

The Application of Artificial Intelligence (AI) in Managing Climate Change

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Dear Editor

Climate change continues to pose a profound threat to public health, with its impacts becoming increasingly complex and multifaceted (1). Recent studies have underscored how climate change can directly and indirectly affect the health of individuals and communities, particularly through environmental degradation, extreme weather events, and shifting disease patterns (2). Understanding this intricate relationship is essential for policymakers, health practitioners, and communities seeking to implement effective mitigation and adaptation strategies (3). By recognizing the health consequences of climate change, we can better prepare health systems and strengthen resilience in vulnerable populations (4).

The integration of artificial intelligence (AI) into climate change management represents a transformative advancement in our ability to address these challenges (5). AI technologies offer powerful tools for analyzing environmental data, modeling climate scenarios, and supporting evidence-based decision-making (6). In the realm of environmental health, AI enables more accurate predictions of climate-related risks and facilitates targeted interventions that protect both ecosystems and human well-being (7).

One of the most promising applications of AI lies in modeling and predictive analytics. By processing vast datasets, AI enhances climate models that forecast temperature fluctuations, precipitation patterns, and extreme weather events (8). These models are critical for anticipating environmental health risks and guiding resource allocation. For example, AI-driven water resource

management systems can predict scarcity or surplus, enabling more sustainable planning in regions facing hydrological stress (9).

AI also plays a vital role in risk assessment and management. Through disaster risk reduction models and vulnerability analyses, AI helps identify populations and areas most at risk from climate-related hazards (10). This information is essential for developing adaptive public health strategies and environmental protection plans. Moreover, AI-powered monitoring systems such as IoT-based water sensors enable real-time oversight of environmental conditions, ensuring safe and efficient resource use (11).

Infrastructure resilience is another area where AI contributes significantly (12). Predictive maintenance algorithms can detect early signs of failure in critical systems like dams and pipelines, allowing for timely repairs and reducing the risk of environmental contamination (13). In agriculture, AI supports climate-smart practices by optimizing irrigation, fertilization, and harvesting, thereby improving food security and reducing ecological impact (7).

Public health monitoring benefits greatly from AI's capabilities. Machine learning models can forecast outbreaks of climate-sensitive diseases, such as vector-borne and waterborne illnesses, by analyzing weather patterns and epidemiological data (1). These insights are invaluable for early warning systems and targeted health interventions (10).

To strengthen the scientific foundation of this discussion, it is recommended that future versions of this letter

incorporate more up-to-date references and draw more explicitly on the author's expertise in environmental health and AI applications (11). Including recent peer-reviewed sources will enhance the credibility and relevance of the arguments presented (12).

In conclusion, the application of AI in climate change management offers a powerful means to safeguard environmental and public health. By leveraging AI's analytical and predictive capabilities, stakeholders can develop more resilient, adaptive, and sustainable responses to the evolving climate crisis.

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Competing Interests

The authors declare that they have no conflict of interest.

Ethical Approval

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