HEATWAVE IN BANGLADESH IN 2025

Impacts on Livelihoods, Economy, Health, Agriculture and Other Sectors

Special Focus on Khulna and Southwestern Bangladesh

Research conducted by

An Organization for Socio-Economic Development (AOSED)

in collaboration with

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Important evidence note

This report is a desk-based synthesis. Meteorological descriptions of 2025 are based primarily on official BMD records. Because no consolidated official database was identified for 2025 heat-related mortality, morbidity, lost work hours, crop damage, fisheries losses or district-level economic costs, recent 2024 studies are used only as regional or national benchmarks. They are not presented as verified 2025 loss estimates.

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The report also recognizes the lived experience of farmers, fishers, rickshaw and van pullers, construction workers, street vendors, women engaged in unpaid care and water collection, children, older people and low-income residents who face the most immediate consequences of rising heat.

Executive Summary

Bangladesh experienced repeated episodes of abnormal and hazardous heat during 2025. The most acute period occurred in early to mid-May, when Chuadanga reached 42.0°C on 10 May. By 12 May, severe heatwave conditions were reported in Khulna, Chuadanga, Meherpur and Jashore, while much of the remainder of Khulna Division was under mild to moderate heatwave conditions. Official station data included 41.8°C in Chuadanga, 40.2°C in Jashore, 40.0°C in Khulna, 39.5°C in Satkhira and Koyra, and 39.1°C in Mongla (BMD, 2025a; BMD, 2025b).

The 2025 season was not a single uninterrupted event. Heat appeared in western Bangladesh from March, intensified rapidly in May, and returned in June and the monsoon period. This recurrence is important because repeated heat episodes produce cumulative harm. Workers lose multiple days or hours of income, households spend more on water and healthcare, crops and ponds have less time to recover, and high nighttime temperatures reduce physical recovery.

Khulna and the wider southwest face a distinctive compound risk. Inland western districts such as Chuadanga, Jashore, Meherpur, Jhenaidah and Kushtia are frequently exposed to hot and dry continental airflow and long rain-free periods. Coastal districts including Khulna, Satkhira and Bagerhat combine heat with salinity, freshwater scarcity, shallow ponds, fragile aquaculture systems and climate-sensitive livelihoods. Khulna City also faces an intensifying urban heat island. A 2025 study found that mean land surface temperature increased by about 7°C between 1993 and 2023, built-up land expanded roughly threefold, vegetation declined by nearly half, and 23.7 percent of the study area was classified as an excessive heat zone (Suborna et al., 2025).

Direct 2025 reporting documented slowed public movement, deserted roads during peak afternoon heat, reduced outdoor work, suspected heat-related death, increased demand for drinks and cooling, and rising household expenditure. A farmer in Chuadanga died after collapsing during the 10 May heatwave, with a hospital physician identifying suspected heatstroke. These reports are important but do not substitute for systematic health surveillance (Prothom Alo/UNB, 2025).

A precise 2025 economic loss figure cannot be responsibly calculated from the publicly available evidence. However, recent benchmark studies show the scale of risk. The World Bank estimated that heat-related physical and mental health conditions caused 250 million lost workdays and up to US$1.78 billion in economic losses in Bangladesh during 2024, equivalent to about 0.4 percent of GDP. A rapid assessment in Chuadanga, Kushtia, Jhenaidah and Meherpur found average daily income losses of BDT 234 among marginal workers when working time fell from about nine hours to six hours. That assessment also documented higher irrigation costs, lower crop yields, fisheries and livestock disruption, and water scarcity. These are 2024 findings used as vulnerability benchmarks, not 2025 loss totals (World Bank, 2025; WAVE Foundation, 2025).

The evidence supports a clear conclusion: extreme heat in Bangladesh is no longer a temporary weather inconvenience. It is a multisector development risk affecting labour productivity, health, food systems, water security, education, energy demand, urban planning, gender equality, household debt and poverty reduction. For Khulna and the southwest, heat must be addressed alongside salinity, water scarcity, urbanization and livelihood insecurity.

KEY FIGURES

42.0°C Chuadanga peak, 10 May 2025	**40.0°C** Khulna station, 12 May bulletin	**44 days** Extra extreme-heat days attributed to climate change, May 2024-May 2025	**250 million** Lost workdays in 2024 national benchmark
US$1.78 bn 2024 national economic benchmark	**BDT 234/day** Average income loss in 2024 southwest benchmark	**+7°C LST** Khulna mean land-surface temperature change, 1993-2023	**23.7%** Khulna study area in excessive heat zone

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Acronyms and Abbreviations

Acronym	Meaning
AOSED	An Organization for Socio-Economic Development
BMD	Bangladesh Meteorological Department
CJF	Climate Justice Forum
DAE	Department of Agricultural Extension
DGHS	Directorate General of Health Services
HAP	Heat Action Plan
HI	Heat Index
ILO	International Labour Organization
LST	Land Surface Temperature
NbS	Nature-based Solutions
OSH	Occupational Safety and Health
ORS	Oral Rehydration Salts
UHI	Urban Heat Island
WASH	Water, Sanitation and Hygiene
WBGT	Wet Bulb Globe Temperature
WHO	World Health Organization

1. Introduction

Bangladesh has historically organized disaster preparedness around cyclones, floods, storm surges, river erosion and drought. Extreme heat has received less institutional attention because its impacts are diffuse, often delayed and difficult to count. A cyclone can destroy a house in minutes. Heat can reduce work capacity, worsen illness, lower crop quality, increase irrigation costs and drain household savings without leaving a single visible damage line.

This invisibility does not make heat less serious. Heat is simultaneously a meteorological hazard, a public-health emergency, an occupational risk, a food-system shock and an inequality multiplier. It affects people through direct exposure and through the systems on which they depend: water, electricity, transport, healthcare, agriculture, fisheries and livestock.

The 2025 heat season is especially relevant because it followed the record-breaking national heat emergency of 2024. While 2025 was not identical in duration or spatial coverage, it confirmed that severe heat has become recurrent. Western and southwestern districts again emerged as hotspots, and heat returned after temporary relief from rainfall.

1.1 Purpose of the report

- Document the main features of the 2025 heatwave season in Bangladesh.

- Assess impacts on livelihoods, economy, health, agriculture, fisheries, livestock, water, energy, education and other relevant sectors.
- Examine why Khulna and southwestern Bangladesh face elevated and compound heat risk.
- Distinguish verified 2025 evidence from earlier benchmark data and long-term structural analysis.
- Recommend practical actions for government, local authorities, employers, civil society, communities and development partners.

1.2 Geographic scope

The report focuses on Khulna Division and the wider southwestern heat-risk belt. It gives particular attention to Khulna, Chuadanga, Jashore, Satkhira, Meherpur, Jhenaidah, Kushtia, Bagerhat, Mongla and Koyra. The geography includes inland agricultural districts, major urban and industrial centres, port-related labour markets, coastal aquaculture zones and salinity-affected communities.

1.3 Definition and classification

BMD classifies a heatwave using observed maximum air temperature. The classification used in 2025 bulletins is shown below. The categories are useful for weather communication, but they do not capture every dimension of human heat stress. Humidity, direct solar radiation, wind, workload, clothing, housing materials and nighttime temperature all influence physiological risk.

BMD category	Maximum air temperature
Mild	36.0°C to 37.9°C
Moderate	38.0°C to 39.9°C
Severe	40.0°C to 41.9°C
Very severe	42.0°C or higher

Why the air-temperature threshold is not enough

A worker in direct sunlight can experience dangerous heat stress even when the official maximum temperature remains below 40°C. For occupational decisions, BMD temperature categories should be supplemented by humidity-aware indices such as the Heat Index or WBGT, together with workload and exposure duration.

