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Heat Stress, Labour Well-being, and Productivity amidst Heat Waves

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| Anirudh Krishnan



Discussion Paper

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ABSTRACT

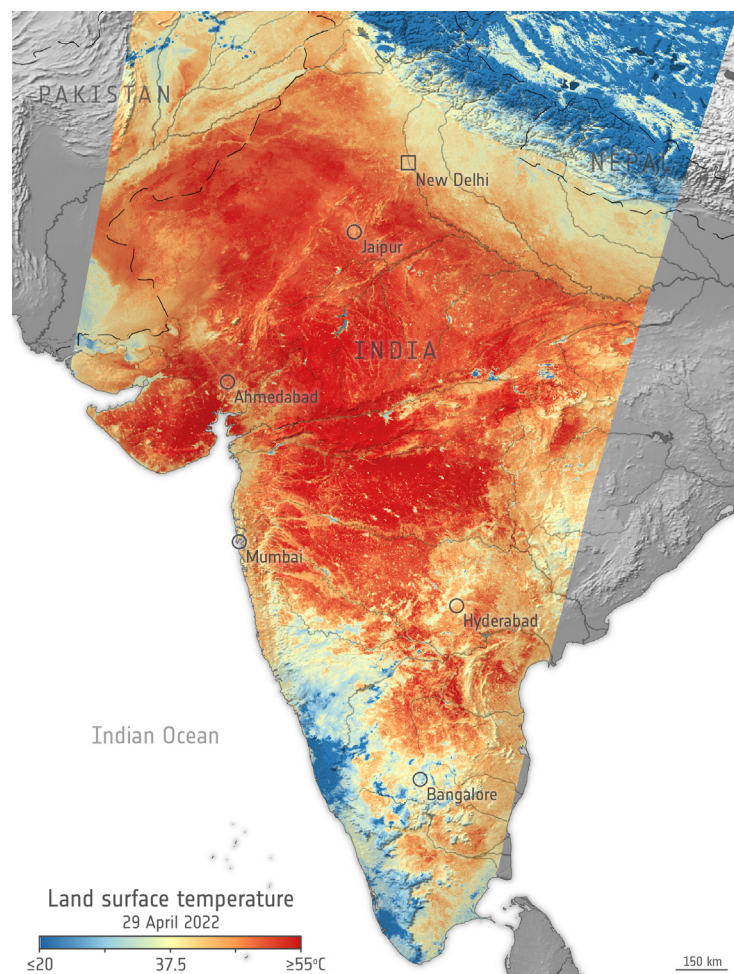
Heat waves are among the most dangerous natural hazards. Global temperatures are at an all-time high, and extreme temperature events are more frequent and prolonged. This leads to an increase in the number of people exposed to heat stress. This paper discusses the concept of heat waves while analysing the heatwave trends in India. It highlights the effects of heat waves on the productivity, health, and well-being of urban blue-collar and other outdoor workers in the Indian economy. The paper closes out by recommending short and long-term policy interventions that can help protect outdoor workers from the adverse effects of heat stress

Keywords: Productivity, heat waves, health and well-being, manual labour, informal economy

INTRODUCTION

India reported 280 heat wave days between 11 March and 18 March 2022– the highest in 12 years (Pandey, 2022). India also recorded its hottest March in 122 years this year, with average temperatures being 1.86°C above normal (Arora & Bhardwaj, 2022). Rajasthan, Madhya Pradesh, Himachal Pradesh, Gujarat, and Haryana accounted for 54% of the heat waves this year. Furthermore, the hilly areas of India are abnormally warm this year (Pandey, 2022). The middle to upper-class sections of the population generally have access to air-conditioned offices and hence do not face heat exposure in their work (Chaudhary & Rathi, 2022). However, the same is not true for occupations involving physical labour. A survey found that migrant workers, who make up 40% of Delhi’s population and are engaged in professions like construction, rickshaw pulling, vending, etc., have to endure heat waves without proper shelter or cooling facilities (Chaudhary & Rathi, 2022). Recent data also shows that only 13% of households in India have air conditioning (Ray, 2021).

Figure 1: Land surface temperature in India on 29 April 2022



Source: European Space Agency (2022)

The National Disaster Management Authority of India [NDMA] (n.d) defines heat waves as periods of abnormally high temperatures. These are substantially more than the average maximum temperatures during the summer months. Over 1.6 lakh people died from heat waves globally between 1998-

2017 (World Health Organization, n.d.). Moreover, the number of people exposed to heat waves increased by more than 12.5 crores between 2000 and 2016 (ibid.). In India, heat waves have caused more deaths than any other natural disaster over the past century (Rohini et al., 2016). Heat waves mainly occur over northwestern and southeastern parts of the country between April and June, usually lasting 5 days a season. However, heat waves can last more than 7 days (ibid). Heat waves have increasingly become a barrier to economic activities since they reduce business operations during the hottest hours and also affect workers in outdoor occupations (ILO, 2019a).

