

Study on the Impact of Heat Stress on Human Productivity and Economy in Cambodia

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មន្ទីរពិសោធន៍កម្ពុជា
THERMAL LABORATORY

The CCCA3 Knowledge Sharing Event
Sokha Beach Hotel, Preah Sihanouk province. 28-29th December, 2023.

Background

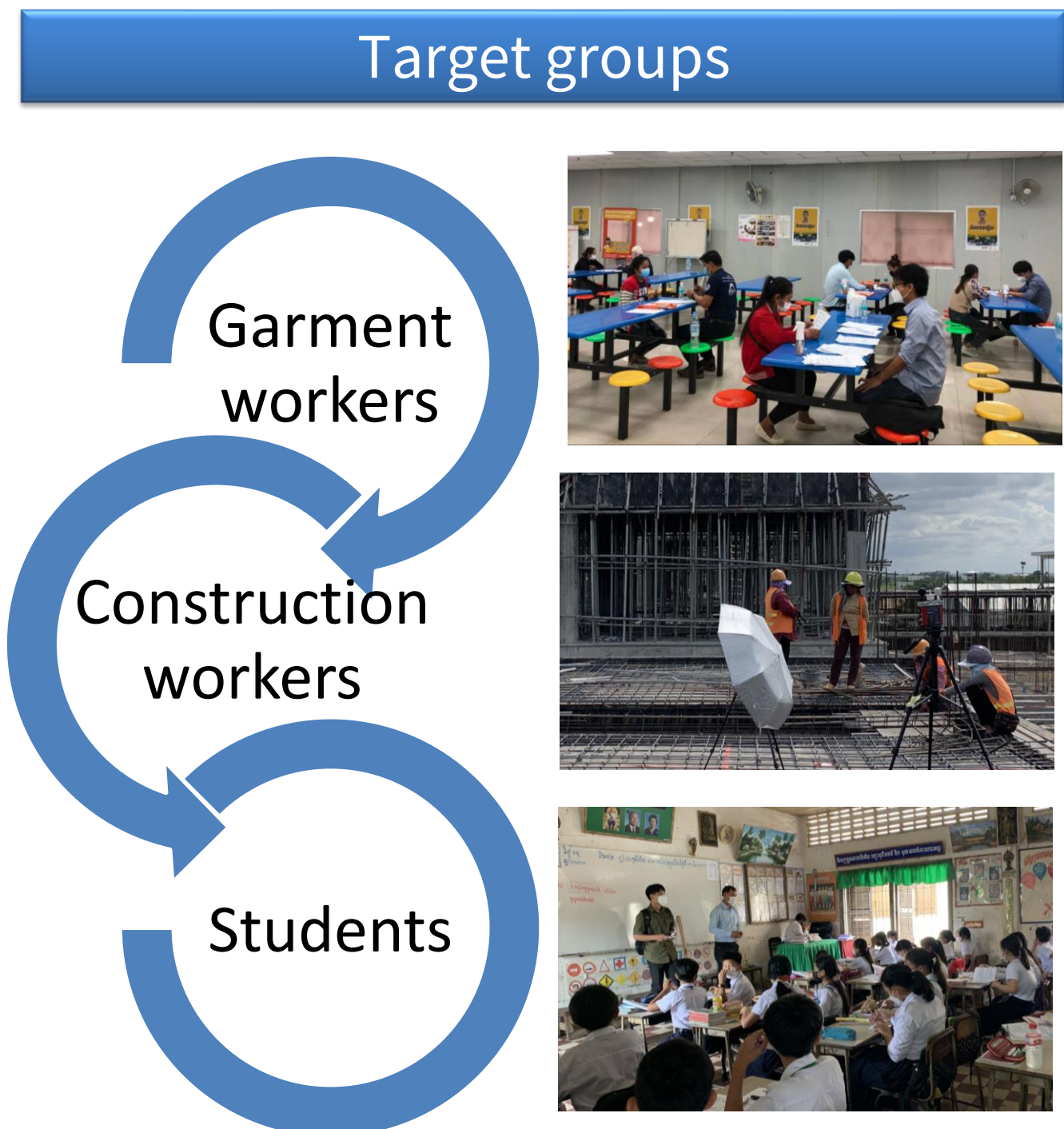
Heat stress depends on radiation, air velocity, ambient temperature, relative humidity, clothing, body core temperature, human's activities.