2. Methodology and Evidence Limitations

The report applied a structured desk-review approach. Sources were selected based on authority, relevance to 2025, geographic relevance to the southwest, transparency of methods and capacity to explain sectoral pathways.

Evidence tier	Principal sources	How used
Tier 1: Direct 2025 evidence	BMD daily bulletins, monthly outlooks and climate summaries; 2025 reporting of observed impacts	To establish timing, intensity, location and directly reported disruption
Tier 2: Recent benchmark evidence	World Bank national analysis; WAVE Foundation southwest rapid assessment; Concern Worldwide assessment	To quantify plausible health, productivity, income and sectoral pathways, clearly identified as 2024 or multi-year benchmarks
Tier 3: Structural and policy evidence	Peer-reviewed Khulna urban heat research; ILO, WHO, UNICEF and local policy briefs	To explain long-term drivers, vulnerable groups and intervention options

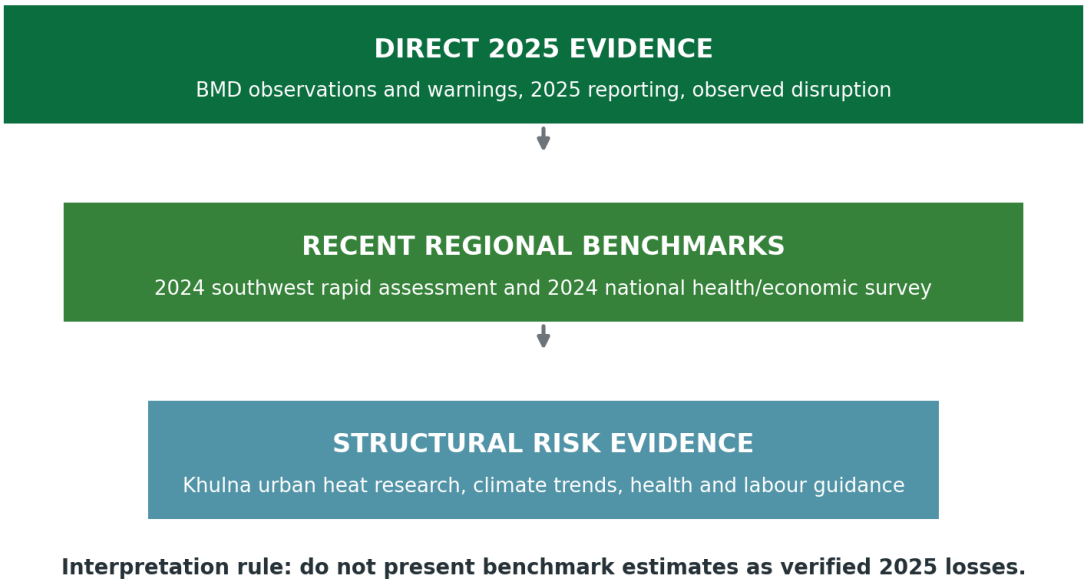

Figure 1. Evidence hierarchy used in this report.

2.1 Limitations

- No consolidated official dataset was identified for 2025 heat-related deaths, illnesses, hospitalizations or excess mortality.
- No comprehensive district-level estimate was identified for 2025 work hours lost, crop damage, aquaculture loss, livestock loss, water cost or energy disruption.
- Media reports provide timely observations but are not representative surveys.
- Land surface temperature from satellite analysis is not the same as near-surface air temperature measured by meteorological stations.
- Attributing a specific illness, death or crop loss to heat requires clinical, epidemiological or agronomic assessment that was not available for every reported incident.
- The report therefore avoids producing a single speculative monetary estimate for the 2025 heatwave.

3. Meteorological Overview of the 2025 Heatwave Season

The 2025 heat season developed in pulses. Mild heat appeared in western and southwestern Bangladesh from March. Conditions intensified sharply from 7 May, peaked around 10-12 May, and recurred in June. BMD monthly outlooks also anticipated mild heatwave episodes during the monsoon period.

3.1 Early-season heat

Western districts began experiencing heatwave conditions in March 2025. Contemporary reporting recorded a national high of 39.8°C in Chuadanga on 28 March. Early-season heat extends cumulative exposure and can affect land preparation, irrigation, fruit development and the capacity of workers to acclimatize safely.

3.2 Rapid escalation in May

The early May episode intensified unusually quickly in Chuadanga. BSS reported maximum temperatures of 36.8°C on 7 May, 39.7°C on 8 May, 41.2°C on 9 May and 42.0°C on 10 May. Relative humidity at the time of the 42.0°C observation was reported at 23 percent. Roads became largely deserted during peak hours and some asphalt surfaces softened under the heat (BSS, 2025).

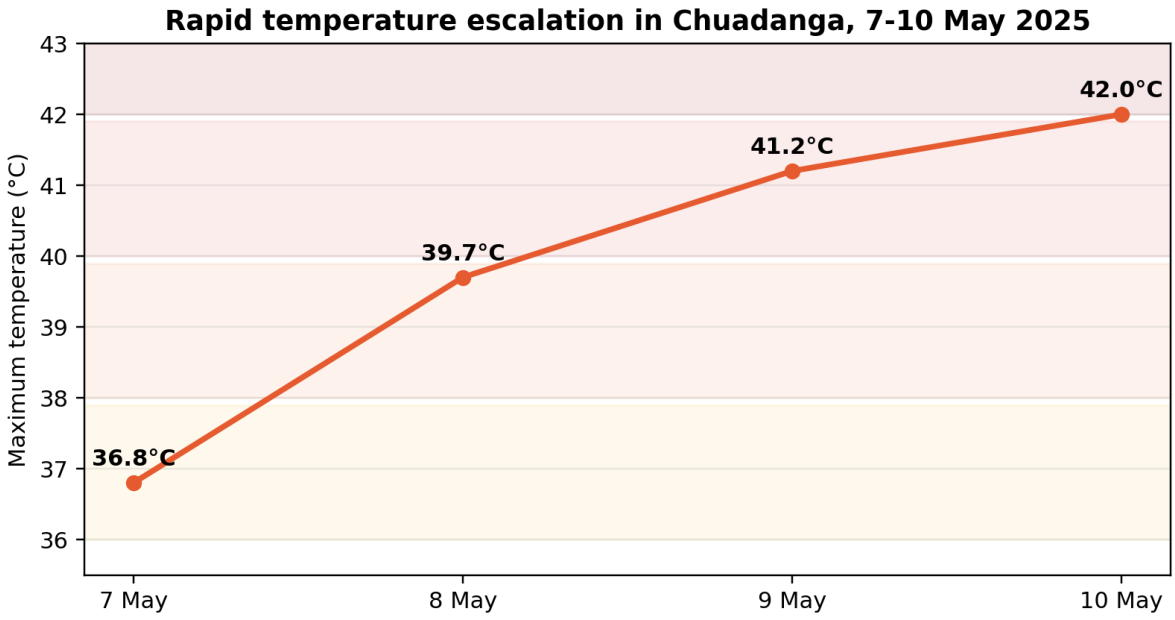

Figure 2. Chuadanga maximum temperature progression, 7-10 May 2025. Source: BSS reporting based on the local meteorological office.

