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# Policy brief

## Impacts of climate change on health in Bangladesh

LSE The London School of Economics and Political Science

University of Leeds

### Summary

- Bangladesh has made tremendous progress in improving the health outcomes of its population, from better infant and maternal health to overall healthy life expectancy.
- However, there is clear evidence that climate change is already negating some of these health gains, making it harder for the country to reduce poverty, improve prosperity, and pursue growth along a pathway compatible with net zero.
- Because Bangladesh is one of the most climate-vulnerable countries in the world, understanding the links between climate change and health is essential for making the country climate-resilient.
- There is considerable scope for Bangladesh to take advantage of the health co-benefits of tackling climate change and air pollution, which can improve health outcomes and reduce pressure on health services.
- Extreme heat and air pollution are together particularly damaging for health, especially for people with pre-existing conditions. Focusing on reducing air pollution is therefore very important but will require cooperation and coordination across multiple ministries.
- Policies in Bangladesh have evolved in the last five decades, with the most recent policies such as the National Health Policy and the National Adaptation Plan explicitly including provisions to address climate change impacts on health.
- Bangladesh should increase its use of heat adaptation strategies that have been shown to work across the globe, including early warning systems, ensuring people have access to cooling, and changing working hours for those in high exposure sectors.
- Climate change makes it harder for people to improve their nutritional status. For Bangladesh, targeting food insecurity hotspots, in parallel with ensuring people have access to clean water and sanitation, can improve food security and nutrition.

**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 **Lauren O'Leary**, **Shouro Dasgupta** and **Elizabeth JZ Robinson**.

## Introduction: climate change could set back decades of advances in health

Bangladesh became an independent country in 1971. In the two decades that followed, it made tremendous progress in health and development, with public health interventions and investments. It implemented its first five-year plan and developed a population policy (1973-80) that focused on rural health care and family planning and created a Directorate General of Family Planning (Sabina and Barkat, 2011). The Expanded Programme on Immunisation was created in 1979 and the percentage of fully vaccinated children increased from less than 10% in the 1980s to more than 80% by the turn of the 21st century (Islam, 2009). Average life expectancy increased from just 40 years in 1960 to 72 in 2020 (Khondker et al., 2022; World Bank data); infant mortality (the probability of dying between birth and age 12 months) declined dramatically from 169 per 1,000 live births in 1970 to 23 in 2021 (WHO, n.d.); and the under-5-year mortality rate fell from 273 per 1,000 live births in 1970 to 27 in 2021 (ibid.).

This progress is both a symptom and source of economic growth. Economic growth generally leads to improved human health, and evidence shows that human health benefits economic growth (Ranis et al., 2000; Well, 2007; Bloom et al., 2019). Unfortunately, climate change may be negating these health gains and will make it harder for Bangladesh to improve its health outcomes further.

Bangladesh has been ranked by the Global Climate Risk Index as the country seventh most affected by climate change between 1999 and 2018 (Eckstein et al., 2021). With a sub-tropical climate, and subject to monsoon winds, the country is naturally exposed to extreme weather events such as flooding, cyclones, sea level rise, and landslides, in addition to extreme heat and heatwaves. Coastal and riverine communities are especially susceptible to flooding.[1] Because Bangladesh is one of the most climate-vulnerable countries in the world, understanding the links between climate change and health is essential for making the country climate-resilient.

