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Policy brief

Adapting to the impacts of extreme heat on Bangladesh's labour force



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Summary

- Working conditions in Bangladesh are worsening due to extreme heat associated with climate change. This increased heat stress is already having a negative impact on workers' health and labour productivity.
- On a combined measure of labour supply and labour productivity in sectors that are relatively highly exposed to heat in Bangladesh, a decrease of 46.2 percentage-points by 2080 is projected under a 3°C warming scenario.
- The loss in productivity could compromise efforts to reduce poverty and attainment of the Sustainable Development Goals (SDGs), making it more challenging for Bangladesh to achieve its medium- and long-term goals of promoting prosperity and inclusive growth.
- Possible adaptation options include changing working conditions (e.g. providing cooling and hydration breaks, changing working hours, and providing access to cooling indoors), adjusting building design, climate-smart urban planning, and increasing mechanisation of some tasks.
- While there are several policies and frameworks for labour protection in place, their enforcement is currently weak. Better data on how heat is harming worker health and reducing labour supply and labour productivity can support stronger enforcement, along with regulations that protect the health of workers.
- Action on climate change, including making reforms towards a low-carbon economy, is also likely to affect the labour market by causing significant reallocation of workers. This will require just transition policies to be put in place, to avoid rising unemployment, poverty and inequality.
- Measures to ensure that the transition to a low-carbon economy is just may include creating new job opportunities, retraining workers, and ensuring the protection of the labour force, including migrant workers and informal workers.

Policy briefs provide analysis on topical issues, presenting specific recommendations to inform ongoing policy debates. Drawing on the Grantham Research Institute's expertise, they summarise either our research findings or the state of knowledge about a particular issue.

This policy brief has been written by **Lucia Letsch, Shouro Dasgupta and Elizabeth JZ Robinson.**

Introduction

The impact of global warming on the labour force is already evident and is unequally distributed across the world (Dasgupta et al., 2021). Global economic inequality is rising due to global warming, with hotter, poorer countries experiencing a decline in growth due to warmer conditions (Diffenbaugh and Burke, 2019).

Bangladesh is an example of a country for which the health and productivity of its workforce – and thus its economic output – are under increasing threat in a warming world. Yet to date, the non-fatal effects of direct heat exposure have received insufficient attention from researchers and policymakers. This policy brief considers how policymakers can better ensure workers in Bangladesh are protected from extreme heat while pursuing sustainable development pathways and a just transition to a low-carbon economy. Other countries with similar vulnerabilities to Bangladesh can also draw lessons from our findings.

The links between climate change, heat and the labour market – Bangladesh’s vulnerability

Bangladesh, with a tropical/subtropical climate and high temperatures and humidity, is classified as being at high risk from extreme heat hazards (Think Hazard, n.d.). Climate change is putting a large share of Bangladesh’s population at increased risk from heat stress-related health problems and is already having negative impacts on the labour force; as global temperatures rise further, these effects will intensify in the future (Dasgupta et al., 2021). Bangladesh experienced its longest heatwave in decades in June 2023, with temperatures reaching above 40°C in many areas. In Rangpur, 41°C was recorded, the highest temperature experienced in the city since 1958 (Mahmud, 2023). In the broader regional context, parts of South Asia and Southeast Asia are among those areas at highest risk globally under future warming scenarios.

Exposure to external heat changes the transfer rate of internal heat away from the body. In hot ambient conditions, this transfer is limited and therefore the body temperature increases (Kjellstrom et al., 2016). Excessive exposure to heat can have adverse effects on health, leading to organ damage, heat stroke and even death. An increase in the Universal Thermal Climate Index (UTCI)¹ when temperatures reached 34°C and 35°C during 2012–13 resulted in an increase in mortality in Bangladesh of more than 30% (Bukart et al., 2014). This risk was higher for men, who are more likely than women to work outside in sectors most exposed to heat.