3.3 Severe conditions across the southwest

The BMD bulletin dated 12 May stated that severe heatwave conditions were sweeping Khulna, Chuadanga, Meherpur and Jashore, alongside several western districts. Mild to moderate heatwave conditions affected the rest of Khulna Division and broad areas of the country. The same bulletin showed severe station temperatures in Chuadanga, Jashore and Khulna, with high moderate heat in Satkhira, Koyra and Mongla (BMD, 2025a).

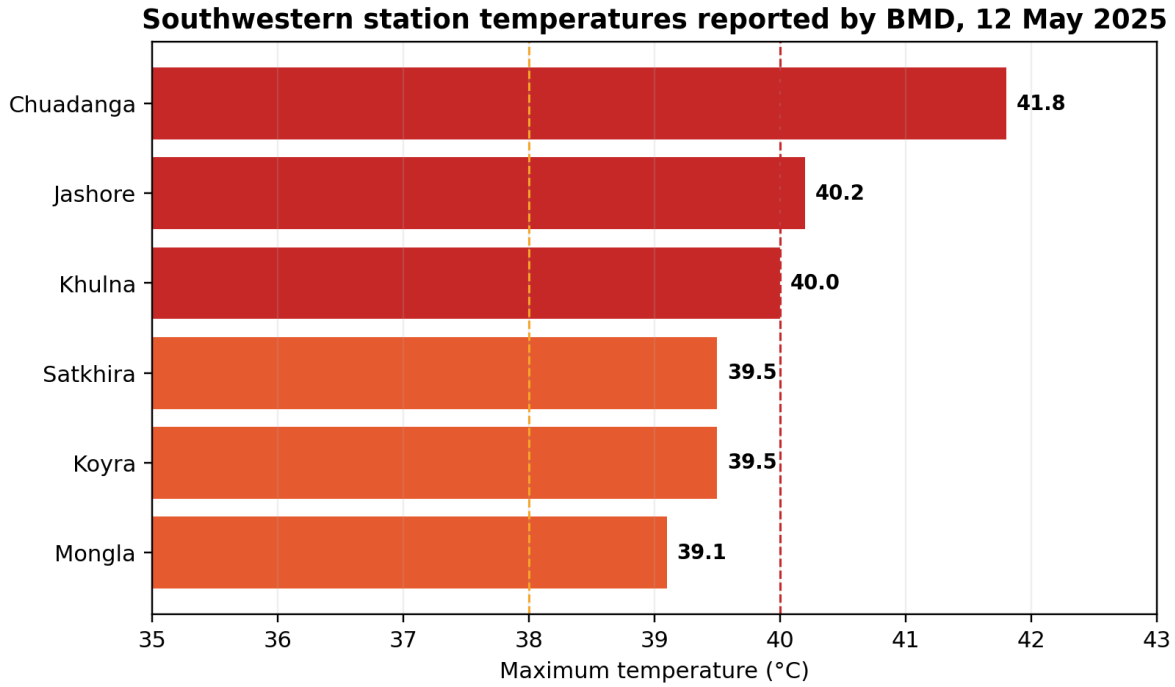

Figure 3. Maximum temperatures at selected southwestern stations in the BMD bulletin dated 12 May 2025.

3.4 Nighttime heat and incomplete recovery

The 12 May BMD table also showed high minimum temperatures in parts of the southwest, including about 28.8°C in Khulna, 28.5°C in Mongla, 29.5°C in Satkhira and 29.0°C in Koyra. Warm nights reduce the body's

opportunity to recover. They are especially difficult for people living in crowded, poorly ventilated or tin-roofed housing, and for workers returning to strenuous activity the following morning.

3.5 Recurrence in June and July

Heat did not end with the May peak. BMD reported a mild heatwave across Khulna Division on 2 June, light to moderate heat on 3 June, and continuing mild heat on 7-8 June. The July monthly outlook indicated that one or two mild heatwaves could occur in parts of Bangladesh, with day and night temperatures likely to remain above normal. Recurrence increases cumulative health, livelihood and production losses even when each individual episode is shorter than the 2024 national emergency.

3.6 Climate-change contribution

A global attribution assessment by World Weather Attribution, the Red Cross Red Crescent Climate Centre and Climate Central examined the period from May 2024 to May 2025. Bangladesh was reported to have experienced 94 days of unusually high temperature during that period, including 44 additional extreme-heat days attributable to human-caused climate change. The metric is based on temperatures above the local 90th percentile and is not identical to the BMD heatwave definition, but it demonstrates that climate change is substantially increasing exposure (Climate Central et al., 2025; TBS, 2025b).

Period	Observed or forecast condition	Southwest relevance
March 2025	Mild to moderate heat begins in western districts; Chuadanga reaches 39.8°C on 28 March	Early onset and cumulative exposure
7 May	Mild heatwave over Khulna Division; temperatures forecast to rise	Beginning of rapid escalation
9 May	Chuadanga reaches 41.2°C; 72-hour warning of possible severe heat	Severe risk emerging
10 May	Chuadanga records 42.0°C	Very severe threshold reached
11-12 May	Severe heatwave in Khulna, Chuadanga, Meherpur and Jashore	Regional peak
2-8 June	Mild to moderate heat repeatedly reported over Khulna Division	Recurrence after temporary relief
July outlook	One or two mild heatwaves possible; above-normal temperatures anticipated	Monsoon-season heat risk

4. Why Khulna and Southwestern Bangladesh Face Elevated Risk

The southwest is not uniformly hot, and different districts face different forms of vulnerability. The region's risk emerges from the interaction of meteorology, urban growth, land use, water and salinity, livelihood patterns, housing and unequal access to cooling.

4.1 Western exposure and dry continental airflow

Inland western districts lie close to the Indian border and often receive hot westerly or northwesterly air before it spreads eastward. During dry intervals, limited cloud cover, low soil moisture and sparse vegetation intensify sensible heating. Chuadanga and Jashore therefore frequently register among the country's highest temperatures.

4.2 Urban heat island in Khulna

Urban surfaces absorb and retain solar energy. Concrete, asphalt, metal roofs, traffic, reduced tree cover and declining water bodies raise local surface temperature and delay nighttime cooling. Suborna et al. (2025) found that Khulna's built-up land expanded approximately threefold from 1993 to 2023, vegetation cover declined by nearly 50 percent, mean land surface temperature rose by about 7°C, and 23.7 percent of the study area was classified as excessive heat. The study forecast 29 days above 36°C over the following five years.

Interpretation caution

Land surface temperature measures the temperature of the ground or built surface observed by satellite. It should not be equated directly with the air temperature reported by BMD. It is nevertheless a strong indicator of urban heat storage, land-cover change and neighbourhood-level exposure.

4.3 Salinity, freshwater scarcity and coastal heat

Satkhira, Koyra, Mongla and other coastal areas often face dry-season salinity and limited freshwater supply. Heat raises drinking-water demand and evaporation while lower water levels can concentrate salinity in ponds and canals. Households may have to travel farther or purchase water at the same time that outdoor movement becomes more dangerous.

4.4 Heat-trapping housing and settlement form

Corrugated metal roofs, low ceilings, limited cross-ventilation and dense settlement can make indoor conditions hotter than the outdoor shade temperature. Tenants and low-income residents often cannot modify roofs or install insulation. Electricity interruptions make fans and pumps unreliable. Warm nights extend exposure into sleeping hours.

4.5 Livelihood exposure

The regional economy depends heavily on agriculture, transport, construction, fisheries, aquaculture, livestock, port-related work, street trade and other outdoor or semi-outdoor occupations. Many workers are paid by the hour, trip or task. They must choose between income and safety, a choice that makes generic advice to "stay indoors" impractical.