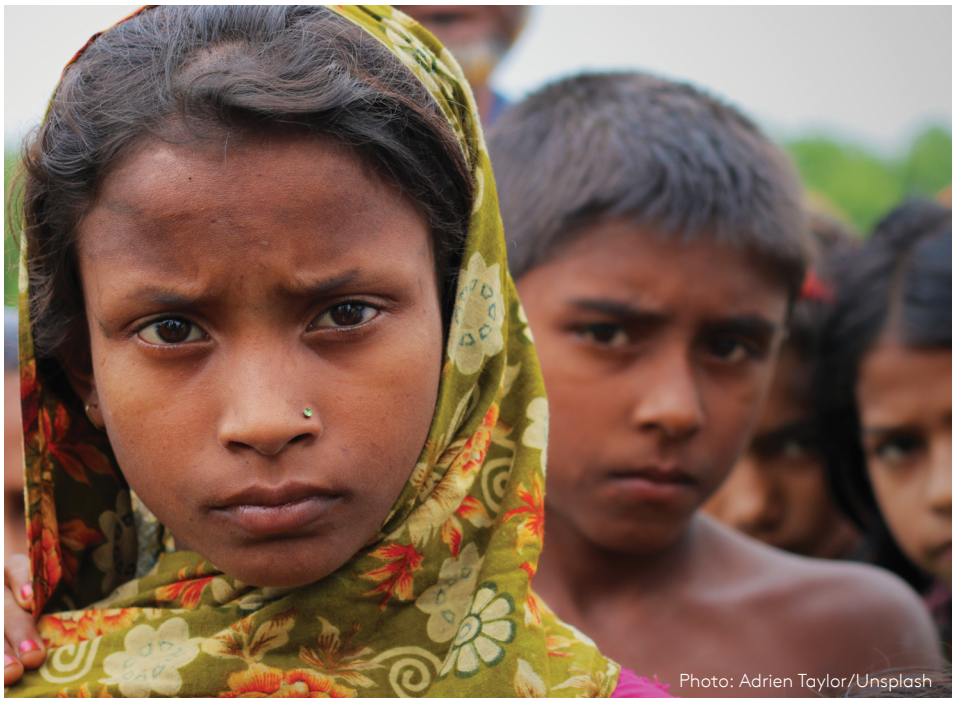

Photo: Adrien Taylor/Unsplash

"Because Bangladesh is one of the most climate-vulnerable countries in the world, understanding the links between climate change and health is essential for making the country climate-resilient."

1. Two previous policy briefs in this series examine the impacts of and responses to flooding and extreme heat in Bangladesh: see Letsch et al. (2003 a and b).

## How climate change is affecting human health in Bangladesh

Climate change is having, and will continue to have, repercussions on all sectors of Bangladesh's economy and in turn, the health of the population. The impact on individuals and households is likely to vary considerably across regions and between occupations, and is affected by sex, age and different levels of community vulnerability (Huque and Rabbani, 2012).

There are multiple pathways through which climate change affects human health in Bangladesh. Generally speaking, summers are becoming hotter and longer, the monsoon season is extending from February to October, and winters are also becoming warmer. With these changes, Bangladesh appears to be losing its distinct seasonal variations (Ahmad, 2023). The consequences of these changing temperatures and rainfall are likely to be affecting health through both direct and indirect pathways, as described in more detail below.

### Extreme weather – impacting physical and mental health

Since 2000, the number of extreme weather-related events including droughts, floods and cyclones affecting Bangladesh has increased by 46% (Mahmud et al., 2021). For example, there were 1.7 months of drought on average during 2012–2021, compared with the 1951–1960 average of just 0.3 months. Mental health issues and forced migration, with accompanying societal disruption, are also being linked to Bangladesh's extreme weather events (Patz et al., 2003; Takaro et al., 2013). Evidence shows that a 1°C increase in temperature increases the probability of reporting an anxiety disorder by 21%, while exposure to natural disasters such as flooding increases the likelihood of depression by 31%, anxiety by 69%, and co-presence of both these conditions by 87% (Wahid et al., 2023). Climate change-induced natural disasters also displace a substantial number of people in Bangladesh every year. More than seven million people were displaced by these events in 2022 alone, with the number expected to increase to 13 million per year by 2050 (World Bank, 2022).