This paper highlights the effects of heat waves on the productivity and health of the workforce engaged in outdoor occupations in India. It considers the latest reports on labour while substantiating some data with anecdotal evidence collected while interviewing¹ informal labourers in New Delhi. Finally, the paper suggests possible policy interventions to maintain the well-being of this segment of the population.

EFFECTS OF HEAT WAVES ON LABOUR PRODUCTIVITY

Extreme weather events such as heat waves, heavy rainfall, and snowfall negatively affect the productivity and efficiency of the informal workforce, especially agricultural workers and manual labour like rickshaw pullers, construction workers, fruit sellers etc. (Li et al., 2016, as cited in Barthwal et al., 2022). The International Labour Organization [ILO] (2019a) estimates that if the current global warming trends continue, the total share of working hours lost will rise to 2.2% by 2030. This loss of working hours is equivalent to losing 8 crore full-time jobs or US\$ 2,400 billion (ibid.). Moreover, this loss of working hours is not evenly distributed. Southern Asia and Western Africa are expected to face a loss of 5.3% and 4.8% of the total working hours, respectively, corresponding to around 4.3 crores and 90 lakh full-time jobs.

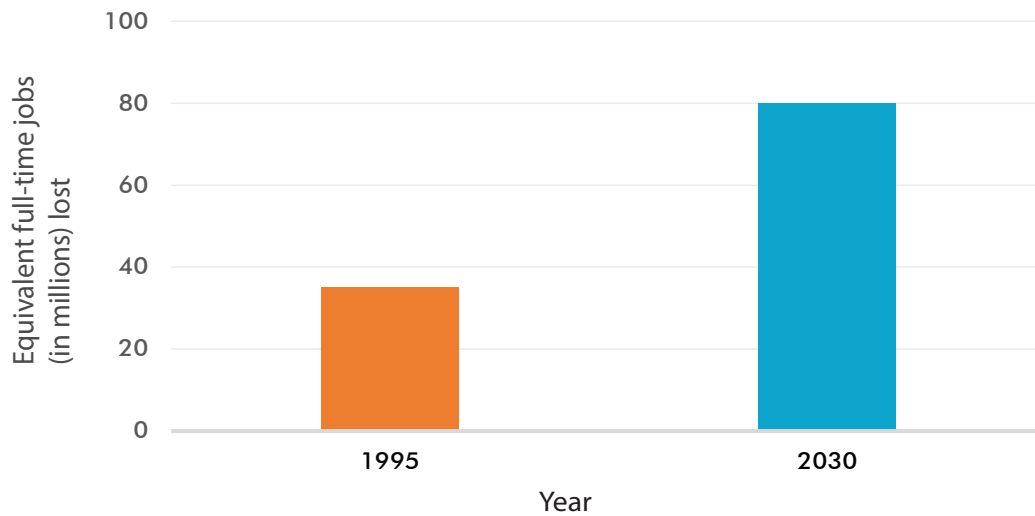
Between 2001 and 2020, India lost around 259 billion hours of labour² annually due to humidity and heat waves, costing India Rs. 46 lakh crores in total (Deshpande, 2022). Heat waves result in the loss of labour hours by preventing workers in occupations with physical labour from operating efficiently due to excessive sweating, exhaustion, and dehydration. The ILO (2019a) further estimates that India will lose around 5.8% of its total labour hours in 2030 due to heat and humidity. The loss of labour hours due to heat stress has severe implications for India since approximately 90% of the labour force is engaged in the informal sector, and most of this labour is employed in physically demanding occupations (Barthwal et al., 2022; ILO, 2019a).

This makes the Indian economy highly vulnerable to the effects of heat waves. It is estimated that most of the impact of lost work hours in India will be felt in the agricultural sector, followed by the construction sector (ILO, 2019a).

¹ The interviews referred to in this paper are to be taken only as indicative quotes. These quotes and interviews do not serve and are not to be interpreted as research findings since the respondents belong to a very limited geography.

