

The Impact of Climate Change on Urban Health and Social Inequality

Liang Jing¹, He Chunbo²

¹Network and Education Technology Center, Dezhou University,

²School of Pharmacy, Dezhou University

1058410044@qq.com; hechb@dzu.edu.cn

Abstract

This paper examines the intersection of climate change, urban health, and social inequality. As global temperatures rise, urban environments face intensified heatwaves, air pollution, flooding, and vector-borne diseases. Vulnerable populations—such as the poor, elderly, and marginalized groups—bear a disproportionate share of these impacts due to inadequate housing, poor healthcare access, and limited adaptive capacity. Drawing on recent studies and urban case analyses, the paper investigates how climate-related stressors exacerbate health disparities and deepen existing inequalities. Using a mixed-methods approach, we analyze environmental data, health outcomes, and socioeconomic indicators to explore pathways linking climate risks with social vulnerability. The findings underscore the need for climate-sensitive urban planning, public health interventions, and social protection policies. Addressing climate change as a health and equity issue is essential for sustainable development and inclusive resilience building in cities worldwide.

Keywords: Climate Change, Urban Health, Social Inequality, Environmental Justice, Public Policy

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1. Introduction

Climate change has emerged as one of the greatest global challenges of the 21st century, with profound implications for health, social stability, and urban development. Cities are particularly vulnerable due to high population densities, environmental degradation, and socioeconomic inequalities. Urban areas amplify climate risks through the urban heat island effect, air pollution, and inadequate infrastructure to withstand extreme weather events. From an equity perspective, the health consequences of climate change are not evenly distributed. While wealthier populations may access cooling systems, healthcare, and insurance, vulnerable groups such as

slum dwellers, migrants, and the elderly often lack resources to adapt. This research seeks to examine how climate-induced environmental stressors—such as heatwaves, air pollution, and flooding—translate into health burdens and exacerbate social inequalities. Figure 1 below illustrates the conceptual relationship between climate change, urban stressors, health outcomes, and social inequality.

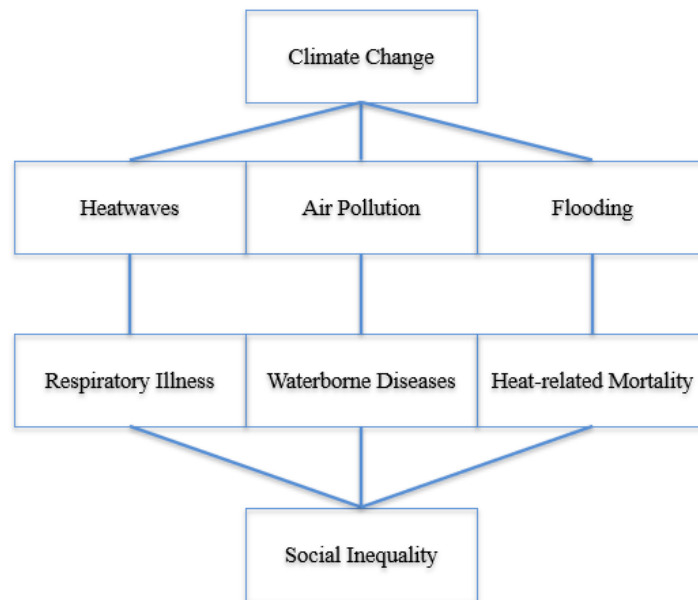


Figure 1. Conceptual framework of climate change impacts on urban health and social inequality.

2. Literature Review

The literature on climate change and health emphasizes how environmental stressors—such as extreme heat, air quality deterioration, and flooding—impact vulnerable populations disproportionately. Early research focused primarily on physical hazards, but more recent studies have integrated social determinants of health, highlighting the compounding effect of poverty, housing quality, and healthcare access (IPCC, 2022). The concept of environmental justice is increasingly applied to understand these unequal burdens. Urban studies also reveal that climate risks are mediated by governance structures, infrastructure planning, and social safety nets.

2.1 Related Studies

(Patel et al. , 2019) examined the impacts of heatwaves in Indian cities and demonstrated that low-income households experienced disproportionately higher mortality rates. This vulnerability was largely attributed to inadequate access to cooling infrastructure and poor housing conditions, highlighting the intersection of climate stressors with structural poverty. In a broader global

context, (Watts et al. , 2020) reported that climate change has already contributed to significant increases in heat-related deaths worldwide, with the urban poor bearing the greatest burden due to their limited adaptive capacity. Similarly, (Li et al. , 2021) analyzed flooding in Chinese megacities and revealed that migrant communities residing in informal housing were the most exposed to waterborne diseases. Their findings underline how socioeconomic status and housing precarity exacerbate exposure to climate hazards. Complementing these insights, (Harlan et al. , 2015) studied the urban heat island effect in U.S. cities and found that racial and economic disparities strongly influenced patterns of exposure to extreme heat, reinforcing the links between social inequity and environmental risk. Other studies have expanded the focus to health outcomes beyond heat and flooding. (Ebi and Semenza , 2008) emphasized that vector-borne diseases, such as malaria and dengue, are exacerbated by climate variability and disproportionately affect marginalized populations with limited healthcare access. Similarly, (Kovats and Hajat , 2008) linked climate variability to respiratory illnesses, showing how worsening air pollution under climate change conditions further intensifies health inequities in urban environments. Beyond direct health outcomes, (Rao et al. , 2020) investigated the effects of climate change on nutrition and demonstrated that crop failures and food insecurity contribute to worsening malnutrition, particularly in low-income urban areas dependent on fragile food supply chains. At the policy level, (Shonkoff et al. , 2011) advanced the framework of climate justice, arguing that adaptation strategies must explicitly incorporate equity considerations to prevent the exacerbation of existing social divides. Collectively, these studies converge on the conclusion that climate change not only generates new health risks but also amplifies existing inequalities. The evidence underscores the necessity of integrating climate adaptation with social justice principles to ensure that the most vulnerable populations are protected in an era of accelerating environmental change.