Because the physiological impacts from heat stress can also reduce overall human performance, heat exposure reduces both labour supply (the number of hours worked) and labour productivity (output during those working hours). Working in heat-stressed conditions can reduce productivity by causing workers to slow down, take more breaks, experience impaired mental capacity and make errors more frequently, and can reduce capability to carry out physical work (Kjellstrom et al., 2016). Workers might also be absent more often during hot periods. Both economic output and individual wages can be affected by productivity loss, harming local economies and communities.

The structure of the labour market further exacerbates the vulnerability of Bangladesh’s workforce to heat stress. A large proportion engages in

“Climate change puts a large share of Bangladesh’s population at increased risk from heat stress-related health problems.”

1. The UTCI describes the physiological comfort of the human body under specific meteorological conditions (Bröde et al., 2012). It takes into account not just the ambient temperature but also humidity, wind and radiation, all factors significantly affecting our physiological reaction to the surrounding environment.



Workers in a Dhaka garment factory, where temperatures can reach into the high-30s Celsius.

Photo: Maruf Rahman, Pixabay

outdoor work: in 2021, 37% of total employment was in agriculture and 22% in industry, which includes mining, quarrying and construction in addition to manufacturing (World Bank, 2023). These outdoor workers are highly exposed to the negative effects of heat stress.

Workers in factories with no air conditioning and low protection, such as in the Ready-Made Garment (RMG) industry, are also greatly affected by high and rising temperatures. In Bangladesh, over four million workers are employed in the RMG sector, 80% of whom are women (Reza et al., 2017). For peak production hours in July, the temperature in garment factories in Dhaka can pose high to very high risks to workers, with indoor temperatures reaching 38°C² (Chowdhury et al., 2017).

Increases in mortality from heat stress have been found to be higher for men than women in Bangladesh overall (Bukart et al., 2014). This is likely due to men being more likely to carry out heavy labour outside. However, women who work in the agriculture sector, which accounts for 56% of female employment in Bangladesh (compared with 28.4% of male employment), are also exposed to heat outdoors (World Bank, 2023). Furthermore, in both indoor and outdoor work women are more represented than men in the informal sector, where work is often less secure and lower paid – meaning securing protection from or adapting to heat is more difficult.

Projected changes to labour supply and productivity

In Bangladesh there is projected to be a decline in labour supply and labour productivity in sectors highly exposed to heat (i.e. where work is conducted outside in the sun). Combining these measures, declines are projected of 11.3 percentage-points under a 1.5°C warming scenario (around the year 2040), of 20.9 percentage-points under 2°C of warming (by around 2060), and of 46.2 percentage-points under 3°C of warming (by around 2080) compared with the 1986–2005 historical baseline. To date, decline in output due to increased heat stress has been found to be greatest in the agricultural sector (Hossain et al., 2022).

Even in sectors less exposed to heat (i.e. in which work is conducted inside or outside but in the shade), labour supply and productivity combined

2. Measured in Wet Bulb Global Temperature (WBGT), which also accounts for humidity; a WBGT above 32.2°C is considered to pose very high risk for heat casualties.

are projected to decrease by 9 percentage-points under a 1.5°C warming scenario, 13.3 percentage-points under 2°C, and 25.1 percentage-points under 3°C compared with the baseline. These are some of the largest projected reductions globally due to future climate change (Dasgupta et al., 2021). These reductions will have negative effects both on Bangladesh's national output and on individual incomes, which will make it more difficult for Bangladesh to reduce poverty and attain the Sustainable Development Goals (SDGs).

For workers who are not on a fixed wage but are paid by unit, which is often the case in the informal sector, the productivity losses of heat exposure can translate into lower incomes. Any losses in incomes can be particularly challenging for women, as they have less access to resources and ownership, and already receive a lower wage on average than men (Kapsos, 2008).