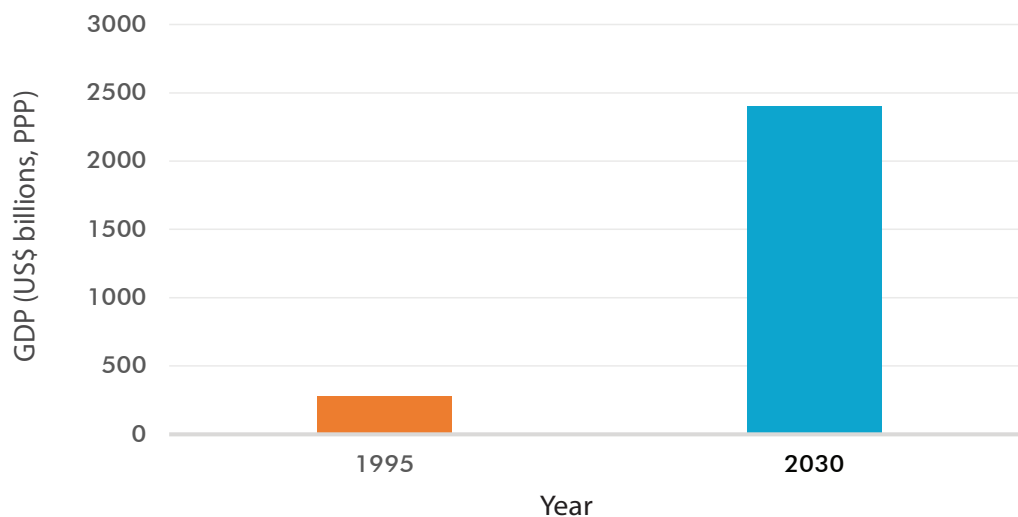
² One Labour hour refers to the total number of projected hours or actual hours to be worked or have been worked by workers receiving an hourly wage (Labour Hours Definition: 119 Samples, n.d.).

Figure 2: Equivalent full-time jobs (in millions) lost due to heat stress globally in 1995 and projections for 2030



Source: ILO (2019a)

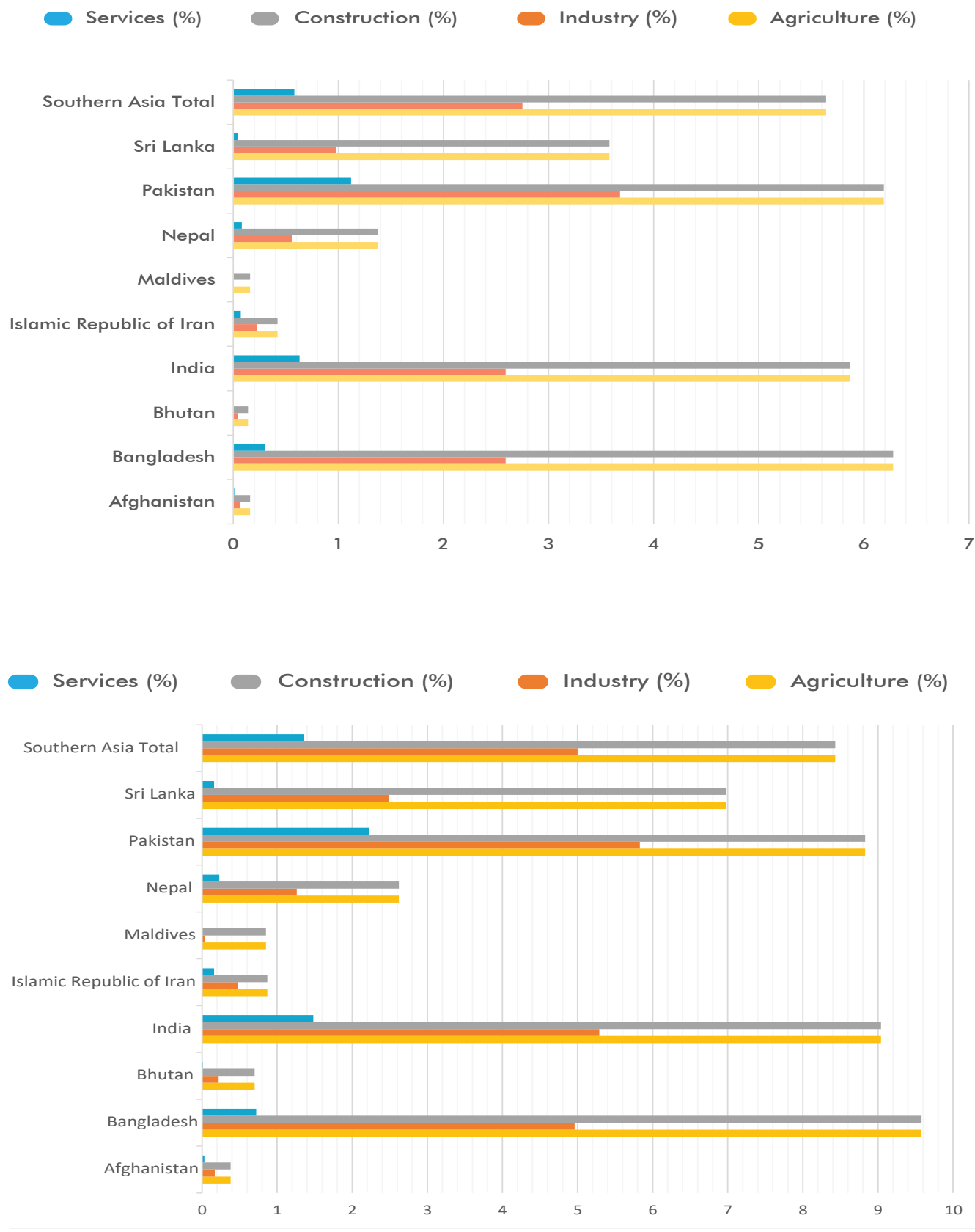
Figure 3: GDP (US\$ billions, PPP) lost due to heat stress globally in 1995 and projections for 2030.



