ILR Global Labor Institute

Higher Ground? Climate change and apparel production

A brief for apparel brands, retailers and manufacturers | September 2024

Extreme heat and intense flooding are ever-larger threats to global production and trade. The apparel and footwear industry, with production spread widely across tropical and sub-tropical zones, is among the most vulnerable.

This brief for apparel brands and manufacturers—based on analyses by the Cornell University Global Labor Institute and U.K.-based fund manager Schroders—looks into fashion's near future to calculate the possible economic damage caused by high heat, rising humidity, and disruptive flooding. Three brief case studies show how these climate-related losses can be clawed back and point towards positive returns on climate-adaptative investments.

High heat stress. Our 2030 and 2050 analyses use data from the ILO's Better Work program in Cambodia show how many more days per will reach wet-bulb globe temperatures (WGBT)—the combination of heat and humidity and the most accurate measure of heat stress—of 30.5 °C or higher. At this high heat-stress level in an apparel factory, the ILO estimates that an hour of work should be equal parts effort and rest to protect against fatigue, dehydration, dizziness and worse.

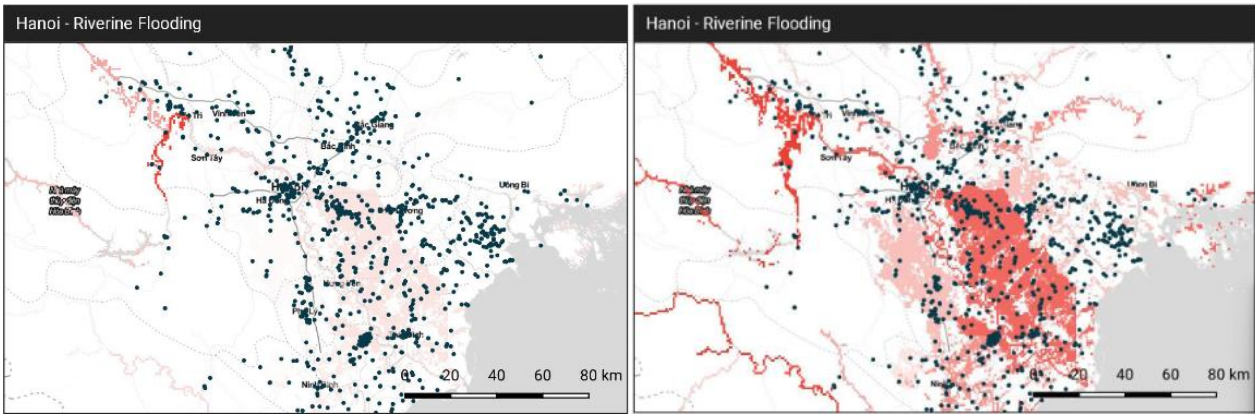
Among apparel production centers in our focus countries of Bangladesh, Cambodia, Pakistan, and Vietnam, the average number of high heat-stress days ('exceedance days') is expected to climb 50.9 percent, from 39 days in 2014 to 59 days by 2030. Dhaka, Yangon, Ho Chi Minh, Phnom Penh, and Jakarta will experience a near-doubling of high heat-stress days between 2030 and 2050. Cairo and Amman—despite low humidity—will see heat levels that threaten workers' health and output.

Major production centers		Annual exceedance days at 30.5 °C WBGT	
City	Country	2030	2050
Karachi	Pakistan	189.95	202.71
Colombo	Sri Lanka	144.52	157.76
Managua	Nicaragua	133.29	151.9
Dhaka	Bangladesh	64.81	104.48
Yangon	Myanmar	58.90	91.62
Delhi	India	55.14	75.00
Ho Chi Minh	Vietnam	55.14	97.76
Chattogram	Bangladesh	50.10	84.86
Phnom Penh	Cambodia	41.38	75.05
Hanoi	Vietnam	37.29	55.86
Jakarta	Indonesia	9.81	38.29

Sources: Schroders, WorldPop, World Resources Institute, Copernicus EU. Flooding based on RP-10 Event, RCP4.5. Heat levels are based on Wet Bulb Globe Temperature, SSP 2-4.5. Analysis undertaken July 2023.

