



Enhancing Health System Resilience: An Operational Imperative for Climate-Adaptive Healthcare

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Abstract

Climate change is increasingly recognized as a critical determinant of health system performance, disrupting healthcare delivery through extreme weather events, infrastructure instability, and evolving disease patterns. Despite growing awareness, the operational integration of climate resilience into routine health system governance remains limited. We propose the Climate-Adaptive Clinical Governance Model (CACGM), a concise four-domain framework encompassing climate intelligence integration, resilient infrastructure, workforce preparedness, and interdisciplinary governance. By embedding anticipatory adaptation within institutional planning and service delivery, CACGM supports a transition from reactive crisis response toward proactive, climate-resilient healthcare systems capable of sustaining quality care under environmental stress.

Key Words: Adaptive governance, Climate change, Climate-resilient health systems, Clinical governance, Health system resilience.

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Dear Editor,

Climate change has evolved from an environmental concern into a systemic threat to healthcare delivery and population health. Increasingly frequent heatwaves, floods, wildfires, and air pollution events disrupt healthcare operations, strain infrastructure capacity, and alter patterns of morbidity and healthcare utilization (1–3). These pressures expose the limitations of health system models designed for relatively stable environmental conditions rather than recurrent climate-related disruptions.

Although climate resilience has gained prominence in global health policy discourse, its operational integration into healthcare governance remains fragmented and inconsistent (4, 5). Current approaches often prioritize emergency response over anticipatory adaptation embedded within routine healthcare management. There is therefore a clear need for governance-oriented frameworks that translate climate resilience into actionable components of everyday clinical and organizational decision-making.

We propose the Climate-Adaptive Clinical Governance Model (CACGM), a four-domain operational framework designed to embed resilience within healthcare systems. CACGM conceptualizes climate adaptation not as a discrete emergency function but as a continuous component of governance, preparedness, and service delivery.

The first domain, climate intelligence integration, focuses on incorporating meteorological, epidemiological, and environmental surveillance data into clinical operations and resource planning. Linking predictive forecasting with healthcare utilization trends can support anticipatory allocation of beds, workforce capacity, pharmaceuticals, and emergency supplies during environmental stressors such as heatwaves or poor air quality. Global evidence indicates that climate-sensitive health risks are intensifying while adaptive capacity remains uneven, underscoring the importance of early-warning systems and climate-informed planning (2, 3, 6).

The second domain, infrastructure resilience, emphasizes the capacity of healthcare facilities to maintain safe and continuous operations during climate-related disruptions. This includes resilient energy systems, secure water infrastructure, adaptive procurement mechanisms, and climate-informed facility design. The World Health Organization highlights that climate-resilient health systems must anticipate, absorb, adapt to, and recover from environmental shocks while maintaining care quality (4). Achieving this requires a shift from reactive repair toward resilience-oriented system design.

The third domain, workforce preparedness, addresses the evolving competencies required of healthcare professionals. Climate change is altering disease patterns, vulnerability profiles, and clinical complexity, necessitating skills in environmental risk communication, adaptive triage, and management of climate-sensitive conditions (1, 6, 7). Without corresponding workforce adaptation, structural resilience alone will be insufficient to sustain effective healthcare delivery.

The fourth domain, interdisciplinary governance, underscores the importance of coordination across healthcare institutions, public health agencies, environmental sectors, urban planning, and emergency management systems. Institutionalized cross-sector collaboration and climate-adaptive clinical protocols can enhance accountability, improve response coordination, and reduce systemic vulnerability during climate-related events (2, 4, 5).

Collectively, CACGM provides a scalable and practical framework for embedding climate resilience into healthcare governance and clinical systems. Transitioning toward climate-

adaptive healthcare is no longer optional but an operational and ethical imperative. Health systems that invest in anticipatory governance and adaptive capacity will be better positioned to sustain equitable, high-quality care in an era of accelerating environmental change.

CONFLICT OF INTEREST: None.

REFERENCES

1. Haines A, Ebi K. The Imperative for Climate Action to Protect Health. *N Engl J Med*. 2019 Jan 17;380(3):263-273. doi: 10.1056/NEJMra1807873. PMID: 30650330.
2. IPCC. Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report. Cambridge University Press; 2022. Available from: <https://www.ipcc.ch/report/ar6/wg2/>.
3. Romanello M, Di Napoli C, Drummond P, Green C, Kennard H, Lampard P, et al. The 2022 report of the Lancet Countdown on health and climate change: health at the mercy of fossil fuels. *Lancet*. 2022 Nov 5;400(10363):1619-1654. doi: 10.1016/S0140-6736(22)01540-9. Epub 2022 Oct 25. Erratum in: *Lancet*. 2022 Nov 12;400(10364):1680. doi: 10.1016/S0140-6736(22)02169-9. Erratum in: *Lancet*. 2022 Nov 19;400(10365):1766. doi: 10.1016/S0140-6736(22)02314-5. PMID: 36306815; PMCID: PMC7616806.
4. World Health Organization. Operational Framework for Building Climate Resilient and Low Carbon Health Systems. Geneva: WHO; 2023. ISBN: 9789240081888. Available from: <https://www.who.int/publications/i/item/9789240081888>
5. Salas RN, Solomon CG. The Climate Crisis - Health and Care Delivery. *N Engl J Med*. 2019 Aug 22;381(8):e13. doi: 10.1056/NEJMp1906035. PMID: 31433915.
6. Watts N, Amann M, Arnell N, Ayeb-Karlsson S, Beagley J, Belesova K, et al. The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. *Lancet*. 2021 Jan 9;397(10269):129-170. doi: 10.1016/S0140-6736(20)32290-X. Epub 2020 Dec 2. Erratum in: *Lancet*. 2021 Jan 9;397(10269):98. doi: 10.1016/S0140-6736(20)32681-7. PMID: 33278353; PMCID: PMC7616803.
7. Ebi KL, Hess JJ, Isaksen TB. Using Uncertain Climate and Development Information in Health Adaptation Planning. *Curr Environ Health Rep*. 2016 Mar;3(1):99-105. doi: 10.1007/s40572-016-0077-0. PMID: 26814795.