Source: ILO (2019a)

Sett and Sahu (2014) assessed the impact of heat stress on female workers' productivity in West Bengal's brick kilns. The study concluded that a 1°C increase in the temperature led to a 2% decrease in productivity. Similarly, a tea stall owner mentioned that she felt particularly exhausted on days when she menstruated. There was increased bodily discomfort on hot days during or before menstruation (personal communication, 21 July 2022).

Figure 4: Working hours lost due to heat stress by sector and country in Southern Asia in 1995 and projections for 2030



Source: ILO (2019a)

As shown in table 1, India lost an equivalent of over 1.5 crore full-time jobs in 1995. Maximum working hours were lost in the sectors of agriculture (5.87% of the total hours) and construction (5.87% of the total hours). This loss of working hours is attributed to these sectors being labour and energy intensive and being largely practised outdoors under direct sunlight exposure. Projections suggest that due to heat stress, India will lose an equivalent of over 3.4 crore full-time jobs in 2030. India's loss will approximately make up 80% of the total number of full-time jobs lost due to heat in South Asia in 2030 (ILO, 2019a).

EFFECTS OF HEAT WAVES ON THE LABOUR HEALTH AND WELL-BEING

Human health is adversely affected by extreme weather conditions like heat waves. Outdoor labour, particularly workers in the informal sector, such as rickshaw pullers, manual labour, street vendors, and construction workers, are more susceptible to the effects of heat waves (Barthwal et al., 2022). Daily intense physical work causes high internal heat production. This heat must be released to avoid health complications.

When air temperature exceeds 37°C, sweating becomes one of the primary mechanisms to cool the human body. However, when the work environment becomes too hot or humid, sweat evaporation becomes inefficient, leading to severe hyperpyrexia (Kjellstrom, 2009; Parsons, 2009). Changes to body temperature can alter bodily functions, like digestion, assimilation, and metabolism. Lack of basic facilities such as proper ventilation and protective gear can also aggravate the adverse effects of excessive heat, leading to heat stress, injuries, cramps, etc. (Schulte et al. 2016).

Even jobs devoid of constant physical labour like vending fruits, vegetables, or tea become exhausting in the acute heat. During interviews with informal workers, they all reported an average working day of 12-13 hours. Work becomes tougher on days with temperatures above 35°C. Two informal workers said they suffered body aches and headaches during harsh summer days. "What can I tell you about the experience other than that it's just troublesome? We just persist through the heat. There is no other option. We stand beneath the tree shade for some relief and bathe four times a day" (Chanderpal, personal communication, 21 July 2022). Another worker reported relying on energy drinks and headache medication to remain hydrated during summers (personal communication, 21 July 2022).

As mentioned earlier in the paper, 90% of India's labour force is engaged in the informal sector and does not receive any social insurance or legal protection like the formal sector (Mehrotra, 2019). The lack of adequate social insurance potentially exacerbates health issues since workers cannot afford medical services due to low wages. Neither are they in a position to challenge their work timings, wages, and working conditions. There have been multiple reports of construction workers falling ill due to the heat but continuing to work to earn their wages (Kataria, 2022).