There might be changes in the location of the labour force as well, due to the environment becoming uninhabitable, leading forced displacement and/or migration of workers, resulting in labour shortages in some regions. In general, migration in Bangladesh has followed a trend from rural to urban areas in recent years. The ensuing rapid urbanisation can exacerbate the negative impacts of climate change, as it may contribute to the heat island effect of large cities and put more people at risk of heat stress. In Dhaka, the population density increased by 76.59% between 2001 and 2017, which was found to have significantly increased the temperature in the city – the average temperature is 3°C higher in Dhaka city compared with its rural surrounding areas (Uddin et al., 2021).

It is estimated that the impact of a 3°C global temperature rise could reduce GDP in Bangladesh by 1.7% per year by 2037 and by 7.6% per year in the long term (Kompas et al., 2018). Other estimates based on a high-emission scenario (RCP-8.5),³ equating to 'business as usual', predict an annual GDP loss in Bangladesh of 0.55% in 2030, 2.68% in 2050, and 8.59% in 2100 (Kahn et al., 2021).

How labour policies and different adaptation measures can decrease vulnerability

Current policies, compliance and barriers to uptake

Bangladesh has introduced several policies and plans that are aimed at improving working conditions. Overall, there has been an effort to move more towards international labour standards in recent years. As a member of the International Labour Organization (ILO), it has ratified eight core conventions, which include legally binding standards on labour rights such as on forced labour, discrimination, and the right to organise. In 2006 the Bangladesh Labour Act (BLA) was passed, containing standards on issues such as minimum wages, wage payments, health, safety and occupational hazards.

Compliance with labour laws has increased with the implementation of the Labour Act and the Labour Rules in 2015, with a focus on improving working conditions and monitoring mechanisms leading to improved labour standards. Improving working conditions will not only benefit the workers themselves but can also be an important measure to limit productivity losses from climate change.

“Losses in income can be particularly challenging for women, as they have less access to resources and ownership, and already receive a lower wage on average than men.”

3. RCP stands for Representative Concentration Pathway and RCP 8.5 “refers to the concentration of carbon that delivers global warming at an average of 8.5 watts per square metre across the planet”, leading to a temperature increase of around 4.3°C by 2100 (see <https://climatenexus.org/climate-change-news/rcp-8-5-business-as-usual-or-a-worst-case-scenario/>).

Plans and policies that aim to protect the health of the labour force include the National Occupational Safety and Health (OSH) Policy and the Health National Adaptation Plan (HNAP). The threat of climate change to the health of the labour force is specifically recognised in the National Adaptation Programme of Action (NAPA), which identifies increased mortality from heat stress as one of the main vulnerabilities in Bangladesh.

However, there are several market failures that act as barriers to climate change adaptation in the workplace, caused by a lack of information and weak enforcement of policies. Firms may not be aware of the negative consequences of climate change on worker productivity, labour supply and health, and employers may have little incentive to implement actions that protect their workers if regulations are not enforced. Increasing the awareness of workers and employers about both labour rights and the negative impacts of heat stress on health and productivity can contribute to overcoming some of the obstacles of labour protection implementation.

The [separate annex table](#) provides a more detailed overview of relevant policies and plans, summarising their aims and activities.

Adaptation measures

There is a need to develop specific measures to ensure the protection of workers from the negative impacts of climate change. Such measures need not involve large public expenditure, as they can focus on creating an enabling environment for the private sector to implement adaptation measures. This would enable firms to reduce climate-related losses and benefit workers through improved working conditions.

Adaptation can have economic benefits by reducing the negative impacts of climate change on labour supply and labour productivity and the long-term health of the workforce. It is estimated that 22–68% of the global economic losses due to decreased labour productivity from heat could be avoided through adaptation measures (Zhao et al., 2021).

Below are example areas in which adaptation has high potential to produce economic, financial and health benefits in Bangladesh. Options need to be assessed according to their specific context, as some measures might only be effective in certain cases (Day et al., 2018).