Intense flooding. Flooding can put factories and their systems out of service for days or weeks and endanger workers' health by forcing them to maneuver through contaminated floodwaters.

Flooding can also shut down road networks and vital ports. Cornell GLI and Schroders created the flood projection maps below using a middle-of-the-road climate scenario (RCP 4.5) for 2030 (on the left) and 2050 (right). River and rainfall flooding are shown in red and apparel and footwear factories in blue. Deeper shades of red signal higher inundation levels, up to 1 m and higher.

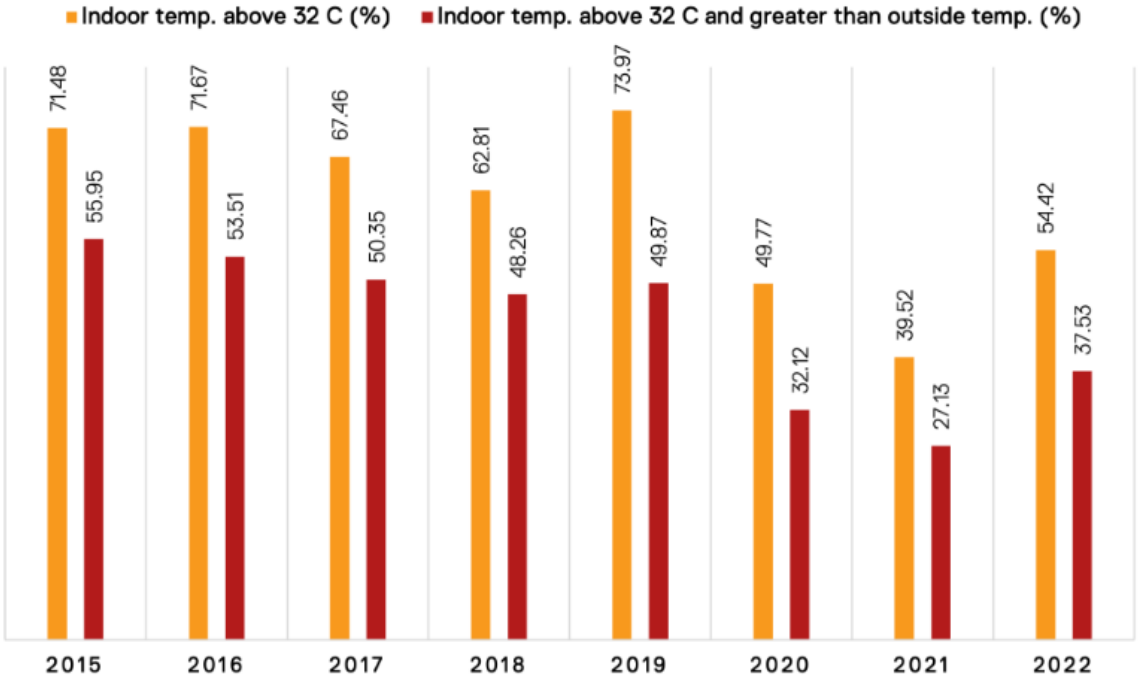


Sources: Schroders, WRI, brand disclosures, Mapped in Bangladesh, OSH. Analysis undertaken July 2023.

Economic impacts. Bangladesh, Cambodia, Pakistan and Vietnam—home to approximately 10,000 apparel and footwear factories, and their 10.6 million workers—represented 18 percent of global apparel exports in 2022. Our analysis shows that slower industry growth caused by heat stress and flood disruptions will result in significant falloffs in export earnings and job-creation across all four countries: a USD 65 bn. (22 percent) shortfall in export earnings between 2025 and 2030 and 950,000 jobs. These 'losses' compound over time and rise significantly by 2050: 68.8 percent in foregone export earnings and 8.64 m. fewer new jobs.

These represent material risks for the industry. Action now to adapt to climate breakdown can reduce the risks and some climate-adaptive investments show positive returns on investment.