### An increasing heat-related disease burden

The average annual temperature in the summer of 2021 was 0.49°C higher than the average in 1986–2005. Infants were exposed to 12 additional heatwave days each on average per year during 2012–2021. Heat-related health risks include increasing mortality from cardiovascular, cerebrovascular, and respiratory diseases such as asthma and chronic obstructive pulmonary disease (COPD), which are exacerbated by the interaction of heat and air pollution (see Box 1). This is likely to be leading to increasing respiratory illnesses and heat-related mortality. There was a 148% increase in heat-related mortality among those over 65 years old in Bangladesh between 2000–2004 and 2017–2021, an absolute change of 1,430 deaths during 2017–2021 due to heat exposure compared with 2000–2004, controlling for population size (Romanello et al., 2022). The share of population aged over 65 in Bangladesh is currently 6% (WDI, 2023) and is projected to increase to 11% by 2050. The exposure to climate change induced heat stress among this vulnerable population group will pose additional challenges to the public health system.

"Since 2000, the number of extreme weather-related events including droughts, floods and cyclones affecting Bangladesh has increased by 46%."

### Vector distribution and changing ecology

The effects of climate change are linked to changes in the vector ecology of infectious diseases. Bangladesh is one of the most flood-prone countries in the world. People living in coastal regions are particularly vulnerable to the impacts of flooding, facing an increase in water-borne diseases (Letsch et al., 2023a). In 2022, there was a particularly high incidence of dengue, a mosquito-borne viral disease, linked to unusually high rainfall in June coupled with high temperatures and humidity (Mahmud et al., 2021). The Dhaka region, where there has been an ongoing outbreak of dengue since 2019, was one of the most affected areas. Dengue is projected to worsen in the coming years as climatic conditions are become more suitable for reproduction of the Aedes genus of mosquito (Paul et al., 2021; Ministry of Health and Family Welfare, 2019).

### Compromised food and water security

Changes and disruption to ecological and biophysical systems are creating impacts through multiple pathways, including damage to coastal rice production areas, heightened reliance on groundwater for irrigation, shifts in seasonal cultivation and harvesting, and creating the necessity for increased pesticide usage (Wassmann et al., 2009; Rahman et al., 2019). Temperature and precipitation variability is projected to reduce total rice production in Bangladesh by an average of 7.4% over the period 2005–2050 (Yu et al., 2010). This may result in altered food production, food and water insecurity, and undernutrition. Flooding, droughts and changes in rainfall patterns are expected to negatively impact food, nutrition and livelihoods. Food insecurity is projected to increase by 7.4 percentage-points by 2041–2060 under a near catastrophic climate change scenario, compared with 2.5 percentage-points under a scenario where the Paris Agreement temperature targets are met.

"Temperature and precipitation variability is projected to reduce total rice production in Bangladesh by an average of 7.4% over the period 2005–2050."

**Box 1. Health impacts of air pollution in Bangladesh**

Bangladesh is consistently ranked as one of the worst countries for air pollution and the associated death rate is also among the highest. Air pollution is high in both rural and urban areas. It increases both morbidity and mortality from respiratory infections, lung cancer and cardiovascular disease – non-communicable diseases, which constitute 67% of all-cause deaths in Bangladesh (WHO, 2021). Major local sources of pollution are traditional cookstoves, brick kilns, rice parboiling units, solid waste open burning, and transport vehicles. Brick kilns contribute 20% of black carbon emissions in the country (Hasina, 2023), which are linked to cardiovascular, pulmonary and respiratory diseases and lung cancer. As warming and air pollution continue to increase in Bangladesh, their interaction effect will likely increase the adverse effects on health outcomes, especially cardiovascular and respiratory morbidity and mortality.

Between 2005 and 2018, 24,000 people in the Dhaka region alone were estimated to have died prematurely due to air pollution (Vohra et al., 2022). More broadly, at least five cities have levels of fine particulate matter ($PM_{2.5}$) that are above the WHO Air Quality Guideline (AQG) limit (i.e. 15 µg/$m^3$ over a 24-hour period).

Therefore, policies that are designed to mitigate climate change but that also contribute to reducing air pollution will also have a major positive impact on health in Bangladesh as a 'co-benefit'.