Area	Indicative heat exposure	Major sensitivity factors	Priority concerns
Chuadanga	Very high	Frequent peak temperatures, dry spells, agriculture, daily labour	Heat illness, work loss, irrigation and crop stress
Jashore	Very high	High observed temperatures, urban expansion, transport and agriculture	Worker safety, urban cooling, crop and poultry protection
Khulna City	High and rising	Urban heat island, dense built environment, low-income settlements, industry	Nighttime heat, energy demand, health and informal labour
Satkhira and Koyra	High compound risk	Heat plus salinity, drinking-water stress, aquaculture dependence	Safe water, fish/shrimp systems, women's water burden
Mongla and Bagerhat	High compound risk	Port and outdoor labour, coastal water stress, fisheries	Worker protection, water, transport and ecosystem stress
Meherpur, Jhenaidah and Kushtia	High	Agriculture, livestock, dry-season water pressure	Irrigation, fodder, livestock heat stress and income loss

Note: The matrix is an analytical synthesis for planning. It is not an official district ranking.

5. How Extreme Heat Produces Multisector Loss

Heat impacts rarely remain within one sector. A worker who becomes ill loses income, spends money on treatment and may reduce food purchases. A farmer facing higher irrigation costs may borrow, cut inputs or sell assets. A fish farmer who loses stock may be unable to repay credit. A water shortage can worsen illness and reduce livestock or crop production. These linked effects create a downward resilience spiral.

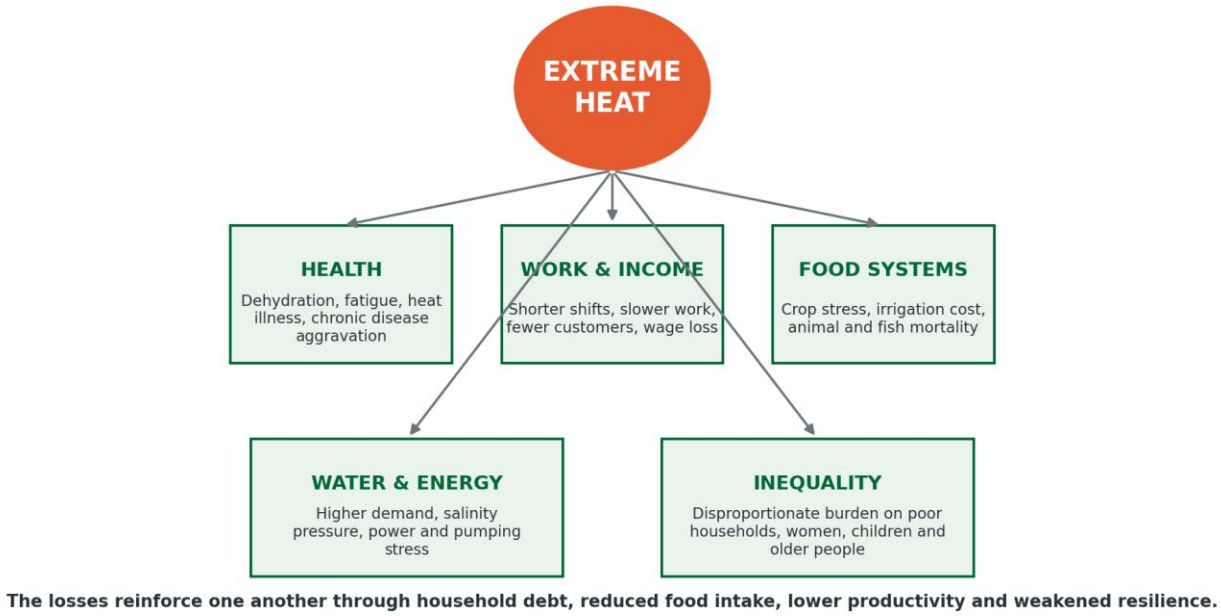

Figure 4. Principal pathways through which extreme heat affects households and local economies.

6. Impacts on Livelihoods and Employment

Livelihood impacts are among the most immediate and least systematically recorded consequences of heat. Outdoor workers reduce pace, take longer breaks, avoid midday work or stop altogether. At the same time, customers and passengers stay indoors, reducing demand for transport, vending and market services.

6.1 Daily wage and informal workers

Reporting from Chuadanga on 10 May described deserted roads, sharply reduced outdoor activity and workers taking shelter. Many day labourers refrained from working. Such observations are consistent with the WAVE Foundation's 2024 assessment in Chuadanga, Kushtia, Jhenaidah and Meherpur, where average working time among 545 marginalized workers fell from about nine hours to six hours and average daily income declined by BDT 234. This amount is a 2024 benchmark, but it illustrates how quickly heat can translate into lost household income (WAVE Foundation, 2025).

6.2 Transport workers and mobility

Rickshaw pullers, van drivers, easy-bike operators, loaders and port workers experience direct sun, radiant heat from roads and vehicles, and limited access to water or shade. Reduced passenger movement compounds the physical burden. Transport workers may need longer recovery after each trip while earning less per day.

6.3 Street vendors and small businesses

The effects vary by business. Vendors of cold drinks, green coconut water, ice cream and juice may experience temporary demand increases, as reported in Chuadanga. Other street vendors lose customers, face spoilage and cannot remain in direct sun. Food sellers incur additional ice, refrigeration and water costs. Markets may shift activity to early morning and evening, reducing total trading time.

6.4 Unpaid and home-based work

Women's unpaid work often intensifies during heatwaves. Cooking in poorly ventilated spaces, collecting additional water, caring for sick children or older relatives, maintaining livestock and preserving food all increase exposure and time burden. Home-based producers may lose output if electricity, water or indoor thermal conditions become unreliable.

6.5 Household coping and longer-term effects

- Borrowing for food, medicine, electricity or water.
- Reducing meal size or dietary diversity.
- Postponing healthcare or school-related expenditure.
- Selling livestock, equipment or other productive assets.
- Taking high-interest loans or advances from employers and traders.
- Migrating temporarily or changing occupation.
- Increasing child or adolescent involvement in household income generation.

Concern Worldwide's assessment found that heat-affected households commonly adopted food-related coping strategies, including borrowing food and reducing meal portions. The survey was not specific to the southwest, but the mechanisms are directly relevant to poor households facing repeated income interruption (Concern Worldwide, 2025).

7. Economic and Productivity Impacts

The economic cost of heat is distributed across workers, households, businesses and public systems. It includes visible costs such as healthcare and irrigation, and less visible losses such as slower work, reduced cognitive performance, lower product quality, missed school, unpaid care and premature asset depreciation.

7.1 National benchmark

The World Bank's 2025 report analyzed temperature and humidity trends from 1976 to 2023 and a two-round 2024 survey of more than 16,000 people. It estimated that heat-related physical and mental health conditions caused approximately 250 million lost workdays in 2024 and economic losses of up to US$1.78 billion, equivalent to around 0.4 percent of GDP. The study also found that Bangladesh's maximum temperature rose by 1.1°C since 1980, while the "feels-like" temperature increased by 4.5°C (World Bank, 2025).

Use of the benchmark

The World Bank figures describe 2024 national impacts. They demonstrate the scale of heat-related economic exposure but should not be cited as the economic loss from the 2025 heatwave.