Case 1 | Cambodia. Factory-level temperature data from the ILO Better Factories Cambodia program assesses all exporting apparel and footwear factories against the program's 32 °C threshold for acceptable levels of indoor heat. Our analysis found that between 2015 and 2022, 64 percent of the factory assessments showed indoor temperatures above the heat threshold. Workers in one in five factories experienced indoor temperatures over 35 °C, and more than 69 percent of factories in violation of the heat standard had temperatures inside the factory that were higher than the concurrent outdoor temperatures. The trend there is towards cooler factories but in 2022—a relatively low-heat year in Phnom Penh—still more than half of factories registered excessive indoor temperatures.



(Sources: Cornell and ILO Better Work. Analysis undertaken July 2023).

Figures provided to us by a long-time, large-scale apparel manufacturer near Phnom Penh show us daily dry-bulb and humidity readings from July, August and December 2022. The production areas use an evaporative water-cooling system, exhaust fans, 13-meter-high ceilings, and a heat shield on the roof to keep recorded dry-bulb temperatures within the 32 °C threshold. Calculating a 'simple' wet-bulb temperature index for the factory, we see that the combination of heat and humidity in the production areas would have pushed the wet-bulb index past our high heat stress threshold on only one of the 90 days for which we have data. And the indoor average index in July—the hottest of the three months—is only 1.5 °C WBGT higher than the average in December, the coolest month.

Case 2 | Pakistan. In a major textile and apparel manufacturer near Lahore, Pakistan, monthly energy-usage totals for its refrigerant and water-evaporative air-cooling systems kept average monthly indoor temperatures below 32 °C in April, May and June 2022—the hottest months of the year. The cooling systems used a monthly average of 1.48 million kilowatt hours (kWh) to cool the buildings in 2022, and electricity usage in those hottest months ran only 6.2, 7.5 and 19.0 percent ahead of the factory's monthly average.

Case 3 | Bangladesh. In a 2020 pilot, the introduction of LED lighting in a group of Indian apparel factories reduced indoor temperatures in the hottest months of the year by an average 2.4 °C. In Bangladesh, this passive cooling investment could produce an annualized 1.25 percent increase in productivity and—combined with a suite of other cooling practices such as green or shaded roofs, exhaust and industrial fans, sufficient work breaks and adequate water—could reduce indoor temperatures by 2 °C in Bangladesh's hottest months and improve apparel worker productivity by

an annualized 1.41 percent. Combining these two temperature-productivity impacts, we estimate a 2.66 percent annualized productivity effect by 2030. If one-half of apparel manufacturers have invested in 'green' improvements and operational changes, the resulting improvements in worker productivity can claw back 28.44 percent of the export earnings by 2030 (USD 7.58 bn.) and 73,372 of the new jobs foregone in our high heat stress scenario.

Recommendations. In our 'Higher Ground?' reports, we note that climate-related standards such as workplace heat thresholds are weak in key apparel producing countries or—in countries where the standards are stronger—enforcement is effectively nil. New rules including European due diligence requirements mean that firms must understand these risks, measure their impacts and act to prevent or remediate harms to workers. We recommend operational, physical and social climate adaptations, including:

- Standards and protocols for heat stress including measuring and managing indoor temperatures, changes to working hours (both time of day and overtime limits) and effort levels, more hydration and rest
- Strong worker health and leave policies for severe weather events
- Living wages and social protection systems that protect workers against costs of climate breakdown
- Engagement with workers and worker organizations on climate policy at factory and industry levels
- Investments in effective passive and active cooling systems and flood protections

ROI. Most of these actions have associated costs but rising heat and intense flooding pose material risks for manufacturers and buyers as shown in our Report 2 study of a leading sportswear brand. Our case studies and a preliminary ROI analysis by Schroders demonstrate that there are positive returns on climate-adaptive investments that compound as worker health and output improve.

Full reports at: https://www.ilr.cornell.edu/global-labor-institute/higher-ground-fashions-climate-breakdown.