Heat Strain Symptom

| | |
|-------------------------|-------------------------------|
| Faint or dizzy | Throbbing headache |
| Excessive sweating | No sweating |
| Cool, pale, clammy skin | Body temperature above 39.5°C |
| Nausea or vomiting | Red, hot, dry skin |
| Rapid, weak pulse | Nausea or vomiting |
| | Rapid, strong pulse |
| Muscle cramps | May lose consciousness |

Heat Exhaustion Heat Stroke

Heat stress causes heat strain including heat exhaustion or heat stroke.



Global temperature rise due to climate change might make the phenomenon of “heat stress” causing in the loss of the total number of working hours.

When workers work under the heat stress condition, they could:

- slow down the work
- take more or longer break time
- limit the number of worker hours
- which all could contribute to the loss of productivity

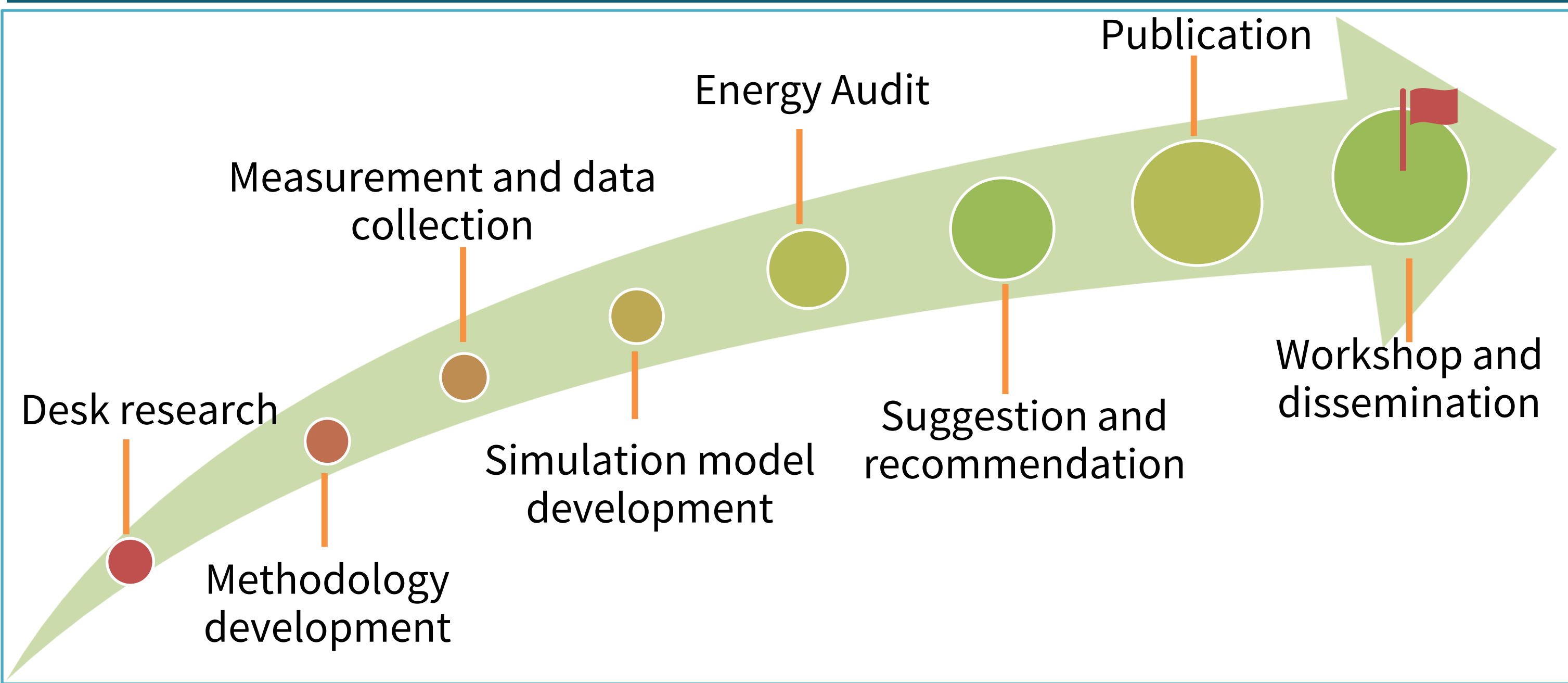
These heat stress can be prevented when the workplace has a proper environmental condition or has proper break time

