcomes directly to policymakers. Climate-linked health burdens are also not stationary - utilising past data to inform future projections, as many of these models do, risks miscalculating non-linear feedback loops in climate and weather systems. Modelling schema and their inherent uncertainties can at best inform the development of scenario-based policy frameworks that decision-makers can use to adapt their approach based on consistent monitoring and review.

Ultimately, shifting from reactive management to proactive policy requires sustained funding for long-term cohort studies that track climate exposures and health outcomes over years, if not decades. This localized data must be integrated directly into long-term national climate-energy modelling and paired with rigorous accountability research to evaluate whether our adaptation investments are actually working as intended.

To resonate with the realities of the subcontinent, this localized evidence base must systematically integrate structural analyses of class, caste, and gender intersectionality. Greater study is also needed on the exposures and impacts from climate shocks faced by migrant communities who are often concentrated in dense, poorly ventilated urban settlements built with heat-trapping tin roofs, poor access to water and sanitation, and where these systemic factors compound the physiological burden. Translating the data we collect into justice-oriented policy requires local evidence that exposes how climate risk is fundamentally refracted through social inequity.

Crafting Climate-Resilient Health Systems

A strong local evidence base provides the blueprint for our third and final objective - transforming India's frontline health infrastructure and workforce into a climate-resilient system. Climate shocks do not just increase patient volumes, they actively threaten health facilities by disrupting power and water lines, straining supply chains, and pushing overworked medical staff to their breaking points. **Building resilience** requires a dual strategy of structural and functional reforms implemented across the delivery apparatus:

? **Infrastructure resilience:** We must integrate climate-resilient design principles directly into the expansion and retrofitting of public health facilities, while establishing strict resilience codes for the private sector. The MoHFW's existing guidelines for green and climate-resilient health facilities, along with the Indian Green Building Council's rating systems, offer excellent foundational frameworks. The challenge now lies in mainstreaming these principles so that hospitals can maintain structural integrity and power continuity during severe floods and peak thermal events. Integrating the private sector under these strict resilience and data sharing standards is vital; a resilient health system cannot rely on an unregulated commercial market where climate-driven health emergencies routinely translate into catastrophic out-of-pocket expenditures for vulnerable families.

By executing interconnected reforms with financial resolve & administrative urgency, India can transform its public health apparatus into a proactive shield for its most vulnerable populations.

? **Workforce training and task sharing:** Human capacity is the true lynchpin of climate adaptation. Across India, frontline clinicians face challenges in accurately attributing **heat-related illnesses**, leading to an overall **underestimate of the true burden**. We must urgently update medical, nursing, and allied health curricula to embed core climate-health competencies. In-service training modules must equip providers to rapidly identify and treat heat stress, particularly its dangerous interactions with pre-existing chronic conditions and maternal health. Furthermore, given severe specialist shortages, India must lean heavily on "task-sharing" by empowering community health workers to monitor vulnerable neighbourhoods, and deliver early cooling interventions.

? **Mainstreaming climate into public health programming:** Climate resilience cannot remain the exclusive domain of a single, isolated program like the NPCCHH. Instead, climate considerations must be systematically embedded across all existing health verticals:

? *Maternal & Child Health:* Integrate pregnancy-specific heatwave guidance into standard antenatal care protocols.

? *Non-Communicable Diseases (NCDs):* Adjust management guidelines to account for how heatwaves exacerbate cardiovascular and renal comorbidities.

? *Mental Health Services:* Expand counselling infrastructure to anticipate and treat the stress, depression, and anxiety linked to chronic climate displacement and economic loss.

? *WASH & Nutrition:* Guarantee climate-proof water availability in health centres during summer peaks, and adjust nutritional distribution schemes to counter climate-induced food insecurity

To make this operational, India can deploy advanced tools like localized climate risk scores to proactively identify high-risk populations, leverage m-health platforms to deliver targeted care to remote communities, and utilize data from ongoing health programs

to flag individuals with heat-sensitive comorbidities.

Finally, unlocking state-level innovation and ensuring accountability across these health programs requires navigating the constraints of fiscal federalism by rethinking how we use adaptation funding. To move past administrative bottlenecks, central budgetary allocations for the NPCCHH must be drastically expanded. Simultaneously, India must explicitly integrate the climate-health agenda into the 16th Finance Commission's devolution framework, embedding dedicated climate-health outcomes into both health sector grants and disaster management allocations. True local resilience can only be realized when this centralized funding is converted into predictable untied resources, granting state and local authorities (panchayats and municipalities) the fiscal autonomy required to design, fund, and maintain region-specific climate-health adaptations.

Conclusions

While initial steps toward data digitization, infrastructure guidelines, and institutional frameworks are encouraging, piecemeal, reactive, and episodic strategies will no longer suffice. Protecting the lives and livelihoods of over a billion people requires a thoughtful, sequential planning and investment: first, by building high quality, open data systems; second, by translating that data into granular, locally grounded evidence; and third, by using that evidence to forge climate-resilient health systems. By executing these interconnected reforms with financial resolve and administrative urgency, India can transform its public health apparatus from a system perpetually managing climate disasters into a proactive shield for its most vulnerable populations.

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