

# Rising Risk of Heat Waves in Asia



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# Public Health Impact of Heat Waves in Indian Cities

Globally, the effect and burden due to climate change is distributed unequally and often unpredictably. Urban cities, due to their economic and social advancement, face a high risk due to the variability and unpredictability of changing climate. Anthropogenic activities have increased the global average temperature by more than half since 1950's<sup>1</sup> and it is predicted that global mean temperature will rise by 5.5°C by the end of this century.<sup>2</sup> The city will witness increased frequency and intensity of heat wave- a period of sustained high temperature. According to IMD, a heat wave condition is announced when maximum temperature remains to be at 45°C.<sup>3</sup> Episodes of extreme temperature, such as heat waves

were experienced in Orissa in 1998 which caused 2048 deaths and in Ahmedabad and Andhra Pradesh in 2015 which killed 1,334 and 2500 people respectively.<sup>4</sup> Similar bolts of heat waves were also witnessed in Chicago in 1996 in Europe in 2003.<sup>5,6</sup>

Increased rate of hospitalization is seen due heat related morbidity and mortality. Direct effects includes like dehydration, exhaustion, fainting, heat cramps, heat stroke and indirect effects like cardio-respiratory illness. Vulnerability to heat increases with age, disability and existing illness, type of occupation like daily wage labor, transportation, etc., socio economic status.<sup>7,8,9</sup>

During dry spells, urban areas generally experience 10°C rise in

night as compared to the adjoining areas or rural areas due to 'Urban Heat Island' effect; an effect caused by trapping of heat by the materials such as buildings, pavements during the day time and releasing the same at the night time.<sup>10,11</sup> The intensity of the effect is directly proportional to city size, population, unplanned urbanization, vehicular movement and industrial growth and indirectly proportional to the green cover and open land mass. A study by McMichael et al. in 2008 in Delhi along with other international cities, said that for every 1°C rise in temperature above 29°C, there is 3.94% increase in mortality.<sup>12</sup>

The impact of heat related health outcomes in cities are inter sectoral. Incidences of vector borne diseases

will rise due to congestion and high temperature promoting breeding and maturation of pathogen.<sup>13</sup> Water scarcity and food insecurity will be common with increasing temperature which will further push up the levels of under nutrition and other micronutrient related deficiencies. Greenhouse Gases (GHGs) like carbon dioxide, nitrous oxide, etc. released due to high demand of mobility and industrialization acts, heat trapping agent; further causing air pollution and increasing the city temperature. The public health system is already resource strapped to deal with existing health issues, the adversities caused by extreme temperature further adds the burden.

By 2050, urbanization is expected to increase the urban dwellers by 6 million. Establishing effective early warning signals with trans-regional co-operation, setting up effective health surveillance systems, restoring natural resources can mitigate impending extreme events and also factor in an adaptation consciousness.<sup>14,15</sup>

In conclusion, India will have to evolve a multi-dimensional domain expert co-ordination to ensure that global policy frameworks trickle down to the last mile and ensure life and livelihoods are protected from heat waves.

#### References:

1. Core Writing Team, R.K. Pachauri and L.A. Meyer. Climate Change 2014: Synthesis Report. [Internet]. Intergovernmental Panel on Climate Change; [cited 2018 Mar 16]. Available from [https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR\\_AR5\\_FINAL\\_full\\_wcover.pdf](https://www.ipcc.ch/pdf/assessment-report/ar5/syr/SYR_AR5_FINAL_full_wcover.pdf)
2. Mazidiyasni O, Aghakouchak A, Davis S, Madadgar S, Mehran A, Ragno E et al. Increasing probability of mortality during Indian heat waves. *Sci. Adv.* 2007; 3: 1-5.
3. Odisha State Disaster Management Authority: Heat Wave [Internet]. Odisha State Disaster Management Authority; [cited 2018



Street food vendors surviving through the heat wave.

- Mar 15]. Available from: <http://www.osdma.org/ViewDetails.aspx?vchglinkid=GL002&vchplinkid=PL008>
4. Majra J, Gur A. Climate Change and Health: Why should India be concerned. *Indian J Occup Environ Med.* 2009;13(1):11-16.
5. Semenza J, Rubin C, Falter K, Selanikio J, Flanders W, Howe H et al. Heat related death during the July 1995 heat wave in Chicago. *N Engl J Med* 1996;335:84-90.
6. D'Ippoliti D, Michelozzi P, Marine C, de'Donato F, Menne B, Katsouyanni K et al. The impact of heat waves on mortality in 9 European cities: results from the EuroHEAT project. *Environmental Health.* 2010; 9:37.
7. Akhtar R. Climate change and health and heat wave mortality in India. *Global Environmental Research.* 2007; 11: 51-57.
8. Azhar G, Malvankar D, Sharma A, Rajiva A, Dutta P, Jaiswal A et al. Heat-related mortality in India: Excess all-cause mortality associated with the 2010 Ahmedabad Heat Wave. *Plos one.* 2014; 9(3):1-9.
9. Bush K, Luber G, Kotha R, Dhaliwal R, Kapil V, Pasual M et al. Impacts of climate change on public health in India: Future Research Directions. *Environmental Health Perspectives.* 2011; 119(6):765-770.
10. Haines A, Kovats R, Lendrum D, Corvalan C. Climate change and human health: Impacts, vulnerability and public health. *Journal of the royal institute of public health.* 2006; 123: 585-596.
11. Kovats S, Akhtar R. Climate, climate change and human health in Asian cities. *International Institute for Environment and Development (IIED).* 2008; 20(1):165-175.
12. McMichael AJ, Wilkinson P, Kovats RS, Pattenden S, Hajat S, Armstrong B, et al. 2008. International study of temperature, heat and urban mortality: the "ISOTHURM" project. *Int J Epidemiol* 37:1121-1131.
13. Hunter P. Climate Change and waterborne and vector-borne disease. *Journal of Applied Microbiology.* 2003; 94, 375-465. (vector)
14. Yamamoto Y. Measures to Mitigate Urban Heat Islands. *Science and technology trend.* 2006; 18; 65-83. (UHIE)
15. Nuruzzaman M. Urban Heat Island: Causes, Effects and Mitigation Measures -A Review. *International Journal of Environmental monitoring and analysis.* 2015; 3(2):67-73. *International Journal of Environmental Monitoring and Analysis.* Vol. 3, No. 2, 2015, pp. 67-73. *International Journal of Environmental Monitoring and Analysis.* Vol. 3, No. 2, 2015, pp. 67-7

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