## Government policies to mitigate the negative impacts of climate change on health

### 1990s onwards

Not surprisingly, looking back a few decades to the 1990s, there is no explicit mention of climate change in policies such as the Health and Population Sector Program (HPSP), introduced to improve the quality and accessibility of health services; this programme had a focus on maternal and child health and family planning (Ahmed et al., 2015).

To improve health and nutritional outcomes in the country, Bangladesh has implemented a range of policies and programmes over the past two decades. The first National Health Policy was implemented in 2000 and mainly focuses on providing basic services through the Essential Service Package to reduce health costs. However, critics argue that comprehensive support for ill health, especially for chronic diseases, was absent from the policy. This may reduce population resilience to the increase in heat and heatwaves due to climate change. The Health, Population and Nutrition Sector Development Programme (HPNSP), introduced in the early 2000s, focuses on strengthening the health care system, improving health care quality, reducing maternal and child mortality rates, and expanding the coverage of essential health interventions (Sabina and Barkat, 2011; Ministry of Health and Family Welfare, 2019). The National Health Policy (NHP), developed in 2011, aims to improve the health of the population through the provision of universal health coverage, disease prevention and control, and health promotion. It focuses on strengthening the primary health care system and improving the quality of health care services (Haque and Murshid, 2020). The updated NHP in 2011 contains the first mention of the impacts of climate change on health. One of its primary goals is to ensure adequate tracking of disease patterns and the link between climate change and health outcomes.

The Seventh Five-Year Plan (2016–2020) was commissioned to develop policies and institutions that will enable Bangladesh to further accelerate job creation and reduce poverty. Part of its remit was to address the country's health challenges by improving the quality and accessibility of health care services, with a particular emphasis on maternal and child health, nutrition, and disease prevention and control. Specifically, the new five-year plan proposes to build capacity in the area of environmental health through both public and private sector health care providers.

"The updated National Health Policy in 2011 contains the first mention of the impacts of climate change on health."

### Initiatives that explicitly address climate change, air pollution and health

More recently, the Bangladesh government has introduced three key initiatives that explicitly address tackling climate change, air pollution and health.

First, to address the health and climate impacts of air pollution, Bangladesh implemented its National Action Plan on Short-Lived Climate Pollutants (SLCPs). This action plan aims to identify and implement the most cost-effective pathways of SLCP mitigation measures (see Annex 1 for a detailed discussion of relevant policies). Full deployment of this plan would yield a reduction in black carbon emissions by 40% in 2030 compared with a business-as-usual scenario and reduce methane emissions by 17%. From a health perspective, implementing the measures could reduce premature deaths associated with fine particulate matter ($PM_{2.5}$) by approximately 9,000 deaths by 2040 (Department of Environment, 2018); and more broadly, improve cardiovascular and respiratory health.

Second, the National Adaptation Plan (NAP) 2023–50 explicitly addresses the critical role of good health in building resilience to climate change. The goal of the NAP is "to create a nation that is resilient to the effects of climate change by implementing effective adaptation strategies that promote strong societies and ecosystems and encourage sustainable economic growth". This is stated with the aim of reducing the risks and vulnerabilities associated with climate change impacts (Ministry of Environment, 2022). The NAP addresses eight distinct sectors and 11 climatic stress areas.

Third, the Bangladesh Climate Change Trust Fund was established in 2010 to support programmes and initiatives aimed at reducing the country's vulnerability to climate change. It supports projects related to health, water resources, agriculture and disaster management.

Additionally, access and utilising international climate financing mechanisms such as the Green Climate Fund (GCF), the multilateral development banks (MDBs), Global Environment Facility (GEF), and Climate Investment Funds (CIF) will be essential to address the health impacts of climate change in Bangladesh. To increase the access to and utilisation of climate finance, Bangladesh needs to improve coordination among financial mechanisms and entities (e.g. Ministry of Finance and local government institutions), build capacity of both national and local-level agencies, decentralise the delivery of climate finance, and engage the private sector in climate change adaptation efforts.