7.2 Main economic transmission channels

Channel	Examples in the southwest	Economic consequence
Labour productivity	Shorter shifts, more rest, reduced physical pace	Lower output, wages and enterprise revenue

Channel	Examples in the southwest	Economic consequence
Healthcare	Consultation, medicine, ORS, transport, hospitalization	Out-of-pocket expenditure and debt
Agriculture	Extra irrigation, crop stress, labour shortage	Higher cost and lower farm margin
Aquaculture	Aeration, pumping, emergency harvesting, mortality	Stock loss and loan-repayment difficulty
Livestock and poultry	Cooling, water, feed, mortality, lower milk or egg output	Higher unit cost and reduced sales
Energy	Fans, cooling, pumping, refrigeration, backup power	Higher household and business bills
Transport and markets	Fewer passengers, altered hours, spoilage	Reduced daily turnover
Infrastructure	Road softening, equipment strain, water-system stress	Maintenance and service-disruption cost

7.3 Household cost of living

Heat raises daily expenses even for households that do not lose income. Electricity use increases as fans, refrigeration and pumps operate longer. Families buy more drinking water, oral rehydration products, cold drinks and medicines. Some switch to higher-cost air-conditioned transport. Food spoilage and agricultural production costs can also contribute to price pressure. Reporting in July 2025 documented rising electricity, transport, health and food-preservation costs among households, though the examples were not limited to the southwest (Prothom Alo, 2025b).

7.4 Why a 2025 loss total is unavailable

A credible 2025 estimate would require a counterfactual analysis comparing actual output and costs with expected conditions without the heatwave. It would also require district-level data on employment, hours lost, health utilization, crop stages, livestock production, pond mortality, water purchases, energy demand and infrastructure disruption. These data are not currently integrated. Any precise single number would therefore create false confidence.

8. Public Health Impacts

Extreme heat affects health through direct thermal stress, aggravation of existing disease, dehydration and water-related illness, sleep disruption, mental stress and reduced access to care. The risk is determined not only by temperature but also by exposure, humidity, workload, age, health status, housing and access to water and cooling.

8.1 Direct heat illness

Direct conditions include heat rash, cramps, dehydration, dizziness, fainting, heat exhaustion and heatstroke. Heatstroke is a medical emergency. On 10 May 2025, a 45-year-old farmer in Chuadanga died after collapsing during severe heat. A physician at Chuadanga Sadar Hospital stated that the symptoms suggested heatstroke, but the case was reported as suspected rather than laboratory- or post-mortem-confirmed heat death (Prothom Alo/UNB, 2025).

8.2 Aggravation of chronic disease

Heat increases cardiovascular strain, fluid loss and respiratory stress. It can worsen kidney disease, diabetes, hypertension, asthma and other chronic conditions. The World Bank found higher summer prevalence of diarrhoea, persistent cough, respiratory problems and fatigue, and measurable associations between heat and depression and anxiety. Women and older people were especially vulnerable in the national survey (World Bank, 2025).

8.3 Children, pregnancy and older people

Infants and young children become dehydrated quickly and depend on caregivers to maintain hydration and cooling. Pregnant women face additional physiological strain. Older people may have reduced thirst response, limited mobility or chronic disease. UNICEF has emphasized hydration, cooler spaces, avoidance of midday exposure, rapid first aid and urgent referral for severe symptoms. These recommendations remain relevant even though UNICEF's major national statement was issued during the 2024 emergency (UNICEF, 2024).

8.4 Health expenditure and service pressure

Heat-related illness can create substantial out-of-pocket expenditure. Concern Worldwide's 2025 assessment reported average hospitalization spending of about BDT 4,446 among surveyed heat-affected households, with wide variation. Climate Home News also documented increased patient loads and household treatment costs during the 2025 hot season. These reports indicate health-system and household pressure, but they do not constitute a national heat-attributable case count (Concern Worldwide, 2025; Climate Home News, 2025).

8.5 Mental health, sleep and cognitive performance

Warm nights disrupt sleep, concentration and emotional regulation. Anxiety can increase when households cannot cool their homes, pay electricity bills or protect children and older relatives. Workers who sleep poorly are more prone to accidents and lower productivity the next day. Students may struggle to concentrate in hot classrooms or during travel.

8.6 Health surveillance gaps

- Heat illness is not consistently coded and reported as a distinct surveillance category.
- Occupation, exposure location and housing conditions are rarely captured in routine clinical data.
- Suspected heat deaths may be attributed to cardiovascular, renal or other immediate causes.
- District-level data are not routinely linked with BMD observations.
- Excess-mortality analysis is not publicly available in near real time.
- Community clinics and upazila facilities may lack dedicated cooling areas, backup power or trained triage systems.

9. Agriculture and Food Security

Agriculture is affected through both crop physiology and labour exposure. Heat accelerates soil-moisture loss, increases evapotranspiration, impairs pollination and grain formation, causes flower and fruit drop, increases pest pressure and reduces the number of safe working hours. The outcome depends on crop type, growth stage, irrigation access, humidity and duration.

9.1 Rice and irrigation

Boro rice is harvested during the pre-monsoon hot season. Heat can increase irrigation demand and raise fuel or electricity costs. If heat coincides with flowering or grain filling, yield and grain quality may decline. Harvesting labour may also become scarce during dangerous afternoon temperatures.

In its 2024 southwest assessment, WAVE Foundation estimated additional Boro irrigation costs of roughly BDT 2,500 per bigha and average yield reductions of about 80 kilograms per bigha across the study context. These figures are not 2025 estimates, but they indicate the sensitivity of irrigated rice to heat and water stress.

9.2 Fruit, vegetables and high-value crops

Mango, lychee, dragon fruit, vegetables and nursery plants can suffer sun scorch, blossom loss, premature fruit drop and reduced market quality. Heat during transport accelerates spoilage. Southwestern farmers also face the risk that heat is followed by intense rain or storms, creating a sequence of moisture stress and physical damage.

9.3 Agricultural labour and occupational safety

Agricultural workers often perform strenuous tasks with limited shade. The WAVE assessment found that field work fell from six to eight hours to about four to five hours during extreme heat. Reduced labour supply can delay irrigation, weeding and harvesting and increase wage rates for farm owners. Workers who continue without adequate rest or water face acute health risk.

9.4 Food security and nutrition

Heat affects food security through four pathways: lower production, higher production cost, income loss and food-price transmission. Poor households can face reduced access even when markets remain supplied. Concern Worldwide's survey found substantial reports of crop-yield reduction, crop loss and quality deterioration among rural respondents, while uptake of heat-tolerant crops and adjusted planting dates remained limited.

9.5 Adaptation priorities for crops

- Heat-sensitive crop-stage advisories linked to BMD forecasts.
- Early-morning or evening irrigation to reduce evaporative loss.
- Mulching, organic matter and soil-moisture conservation.
- Heat- and drought-tolerant varieties supported by local trials.
- Shade nets and protective management for nurseries and high-value crops.
- Adjusted planting and harvesting calendars.
- Mechanization and staggered work shifts to reduce labour exposure.
- Forecast-triggered input grants or concessional finance for small farmers.

10. Fisheries and Aquaculture

Aquaculture is central to the southwestern economy. Fish and shrimp systems are highly sensitive to water temperature, depth, dissolved oxygen, salinity, stocking density and disease. Shallow ponds and ghers heat quickly, particularly where water exchange is limited.

10.1 Biophysical pathways

- Warmer water holds less dissolved oxygen while fish oxygen demand may rise.
- Evaporation lowers pond depth and can concentrate salinity and pollutants.
- Fish may eat less, grow slowly or become more susceptible to disease.
- Early-morning oxygen depletion can cause sudden mortality.
- Breeding, egg incubation and seed quality may be disrupted.
- Farmers may be forced into emergency or premature harvesting at lower prices.