Changing working conditions

One approach of changing working conditions is to shift working hours to cooler times of the day and ensure that workers take frequent breaks to cool down and rehydrate. However, changing working hours may have unintended consequences on workers' health that are important to consider: e.g. sleep patterns could be negatively affected and exposure to vector-borne diseases could increase and worsen health overall if workers spend more time outdoors in the evening.

Ensuring workers can rehydrate requires adequate access to clean water in factories. In many factories, the low number and unequal distribution of water points and washrooms discourage workers from visiting them, as they fear wasting time if they have to walk far or queue to use the facilities (Jaren et al., 2022). Investing in water and sanitation services in factories and at the community level can help maintain the productivity of factory workers, improving health by reducing water borne disease (WHO, 2022) as well as

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aiding hydration, and thereby reduce absenteeism. It would be likely to greatly benefit women, who are particularly affected by inadequate access to water.

These types of action are likely to require both government policies and active collaboration with employers, labour unions and institutions, similar to the EU Occupational Safety and Health (OSH) that enforces health and safety regulations in the workforce. A recent example of an action from the Asia region is Hong Kong's three-tier heat warning system, drawn up in response to union pressure, although it is not legally binding. Work can be suspended or a rest period allocated of a length that varies based on a heat index. Under the highest tier 'code black' warning, outdoor workers involved in heavy work or those working indoors without air-conditioning suspend their work for 45 minutes after working for 15 minutes every hour.

Adjustments to building design

Conditions inside factories can be improved by adequate cooling systems, including air conditioning and passive cooling options. Improved insulation can also help reduce the indoor temperature in factories. Cooling systems and insulation can be built into new factories from the outset, while retrofits can also be carried out on existing buildings. Retrofitting the rooftops of factories has been found to effectively offset higher indoor temperatures. Four different types of rooftop retrofit – extensive green roofs, rooftop shading, and white cool roofs⁴ – were all found to reduce indoor air temperatures by 2°C on average in a garment factory, for example (Bach et al., 2023).

Such measures require sufficient available funding to renovate and retrofit buildings and an adequate energy supply, especially in the case of air conditioning. Awareness-raising and access to finance could help incentivise factories to take adaptation actions.

Climate-smart urban planning

Given the rapid urbanisation in Bangladesh, urban planning that includes adaptive measures such as urban greening will be crucial for building resilience to heat stress. In cities with existing high-density urban areas with limited space, this option may be most feasible for the design of new areas. In the National Adaptation Plan for the period 2023–2050, adaptation measures such as eco-engineering and green infrastructure such as green roofs, retention areas, permeable pavements, parks and urban forests are proposed as solutions to the threat of extreme heatwaves. However, only a few such projects are currently being planned.

Mechanisation

There has been an acceleration of agricultural mechanisation in Bangladesh, for example in irrigation and tillage; however, the majority of agricultural activities are still carried out manually (Rahman et al., 2021). Forms of mechanisation that improve agricultural productivity while minimising the risk of environmental damage can reduce the need for heavy labour while also ensuring the sustainable development of the agricultural sector. However, mechanisation may not be appropriate for all farming communities as it can lead to workers losing their jobs. To avoid increases in unemployment and inequality, policymakers will need to take a 'just transition' approach, helping to reskill workers and create new, decent job opportunities – also as the energy sector restructures (see below).

“Awareness-raising and access to finance could help incentivise factories to take adaptation actions.”

4. A green roof is a vegetated roofing system. Rooftop shading can include adding awnings, blinds, deciduous trees, and roof overhangs. Cool roofs are painted with a solar reflective coating and are designed to reflect more sunlight than a conventional roof, absorbing less solar energy.



The use of solar panels for electricity in the Sundarbans forest area, Bangladesh, 2021

Photo: IMF Photo/K M Asad, via Flickr

Policies that are based on a participatory approach, allowing farmers to choose the most appropriate tools that meet their needs, and that improve access to machinery, are likely to be the most successful in increasing the resilience of farming communities. National policies that reskill workers will be crucial in sectors where mechanisation displaces workers: as well as agriculture this includes the garment sector, where automation and a trend towards more sustainable production are changing the industry.

