



# RESEARCH




## The Impact of Heat Stress on Human Productivity and Economy in Cambodia

Global warming is exacerbating heat stress, posing a major threat to workers and students. This leads to health problems, reduced productivity, and increased occupational hazards. Heat stress negatively impacts well-being, and increases heat-related illnesses, and even mortality. It also affects workers' willingness to work, overall well-being, and productivity, while raising the risk of accidents.







### OBJECTIVES

- Build knowledge of heat stress
- Investigate the productivity loss due to heat stress
- Build evidence on the impacts of heat stress in three selected sectors: construction, garment, and education

### RESEARCH METHODOLOGY AND APPROACH

	<b>CONSTRUCTION</b> 74 respondents (rebar and molding workers) (100% M), age range: 18-57, in 5 construction sites in Phnom Penh, both cool (Nov 22 to Feb 23) and hot (Mar to Jun 23) seasons
	<b>GARMENT</b> 778 respondents (97% F), age range: 19-55, in 3 factories, both cool (Jul 2022) and hot (Feb 2022) seasons
	<b>EDUCATION</b> 493 respondents (52% F, 48% M), grade 6, 2 primary schools in Phnom Penh

### DATA COLLECTION

	<b>Environmental Parameters</b> Air temperature, radiant temperature, humidity and air movement		<b>Productivity observation</b> Direct, indirect, and non-productive time with observation every 15 minutes
	<b>Personal data collection</b> Age, body mass index, alcohol and smoking habits, medical history		<b>Psychometric factors</b> Thermal sensation and rate of perceived exertion
	<b>Physiological factors</b> Heart rate, monitored every minute for 8 hours per day		<b>Energy audit</b> Energy adaption measures and energy efficiency recommendations

### RESEARCH RESULTS

- Heat stress significantly reduces construction labor productivity and work duration due to physiological strain.
- Workers experience more severe heat impact in hot months than in the cold months.
- Working during the hottest month of the year increases the negative impacts on work pace and accuracy.
- Students experience heat stress symptoms while studying, including low concentration, mild headache, dizziness, and weakness.

#### CAMBODIA CLIMATE CHANGE ALLIANCE

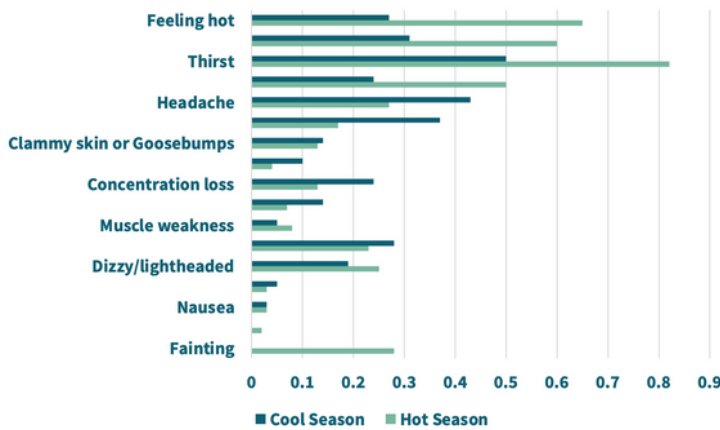
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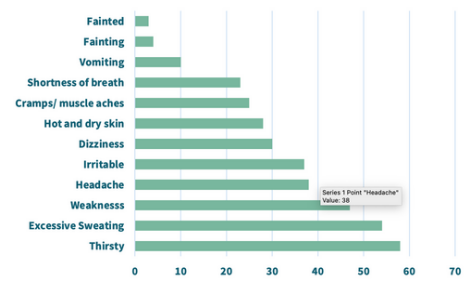
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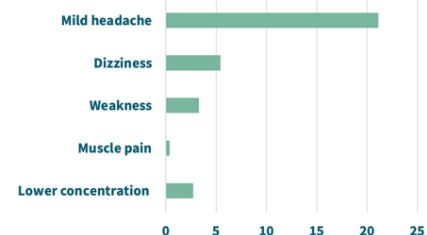
**Graph:** Garment workers' perceived heat strain and symptoms of heat-related illness



**Graph:** Effects of heat stress on construction workers



**Graph:** Heat stress symptoms for students while learning



## RESEARCH ON PRODUCTIVITY LOSS

Objective: To assess the macroeconomic impacts of heat exposure in Cambodia



All sectors: **11.2%** annual decrease in industrial productive working time  
**USD 2,638 million** economy-wide output loss in 2018.



By **2035** further **USD 634 million** output loss is estimated



Affecting the agriculture **16.7%**, construction **9.8%**, manufacturing **3.5%**, and services **3.2%**

## RECOMMENDATION

### CONSTRUCTION SECTOR



- Provide regular breaks of 5-15 minutes for every 45 minutes
- Ensuring adequate hydration with access to cool drinks
- Establishing cooling areas and shadow
- Provide workers with appropriate uniforms

### GARMENT SECTOR



- Have good ventilation and make drinking water available
- Green spaces around buildings can help to protect from heat
- Provide regular training on heat-related risks in daily work and health, and coping mechanisms for managers and workers

### EDUCATION SECTOR



- Provide good ventilation in the classes
- Provide drinking water available
- Create green spaces around buildings
- Train teachers on the impact of heat on human health so they can educate students on coping strategies during hot weather

### PRODUCTIVITY LOSS



- Build resilience against current and future effects of hot climate conditions
- Adaptation measures to protect workers from current and future high heat levels
- Apply “green technology” for energy systems, cooling of buildings, and transport

## CAMBODIA CLIMATE CHANGE ALLIANCE

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