10.2 Evidence from the southwest benchmark

The WAVE Foundation's 2024 assessment reported reduced pond levels, water-quality deterioration, breeding disruption and premature harvesting in Chuadanga, Kushtia, Jhenaidah and Meherpur. The study estimated a production shortfall of about 32,148 tonnes and financial losses around BDT 6.43 billion in its assessed geography. Because the estimate relates to 2024 and depends on the study's method, it should not be transferred directly to 2025.

10.3 Coastal aquaculture and salinity

In Satkhira, Koyra and Bagerhat, adding freshwater during extreme heat may not be feasible because surrounding sources are saline or scarce. Pumping, aeration and water exchange require energy and capital that small producers may lack. The combination of heat, salinity and power interruptions creates a compound production risk.

10.4 Priority farm actions

- Monitor water temperature and dissolved oxygen, especially before sunrise.
- Maintain adequate water depth and reduce organic loading.
- Use aeration or emergency pumping where technically and financially feasible.
- Feed during cooler hours and avoid overfeeding during heat stress.
- Review stocking density before the hottest months.
- Develop emergency harvest, market and cold-chain plans.
- Provide tailored advisories for freshwater, brackish-water and shrimp systems.

11. Livestock and Poultry

Animals experience heat stress when metabolic and environmental heat exceeds their capacity to cool. Symptoms include panting, reduced feed intake, greater water demand, lower fertility, slower weight gain and lower milk or egg production. Poultry can suffer rapid mortality in dense, poorly ventilated sheds.

11.1 Regional vulnerabilities

Small farms often use corrugated metal sheds with limited ventilation and no backup cooling. Water shortages, power interruptions, high stocking density and reduced green fodder worsen exposure. The WAVE assessment documented fodder scarcity, higher feed cost, reproductive disruption, disease, delayed cattle weight gain and reported milk-production reduction during the 2024 heat emergency.

11.2 Poultry sector

Heat reduces feed intake and egg production and can kill birds quickly when ventilation fails. Industry commentary in May 2025 indicated renewed concern about production losses, but no independently verified national 2025 loss estimate was identified. Local surveillance should record mortality, shed temperature, stocking density, power availability and production changes during each alert period.

11.3 Protection measures

- Provide continuous clean water and increase drinker access.
- Improve shade, ridge ventilation and airflow in sheds.
- Reduce stocking density during peak-risk periods.
- Feed during cooler hours and protect feed from spoilage.
- Use solar backup for fans, pumps and small-scale cooling where feasible.
- Deploy mobile veterinary advice and heat-stress checklists.
- Include livestock and poultry losses in district heat-impact reporting.

12. Water Security, WASH and Salinity

Water is both a protective resource and a pathway of risk. Heat increases the need for drinking, bathing, livestock, irrigation and cooling. Dry conditions reduce pond and canal levels, while coastal salinity and contamination limit safe supply. Long collection journeys expose people to further heat.

12.1 Household water stress

Concern Worldwide found that most respondents reported general access to household water, but shortages were concentrated in the hottest months and the assessment could not confirm water quality. In the southwest, the quality dimension is critical because saline or contaminated water may be physically available but unsuitable for drinking.

12.2 Gendered burden

Women and girls often carry primary responsibility for water collection and household care. Increased demand and distant sources extend walking and waiting time during the hottest part of the year. This can reduce time for paid work, rest and education while increasing dehydration and musculoskeletal strain.

12.3 Heat-responsive WASH actions

- Pre-position drinking-water tanks and mobile treatment capacity in coastal hotspots.
- Protect ponds, rainwater reservoirs and freshwater canals from contamination and saline intrusion.
- Install shaded public water points and reduce queue time.
- Test water quality during heat alerts, not only quantity.
- Prioritize older people, pregnant women, persons with disabilities and households without storage.
- Integrate water provision into schools, markets, transport terminals and worker-rest areas.

13. Urban Systems, Energy, Housing and Infrastructure

13.1 Electricity and cooling inequality

Heat increases electricity demand for fans, air conditioners, refrigeration, water pumping, healthcare and industrial cooling. The burden is unequal. Wealthier households can purchase efficient cooling and backup systems, while low-income households depend on fans and unreliable supply. Outages can quickly turn tin-roofed rooms, poultry sheds and health facilities into dangerous spaces.

13.2 Housing and indoor heat

Indoor heat should be treated as a major public-health exposure. Reflective roofs, ceiling insulation, shaded windows, ventilation openings, roof gardens and surrounding trees can reduce heat gain. Rental-housing programmes and settlement upgrading should include thermal safety, rather than relying solely on household-level behaviour.

13.3 Roads, transport and public space

BSS reported softening asphalt during the 10 May Chuadanga heatwave. Road and vehicle surfaces also radiate heat toward pedestrians and transport workers. Bus stops, ferry terminals, markets and footpaths frequently lack shade or water. Heat-responsive infrastructure should include shade, cool materials, drinking-water access and emergency rest points.

13.4 Urban planning for Khulna

A 2025 policy brief on Khulna City and Satkhira Municipality identified the absence of city-specific Heat Action Plans as a major gap and recommended green infrastructure, reflective and ventilated building design, cooling centres, water stations and integration of heat into urban and climate policy. The brief reported a marked increase in urban heat-island locations between 1994 and 2024 (CPE Bangladesh, 2025).

14. Education, Social Services and Community Life

Heat affects education through hot classrooms, unsafe travel, reduced concentration, dehydration and absenteeism. School closure can protect health but also interrupts learning, meals and supervision. The solution is not limited to closure decisions. Schools need heat-safe timetables, water, shade, ventilation, first aid and clear thresholds for modifying activity.

Community ceremonies, religious gatherings, markets and public services may shift to cooler hours or experience lower attendance. The WAVE assessment documented disruption of school attendance and social events during the 2024 southwest heat emergency, showing that heat affects social cohesion as well as production.

14.1 Minimum standards for heat-safe schools

- Reliable drinking water and ORS availability.
- Shaded assembly and play areas.
- Ventilated classrooms and reflective roof treatment.
- Adjusted class and examination schedules during alerts.
- Suspension of strenuous outdoor activity at defined thresholds.
- Teacher training to recognize heat illness.
- Communication with parents and safe transport arrangements.

15. Gender, Age, Disability and Social Inequality

Heat exposure is shaped by social power. The people with the least responsibility for climate change often have the greatest exposure and the least access to cooling, healthcare, savings and political voice. Heat therefore presents a climate-justice issue, not only a weather-management challenge.

15.1 Women and girls

Women may combine agricultural work, livestock care, cooking, water collection and care of sick family members. They can have less control over household resources for treatment or cooling. Pregnant and breastfeeding women require additional hydration and reduced exposure. Gender-disaggregated data are essential because household averages conceal unequal burden.

15.2 Children and adolescents

Children are physiologically vulnerable and dependent on adults. Adolescents may also be involved in farm work, transport support or family businesses. Heat-related school disruption can widen learning gaps, especially for students without digital access or a cool study space.

15.3 Older people and persons with disabilities

Mobility limitations, chronic illness, social isolation and dependence on caregivers can increase risk. Public warnings must be accessible through multiple formats, and community response systems should include household checks and transport to health or cooling facilities.

15.4 Poverty and informal settlements

Poor households face a double exposure: hotter housing and more hazardous work. They are also less able to absorb income loss or medical expense. Heat-triggered social protection is therefore both a health intervention and a poverty-prevention mechanism.