The role of mitigation

Recent development in Bangladesh has been driven in part by the expansion of the industrial sector, which is a major greenhouse gas emitter.

Climate change mitigation will require moving away from fossil fuels to renewable energy supply sources. Restructuring the energy sector will lead to shifts in employment within and across economic sectors. Without adequate mechanisms for a just transition in place, many workers in Bangladesh are at risk of losing their livelihoods, especially since a large proportion of the population works in the informal sector and is therefore outside of any governmental social protection scheme. Anticipating the reallocation of labour and putting in place policies and programmes to provide new, decent job opportunities, for example in the renewable energy sector, and to retrain workers where necessary, can make the transition to a low-carbon economy safer and more just. Ensuring migrant workers' rights and their social protection, and rehabilitating displaced people, will also be important aspects of a just transition in the face of climate change. Involving trade unions in the policy consultation process and developing a common framework for implementing just transition measures can help prepare Bangladesh for the labour market changes and challenges caused by climate change.

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Compared with industrial countries, Bangladesh's contribution to climate change is only minor, however. Strong mitigation action from high-emitting countries will therefore be crucial in limiting the effects of climate change in Bangladesh.

Co-benefits of mitigation for health

Green industries can improve environmental performance, while also bringing social benefits and economic growth. In the brick manufacturing industry in the Greater Dhaka region, for example, energy efficiency improvements have reduced emissions intensity, and are estimated to have led to cumulative health cost savings of between US\$126 and 234 million, due to lower rates of hospitalisation and outpatient visits as a result of reduced exposure to harmful airborne pollutants (Guttikunda and Khaliquzzaman, 2014).

Conclusion: implications for future policies and plans

Bangladesh has experienced rapid economic growth in recent decades, driven by the expansion of export-oriented sectors such as the garment industry. This economic growth has been accompanied by some improvements in socioeconomic and human development. It is now important that these improvements are protected from the worsening impacts of climate change by shifting Bangladesh's economy to a sustainable growth pathway that ensures the health of the labour force while minimising environmental impacts and supports Bangladesh in achieving its aim of becoming an upper-middle income country by 2031 (Reza et al., 2017; World Bank, 2022). Improving working conditions in times of high heat stress and adopting cleaner production methods not only benefits workers' health but can also reduce productivity losses due to climate change and deliver significant cost savings.

Climate change plays an important role for temporary migration and urbanisation and is likely to affect the distribution of the labour force between agricultural and non-agricultural work. The implementation and enforcement of regulations ensuring adequate protection of workers from heat stress can contribute to a just transition to a low-carbon economy.

A more detailed and nuanced understanding of the health implications of heat on workers will support Bangladesh to improve the welfare of the most vulnerable workers and the country's economy as a whole.

References and annex – overview of policies

The in-text citations are hyperlinked. For a separate, downloadable list of the references cited in this brief and a three-page overview of existing policies relevant to addressing the impacts of extreme heat on Bangladesh's labour force, please visit www.lse.ac.uk/granthaminstitute/publication/adapting-to-the-impacts-of-extreme-heat-on-bangladeshs-labour-force.

Grantham Research Institute on Climate Change and the Environment

London School of Economics and Political Science

Houghton Street, London, WC2A 2AE

e gri.policy@lse.ac.uk

w www.lse.ac.uk/granthaminstitute
www.climate-laws.org

Authors and acknowledgements

Lucia Letsch is a Researcher at Fondazione CMCC. Shouro Dasgupta is an Environmental Economist at Fondazione CMCC and a Visiting Senior Fellow at the Grantham Research Institute on Climate Change and the Environment. Elizabeth JZ Robinson is the Director of the Grantham Research Institute.

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