CONCLUDING REMARKS AND POLICY CONCERNS

With the informal sector absorbing most of the population, developing interventions for labour well-being becomes crucial. The following short and long-term recommendations can help reduce the heat stress on workers exposed to heat waves:

1. Nationwide implementation of Heat Action Plans

The National Disaster Management Authority [NDMA] released national guidelines for heat wave management in 2016. Under these guidelines, 17 heat wave-prone states and 120 districts and cities prepared heat action plans (Mukherjee, 2022). In May 2022, the government of India further urged state governments to draft heat action plans [HAPs] at the state, city, and district levels to avoid heat-related deaths and illnesses (Express News Service, 2022). However, the successful implementation of HAPs has only been seen in Ahmedabad.

Ahmedabad, Gujarat, has been implementing HAPs since 2013 to reduce heat exposure for its population (Natural Resource Defense Council [NRDC], 2019). In 2010, more than 1,300 people died in Ahmedabad due to a prolonged heat wave. Following this, the Ahmedabad Municipal Corporation [AMC] prepared a HAP in 2013, the first in the country (Azhar et al., 2014).

HAPs provide a framework for extreme heat response activities. The key strategies under a HAP include:

1. Building public awareness by effectively communicating the risks of heat waves and practices to prevent heat-related deaths;
2. Initiating an early warning system and inter-agency coordination to alert residents about extreme temperature predictions and to prepare health officials, hospitals, and emergency responders to manage heat stress-related cases effectively;
3. Building capacity among healthcare workers; and
4. Reducing heat exposure for vulnerable sections of the population (NRDC, 2019).

The HAP expands access to shaded areas for outdoor labourers and workers. The AMC ensures that night shelters remain open during the day as well to accommodate migrant workers during a heat alert. The AMC urges labour organisations to consider extended afternoon breaks for workers or have alternate working hours. AMC's labour and employment department also plans sensitisation workshops for employers, outdoor labourers, and workers. These workshops inform the attendees about the health impacts of extreme heat and suggest protecting themselves on scorching days.

A pilot project suggested under the HAP aims to provide emergency ice packs and heat illness prevention material to traffic police officers and construction workers (NRDC, 2019). Such labour-centric HAPs can be highly beneficial in urban centres where heat waves occur regularly.

2. Restructuring of the informal sector and promoting shift work

The informal sector in India absorbs a large proportion of workers that would otherwise remain unemployed due to the dearth of opportunities in the formal sector (Punia, 2020). The informal sector primarily consists of labour-intensive work in unorganised firms undertaken by low-skilled labourers. Since unorganised firms do not fall under the jurisdiction of corporate law, the workers have no job security or social protection. Furthermore, wages remain minimal, at times even below the legal minimum wage, due to the abundance of labour (ibid.).

Revamping the informal sector into a more formal setting will enable daily-wage workers and their families to avail employee benefit schemes, contractual agreements, and medical insurance coverage. Contract-based employment protects labour from being underpaid, thereby increasing the income and purchasing power of the workers. Contracts protect workers from being overworked while providing paid sick leaves (Talwar, 2022).

Formalisation of the unorganised sector can also lead to the development of balanced work time agreements [WTA] and shift work. Shift work refers to organising working time such that workers work one after another at the workplace. Shifts help establishments to operate for extended periods. Organisations can also explore other arrangements like job sharing, where one job is split into two part-time jobs for different workers (ILO, 2019b). Organising proper shift timings can help ensure that workers are not exposed to heat or sunlight for an extended period, thereby improving the productivity and longevity of the workforce.

3. Mandatory workplace regulations

A group of construction workers mentioned that their contracts are time-bound and work has to proceed as scheduled. Therefore, no matter the temperature, they must show up for work (personal communication, 21 July 2022). Many workers also reported working exhausted to earn daily wages (Kataria, 2022).

Mandatory workplace regulations can protect workers from the ill effects of heat stress. Employers can reduce working intensity during hot days and provide the workers with cooling measures like rest areas, cold water, and frequent breaks. In China, employers pay their workers high-temperature allowances when the temperature exceeds a certain threshold (Adewumi-Gunn, 2021). A similar system can be implemented in India's heat wave-prone cities to incentivise workers and make them financially stable.

4. Improving green cover in cities

The green cover in Indian cities is constantly declining due to increased infrastructure operations and construction. Tree cover is vital for outdoor workers since it provides shade for respite from the heat and helps preserve the fresh products they sell. Green spaces and trees also help reduce the urban heat-island effect, making cities cooler (Chandran, 2020). Increasing the green cover can be a short-term measure with long-term benefits.

Maintaining labourers' productivity, health, and well-being is vital to the Indian economy. Considering the current climate change trends, India will continue to face its share of heat waves in the coming years. Regulations and policy interventions that work towards the welfare of manual labour and workers exposed to heat stress must be administered nationwide.

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