16. Environmental and Ecosystem Impacts

Heat interacts with drought, salinity, low river flow, wetland loss and vegetation decline. Potential consequences include drying of ponds and canals, stress on urban trees, declining soil moisture, concentrated pollutants, increased fire risk and reduced aquatic habitat quality.

The southwest contains the Sundarbans and extensive river, wetland and estuarine systems. No comprehensive assessment was identified that attributes 2025 ecosystem damage specifically to the heatwave. However, repeated high temperature can compound salinity and low-flow stress, particularly in shallow or poorly flushed water bodies. Ecosystem monitoring should therefore be included in heat-impact assessment.

17. Preparedness, Policy and Institutional Gaps

Bangladesh has taken important steps, including BMD heat warnings and national guidance on heat-related illness. Humanitarian agencies have also piloted anticipatory heat action. The remaining challenge is to convert warnings into locally financed, sector-specific operational measures.

17.1 Warning-to-action gap

A forecast communicates hazard, but people need instructions and resources. A worker needs a protected break and water. A health centre needs cooling supplies and staffing. A fish farmer needs an oxygen and water-management advisory. A coastal household needs drinkable water. Without these links, alerts place responsibility on individuals who may have no feasible protective option.

17.2 Occupational protection gap

The ILO recommends workplace controls that include environmental management, shorter working hours during hot periods, hydration, rest, health management and protection for exposed workers. Bangladesh does not yet have a widely implemented, enforceable heat standard covering formal and informal outdoor work. A national standard should be adapted to local climate, workload and WBGT conditions (ILO, 2024).

17.3 Data and accountability gap

Heat impacts are distributed across agencies. BMD records weather, DGHS records illness, DAE records crop conditions, fisheries and livestock departments monitor production, and local government manages water and public space. The data are rarely combined in real time. This prevents rapid identification of hotspots and weakens the case for finance and compensation.

17.4 Local planning gap

Khulna City Corporation, district administrations and municipalities need Heat Action Plans with assigned responsibilities, thresholds, budgets and review procedures. Plans should be tested before the hot season through simulation exercises and public communication drills.

18. Strategic Recommendations

Recommendations are organized by implementation horizon. Actions should be rights-based and prioritize those with the highest exposure and lowest capacity to adapt.

18.1 Immediate actions: before and during the next heat season

1. Establish district heat coordination cells in Khulna, Chuadanga, Jashore, Satkhira, Bagerhat, Meherpur, Jhenaidah and Kushtia, linked to BMD alerts.
2. Issue impact-based alerts in simple Bangla that specify affected occupations, dangerous hours, expected duration and required action.
3. Pre-position ORS, intravenous fluids, cooling supplies, drinking water and backup electricity at district and upazila health facilities.
4. Create shaded rest and water points at major markets, transport terminals, construction sites, ports and agricultural labour congregation points.
5. Adopt temporary work-rest schedules and shift strenuous work to early morning and evening during orange or red alerts.
6. Activate community outreach to older people, pregnant women, persons with disabilities and households living alone.
7. Issue crop, livestock and aquaculture advisories through extension officers, mobile messages and community organizations.
8. Deploy emergency water supply to salinity-affected coastal communities when heat alerts coincide with drinking-water shortage.

9. Begin daily heat-health and livelihood reporting using a standardized district dashboard.

18.2 Medium-term actions: one to three years

10. Develop and finance Heat Action Plans for Khulna City, Satkhira Municipality and high-risk districts.
11. Introduce a national occupational heat standard based on WBGT, workload, acclimatization, hydration, shade and mandatory rest.
12. Retrofit schools, clinics, markets and low-income housing with reflective roofs, insulation, ventilation and shade.
13. Restore urban canals, ponds, wetlands and native tree corridors as cooling infrastructure.
14. Expand solar backup for water systems, clinics, livestock and small aquaculture operations.
15. Establish heat-triggered cash or food support for daily wage households and emergency grants for small farmers and fish producers.
16. Create local heat-vulnerability maps combining temperature, land cover, poverty, age, disability, housing and water access.
17. Integrate heat risk into local budgets, disaster-management plans, urban master plans and annual development programmes.

18.3 Structural actions: three to five years and beyond

18. Mainstream heat resilience into national climate adaptation, health, labour, agriculture, water, education and urban policy.
19. Reform building codes to include thermal performance, cool roofs, ventilation and minimum shading standards.
20. Develop climate-resilient water systems for coastal towns and rural communities, including rainwater storage and protected freshwater reservoirs.
21. Support research and local trials on heat-tolerant crops, aquaculture species and livestock-management systems.
22. Create a national heat-loss accounting framework linked to climate finance, loss and damage advocacy and social protection.
23. Strengthen greenhouse-gas mitigation and just-transition advocacy, recognizing that adaptation capacity will be exceeded if warming continues.

Actor	Priority responsibilities
BMD	Impact-based forecasts, heat index/WBGT products, station expansion, data sharing
DGHS and health facilities	Surveillance, treatment readiness, mortality review, public advice
Local government and district administration	Heat Action Plans, water points, cooling spaces, worker and community coordination
Labour authorities and employers	Work-rest rules, shade, hydration, medical response, wage protection
DAE, Fisheries and Livestock Services	Forecast-based advisories, extension, loss monitoring, emergency support
Education authorities	Heat-safe school standards, schedule modification, hydration and first aid
Civil society, AOSED and CJF	Community awareness, rights monitoring, local evidence, advocacy and accountability
Research institutions	Exposure mapping, impact attribution, evaluation of adaptation measures
Development partners	Finance, technical assistance, anticipatory action and scalable pilots

19. Proposed Heat Action Framework for Khulna and the Southwest

The following framework can guide a regional plan. Thresholds should be finalized through BMD, DGHS and occupational-health consultation and tested against local exposure and health data.

Alert level	Illustrative trigger	Core actions
Green: Seasonal readiness	Pre-heat season or no active alert	Update plans, train staff, inspect water and cooling systems, map vulnerable households
Yellow: Heat watch	Mild heatwave forecast or rising heat index	Public communication, stock checks, extension advisories, prepare water and rest points
Orange: High risk	Moderate to severe heat or high WBGT	Modify work and school activity, activate surveillance, extend clinic hours, targeted water and outreach
Red: Extreme risk	Very severe heat, dangerous WBGT, high nighttime temperature or health surge	Suspend strenuous work during peak hours, emergency cash/water, cooling centres, rapid health response and daily coordination

19.1 Operational cycle

Phase	Timing	Actions
Prepare	January-March	Risk mapping, procurement, training, public communication, infrastructure checks
Activate	Forecast 3-7 days ahead	Interagency meeting, alert dissemination, sector advisories, pre-position supplies
Respond	During heatwave	Water, health, worker protection, school measures, livestock and aquaculture support
Recover	Within 1-4 weeks	Assess losses, provide support, review deaths and illnesses, restore services
Learn	Post-season	Evaluate thresholds, publish data, revise plan and budget

19.2 Communication principles

- Use action-oriented language rather than temperature alone.
- Communicate through SMS, community radio, mosques, schools, markets, extension staff and local volunteers.
- Provide messages in accessible formats for people with hearing, visual or literacy barriers.
- Avoid placing the entire responsibility on individuals when safe water, shade or wage protection is absent.
- Explain that high nighttime temperatures can remain dangerous after sunset.
- Counter myths and provide clear referral instructions for severe symptoms.

20. Monitoring, Evaluation and Learning Framework

Heat action should be measured by both service delivery and reduced harm. The framework below can be adapted for district dashboards and annual review.