Objectives

Overall goal of the study is prevent economic loss for policy planning and increase human resources in this research field in Cambodia.

- Build human resources in the heat stress field
- Investigate the impacts of heat stress on productivity
- Develop economic model on impact of heat stress
- Identify the work rest schedule for construction worker
- Build evidence on the impacts of heat stress on productivity

Key activities



Dissemination workshop

A workshop shared research on heat stress's impact on health, productivity, and economy. Representatives from 6 ministries, universities, NGOs, and private sectors discussed adaptation strategies and future actions, engaging 52 attendees.

Dissemination workshop, 07 November 2023, Sun & Moon Riverside, Phnom Penh, Cambodia



Achievement of the project

01 Evident

Evidence on the impacts of heat stress on labour productivity the garment, construction and education sectors

Master theses

Report

Publications

Workers' Survey in Cambodia

WPA: Survey of Heat Impacts, Milestone 7c

Natalia Borzino, Vachira Chai, Samuel H. Gauthier, Raghav Ojha, Tani Kijikawa, Mathieu Oth, Peet Tan, Kinnaeth Vongchanh, Jason Lee

05 July 2023

02 Cooler workplace

Solution to make surrounding area cooler. Energy efficiency adaptation.

Booklet

EA reports

EA activities

03 Heat Stress base

Heat stress measurement tools/devices in Cambodia and Measurement methodology, data input platform

Measuring devices

Questionnaires

Handbook

04 Economic model

Economic model using in projection economic loss due to heat stress; & Simulation model on work-rest schedule

Result of Economic model

CLP model

CLP = 59.193 - 1.612·WBGT + 0.204·Age + 0.158·WD + 0.354·%HRmax + 8.336·Timeslot - 0.204·CWD + 3.512·PeSI

MAE (Mean Absolute Error) = 27.30

05 Collaboration

Strengthening research and academic activities for long-term partnerships collaboration

Research Collaboration Agreement

Collaborative Agreement

06 Human resources

Increasing human resources in this research field.

Dr. Kinnaeth Vongchanh

Dr. Sarin Chan

Master students

Ph.D. candidates

Participants: 30 pp

Participants: 52 pp

Heat exposure impacted work productivity and capacity in Cambodia during working hours causing a total economy-wide output loss of US\$2,638 million in 2018. By 2035, the total output loss is estimated to increase by US\$634 million, which represents an additional 24% compared with the total output loss in 2018.

- ### Suggestions
- Promoting heat acclimatization
 - providing information and training for adapting to heat impacts during changing seasons
 - Ensuring the availability of thermometers for monitoring indoor and outdoor temperatures.

| Indoor | Outdoor |
|---|--|
| access to cool drinking water, appropriate uniforms for better ventilation, and official break times are essential. | similar measures apply, with the addition of portable shading during breaks and scheduled official break times (5-15 mins) every 45-90 mins. |



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