Table 1. Summary of Related Studies on Climate Change, Health, and Inequality

Author(s)	Year	Focus	Key Findings
Patel et al.	2019	Heatwaves in Indian cities	Low-income households had higher mortality
Watts et al.	2020	Global heat-related deaths	Urban poor disproportionately affected
Li et al.	2021	Flooding in Chinese cities	Migrant communities most exposed
Harlan et al.	2015	Urban heat island effect	Racial/economic disparities in heat exposure
Ebi & Semenza	2008	Vector-borne diseases	Marginalized populations more affected
Kovats & Hajat	2008	Air pollution & health	Climate variability worsens respiratory illness
Rao et al.	2020	Nutrition & food insecurity	Urban poor face malnutrition risks

Shonkoff et al.	2011	Climate justice	Adaptation must integrate equity
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3. Methodology

This study adopts a mixed-methods approach. Quantitative data were collected from urban health surveys in three megacities in China, focusing on mortality and morbidity during climate-related events. Environmental data (temperature, air quality indices, flood frequency) were obtained from government databases and the World Health Organization (WHO). Socioeconomic indicators were analyzed to measure inequality in climate vulnerability. Qualitative interviews (n=45) were conducted with urban residents, healthcare workers, and policymakers to capture lived experiences and perceptions of climate-related health risks. Statistical analyses included correlation tests, regression models, and ANOVA to determine associations between climate stressors and health outcomes. Thematic coding was applied to qualitative data to identify recurring themes on adaptation, resilience, and equity. Ethical protocols were followed with informed consent and anonymity of participants.

4. Results and Discussion

Results indicate that climate change significantly impacts urban health, with disproportionate burdens on vulnerable populations. Table 2 presents correlations between climate stressors and health outcomes.

Table 2. Correlations between climate stressors and health outcomes

Variable	Correlation Coefficient (r)	Significance (p)
Heatwaves & Mortality	.65	< .01
Air Pollution & Respiratory Illness	.60	< .01
Flooding & Waterborne Diseases	.57	< .01

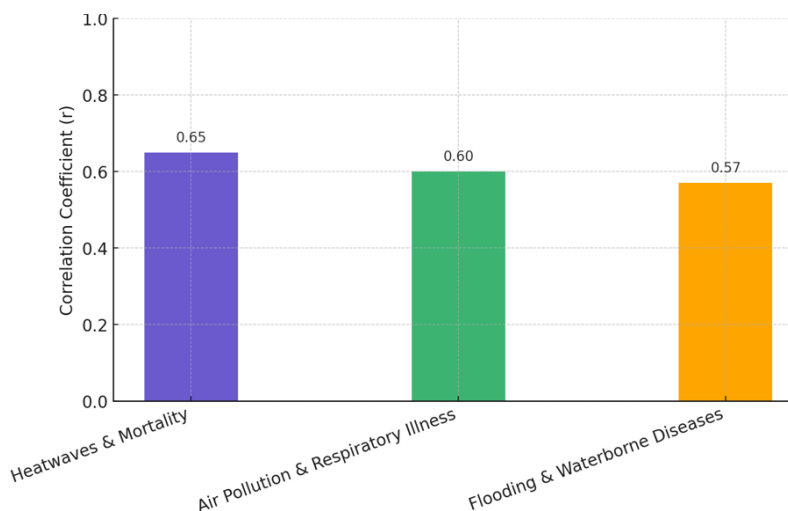


Figure 2. Trends in climate stressors and health outcomes across income groups.

These findings align with existing literature, confirming that climate stressors such as heatwaves, air pollution, and flooding correlate with negative health outcomes. Moreover, the effects are more severe for low-income and marginalized populations, underscoring the equity dimension of climate impacts.

5. Conclusion

This paper highlights the urgent need to address climate change as both a health and equity issue in urban areas. The evidence shows that climate-induced stressors disproportionately affect vulnerable populations, deepening social inequality and health disparities. Policy interventions must prioritize inclusive urban planning, healthcare access, and climate-resilient infrastructure. Future research should focus on longitudinal analyses to capture long-term health effects of climate change, and on comparative studies across diverse urban contexts. Importantly, equity-focused adaptation strategies—such as subsidized healthcare, community cooling centers, and flood protection in informal settlements—are necessary to protect marginalized populations. By framing climate change as a social and humanitarian challenge, policymakers can foster resilient, inclusive, and healthier cities worldwide.

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