Domain	Indicator	Source	Frequency
Hazard	Number of heatwave days by category and station	BMD	Daily and seasonal
Nighttime heat	Nights above locally selected minimum-temperature threshold	BMD	Daily

Domain	Indicator	Source	Frequency
Health	Heat illness consultations, admissions and suspected deaths	DGHS and facilities	Daily during alerts
Labour	Average hours lost and proportion of worksites applying work-rest rules	Labour inspection and rapid survey	Weekly during alerts
Income	Average daily earnings change among selected informal occupations	Rapid household/worker survey	Per event
Agriculture	Affected hectares, irrigation cost and yield change by crop	DAE	Per event and season
Fisheries	Pond temperature, oxygen events, mortality and emergency harvest	Department of Fisheries	Per event
Livestock	Mortality, milk/egg reduction and treatment cases	Livestock Services	Per event
Water	Communities reporting shortage, salinity or emergency supply	Local government/WASH actors	Daily during alerts
Energy	Peak demand, outages and critical-facility backup use	Power utilities	Daily during alerts
Education	Schools modifying schedules and student heat illness	Education offices	Per event
Equity	Support received by women-headed households, older people and persons with disabilities	Social protection and local government	Per event
Urban cooling	Tree canopy, shaded public space, cool-roof coverage and protected water bodies	City corporation/GIS	Annual

20.1 Evaluation questions

- Did alerts reach the most exposed workers and coastal communities in time?
- Were water, shade, health and social-protection actions activated at the correct threshold?
- Did health facilities experience fewer severe cases after preparedness measures?
- Did work-rest measures reduce illness without transferring unacceptable income loss to workers?
- Which crop, aquaculture and livestock advisories prevented measurable loss?
- Did interventions reduce inequality, or did benefits concentrate in better-served areas?
- Were community feedback and local knowledge used to revise the plan?

21. Strategic Role for AOSED and Climate Justice Forum Bangladesh

AOSED and Climate Justice Forum Bangladesh can play a bridging role between communities, technical agencies and policy makers. Their comparative advantage lies in southwest presence, community relationships, climate-justice advocacy and the ability to translate local evidence into policy recommendations.

- Establish a Southwest Heat Observatory that compiles community reports, BMD data and sectoral evidence.
- Pilot community heat-risk mapping in selected wards and unions of Khulna, Satkhira, Koyra, Jashore and Chuadanga.
- Develop simple Bangla heat-action materials for workers, schools, farmers, fish farmers and livestock owners.
- Advocate for occupational heat standards, wage protection and heat-triggered social assistance.
- Support district administrations and municipalities to prepare participatory Heat Action Plans.
- Document loss and damage experienced by poor households and climate-sensitive livelihoods.
- Convene annual pre-summer coordination and post-season learning dialogues.
- Promote rights-based climate finance for water security, urban cooling and resilient livelihoods.

22. Priority Research Agenda

24. Develop district-level heat exposure and vulnerability maps at ward and union scale.
25. Measure indoor temperatures in tin-roofed and low-income housing in Khulna and coastal settlements.
26. Conduct longitudinal worker studies using WBGT, work hours, symptoms and income data.
27. Establish heat-attributable mortality and hospitalization methods for Bangladesh.
28. Quantify crop-stage-specific impacts on Boro, mango, vegetables and other southwest crops.
29. Assess water temperature, dissolved oxygen, salinity and fish mortality during heat alerts.
30. Evaluate livestock and poultry production response to low-cost cooling interventions.
31. Calculate household expenditure on water, energy, treatment and transport during heat events.
32. Assess gendered unpaid-care and water-collection burdens.
33. Evaluate the cooling performance and equity benefits of trees, wetlands, cool roofs and shaded public infrastructure.

23. Conclusion

The 2025 heatwave season confirmed that extreme heat is becoming a recurrent and geographically concentrated development threat in Bangladesh. Chuadanga reached the very severe threshold of 42.0°C on 10 May. Severe heat affected Khulna, Jashore, Chuadanga and Meherpur, while high temperatures extended across Satkhira, Koyra, Mongla and the wider division. Heat returned in June and remained a risk during the monsoon period.

The strongest conclusion is not that every sector experienced a precisely measurable loss in 2025. The available data do not support that claim. The stronger and more defensible conclusion is that the southwest combines high exposure with high sensitivity: outdoor work, climate-sensitive agriculture, aquaculture, livestock, salinity, freshwater scarcity, heat-trapping housing and urban heat-island growth. Recent national and regional benchmarks show that these conditions can generate substantial health costs, lost workdays, income reduction and production loss.

Heat governance must therefore move from general warning to guaranteed protection. People need water, shade, healthcare, safe working hours, income support, resilient food systems and cooler settlements. Local government and sectoral agencies need thresholds, budgets, responsibilities and shared data. Climate justice requires that the costs of protection are not shifted onto workers and poor households who have contributed least to global warming.

For AOSED, Climate Justice Forum Bangladesh and partners, the immediate opportunity is to turn the 2025 evidence into practical regional action: a Southwest Heat Observatory, participatory Heat Action Plans, worker and livelihood protection, community monitoring, and stronger advocacy for adaptation and loss-and-damage finance. The cost of inaction will grow as heat becomes more frequent, lasts longer and combines with salinity, water stress and urbanization.

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Appendix A. Selected BMD Station Data, 12 May 2025

The following figures are transcribed from the station table in the BMD forecast bulletin dated 12 May 2025. The table supports the regional comparison used in this report.

Station	Maximum temperature	Minimum temperature	Heat category based on maximum
Khulna	40.0°C	28.8°C	Severe
Mongla	39.1°C	28.5°C	Moderate
Satkhira	39.5°C	29.5°C	Moderate
Jashore	40.2°C	27.4°C	Severe
Chuadanga	41.8°C	26.7°C	Severe

Station	Maximum temperature	Minimum temperature	Heat category based on maximum
Koyra	39.5°C	29.0°C	Moderate

Appendix B. Proposed Rapid Heat Impact Assessment Checklist

This checklist can be used by local government, community mobilizers and civil-society organizations within 48-72 hours of a heatwave. It is designed for rapid situational analysis and does not replace a statistically representative survey.

Module	Minimum information to collect
Hazard	Dates, alert level, peak and minimum temperatures, humidity/heat index, affected locations
Health	Symptoms, clinic visits, admissions, suspected deaths, medicine/ORS availability, referral barriers
Workers	Occupation, hours normally worked, hours worked during heat, income change, water/shade/rest access
Households	Housing material, indoor heat, electricity, water source, additional spending, coping strategy
Agriculture	Crop and stage, irrigation frequency/cost, symptoms, affected area, labour shortage, expected yield
Fisheries	Water depth/temperature, dissolved oxygen if available, mortality, feeding, emergency harvest
Livestock/poultry	Mortality, feed/water intake, milk/egg change, shed condition, veterinary support
Water/WASH	Source functionality, salinity/quality, collection time, purchase cost, emergency supply
Education	Attendance, timetable changes, student illness, water and ventilation
Response	Warnings received, support delivered, gaps, priority needs and community recommendations

Appendix C. Minimum Principles for Ethical Heat Research

- Obtain informed consent and explain how information will be used.
- Do not conduct long interviews in direct sun or during dangerous hours.
- Provide water, shade and referral information to participants and field teams.
- Avoid asking respondents to recreate strenuous exposure for measurement.
- Protect personal health and income information.
- Disaggregate data by gender, age, disability, occupation and location without exposing individuals.
- Return findings to communities and decision makers in accessible language.
- Clearly separate observed facts, respondent perceptions, estimates and researcher inference.

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