## What is needed for Bangladesh to make further progress?

Climate change has been described as the greatest threat to human health this century. Given how vulnerable Bangladesh is to the impacts of climate change, a focus on health is particularly important. To some extent, the country has laid the groundwork. Since independence in 1971 the country has prioritised the health of its population and more recently the country has explicitly started to tackle the problem of air pollution.

"Implementing air pollution measures could reduce premature deaths associated with fine particulate matter ($PM_{2.5}$) in Bangladesh by approximately 9,000 deaths by 2040."

### More urban green infrastructure

Policies are needed across multiple sectors to boost the climate resilience of health systems and infrastructure in Bangladesh, and to promote health across the life course, and healthy environments. Currently, a lack of green spaces is a particular problem in Bangladeshi cities, which are characterised by a high urbanisation rate, high population density, and traffic congestion. Urban green space is more present in smaller cities such as Bogra and Tangail but less evident in the bigger cities such as Dhaka (pictured below) and Khulna. Green infrastructure will play a key role in adapting to the threat of more extreme heatwaves in Bangladesh cities. The NAP 2023–2050 has proposed green infrastructure and nature-based solutions for smart city development and adaptation to climate change. However, many of these proposed ideas are in their infancy and few projects have been planned so far. Therefore, more emphasis needs to be placed on developing these ideas into sustainable solutions (see Annex 1).

"Green infrastructure will play a key role in adapting to the threat of more extreme heatwaves in Bangladesh cities."

### Reducing pollution and the toll on workers

The local health co-benefits of reducing emissions in terms of cardiovascular and respiratory diseases along with air pollution-heat related morbidity and mortality are significant. Specific actions needed to reduce pollution in Bangladesh include implementing and enforcing industrial emission standards, and ensuring that emission-reducing technology is used in brick kilns and the transport sector. Labour protection policies and regulations, especially for outdoor workers, can ensure adequate protection of workers from heat stress and contribute to a just transition to a low-carbon economy (Letsch et al., 2023b).

Photo: Andy Bridge/Unsplash

### Multi-sectoral approach

As we have seen, climate change will have critical public health implications for Bangladesh through both direct and indirect pathways, in addition to being influenced by different socioeconomic mediating factors. Measures to respond to the climate change-induced health crisis needs to be multi-sectoral. Some of these measures include improving public health service delivery platforms to deal with the health effects of heat stress and air pollution, with a focus on vulnerable groups such as the elderly and children. Strengthening health systems will also help to preempt and mitigate outbreaks of infectious and other emerging or reemerging climate-sensitive diseases. Such policies would include early warning systems, and surveillance systems to track climate-sensitive diseases. Bangladesh needs to invest in climate-driven early warning systems to provide advance warnings of increased outbreak risk to deploy interventions and resources that can mitigate the impact of such outbreaks (Rocklöv et al., 2023).

Improving the resilience of health systems including provision of universal health coverage is also key to mitigate the impacts of climate change impacts on health. Currently, 2.5% of the population have health insurance. The Bangladesh government has set a goal of achieving universal health coverage (UHC) by 2032. However, there is currently limited fiscal space for implementing UHC in Bangladesh.

Climate change is already negatively affecting food and nutritional security (Dasgupta and Robinson, 2022), which in turn increases the risk of infectious and cardiovascular diseases among adults, and stunting and wasting among children (ibid., 2023). For Bangladesh, targeting food insecurity hotspots, in parallel with ensuring people have access to clean water and sanitation, can improve food security and nutrition. Support measures for the agricultural sector to ensure adequate nutrition through initiatives such as climate-smart agriculture, crop diversification, and social safety nets are required.

## Annex – references and overview of policies

The in-text citations within this brief are hyperlinked. For a separate, downloadable list of the cited references and a four-page overview of existing health response policies and plans in Bangladesh, please visit: www.lse.ac.uk/granthaminstitute/publication/impacts-of-climate-change-on-health-in-Bangladesh/

**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**

Lauren O'Leary is an Economist at the Centre for Economics and Business Research (Cebr). 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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