



**BRAC** SCHOOL OF  
JAMES P GRANT PUBLIC HEALTH



# Climate Change, Heat, & Energy

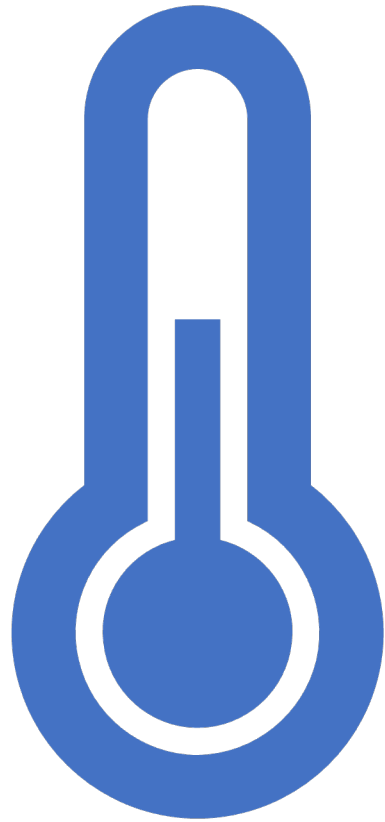
## *A Fatal Feedback*

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**Malabika Sarker**

*BRAC James P Grant School of Public Health*

**Bangladesh**

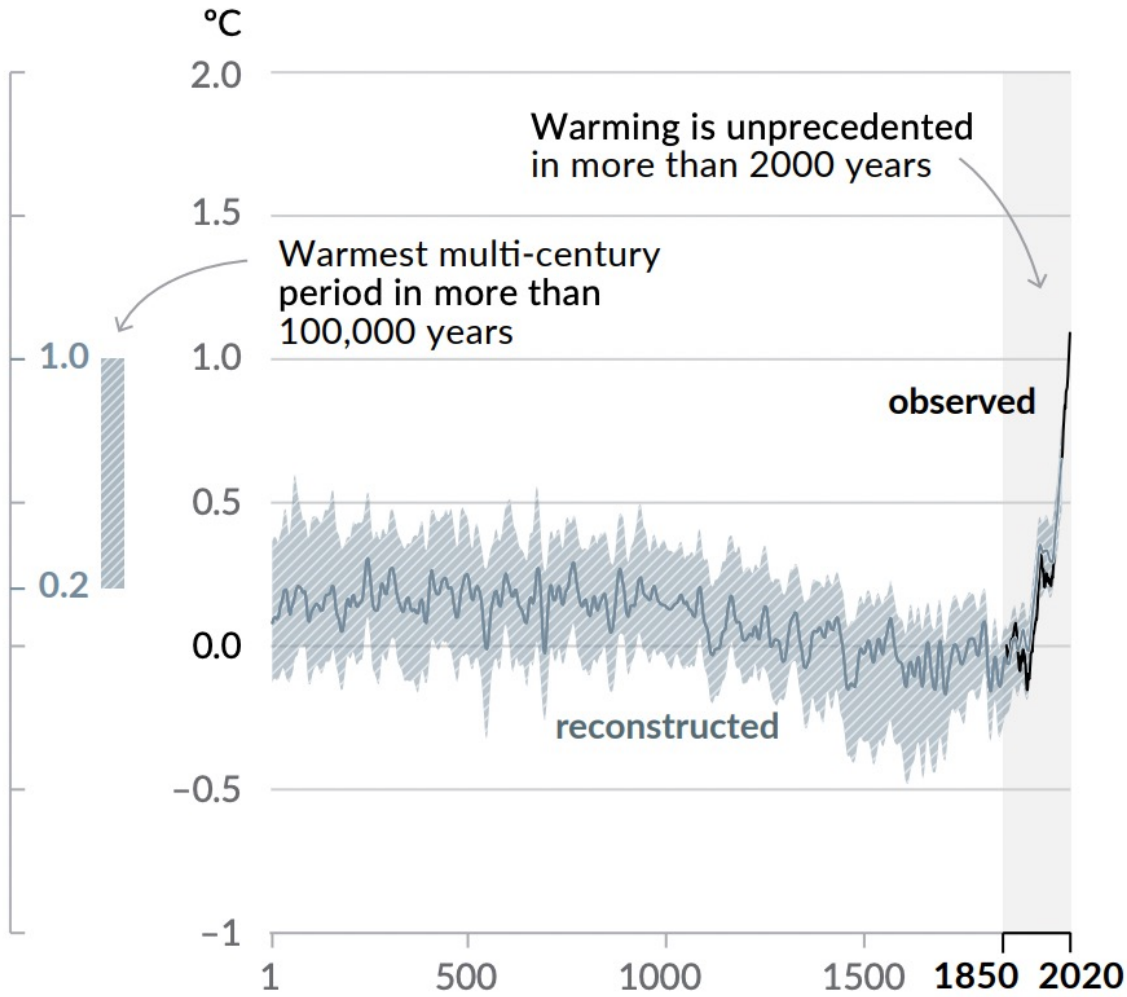


# **Heat**

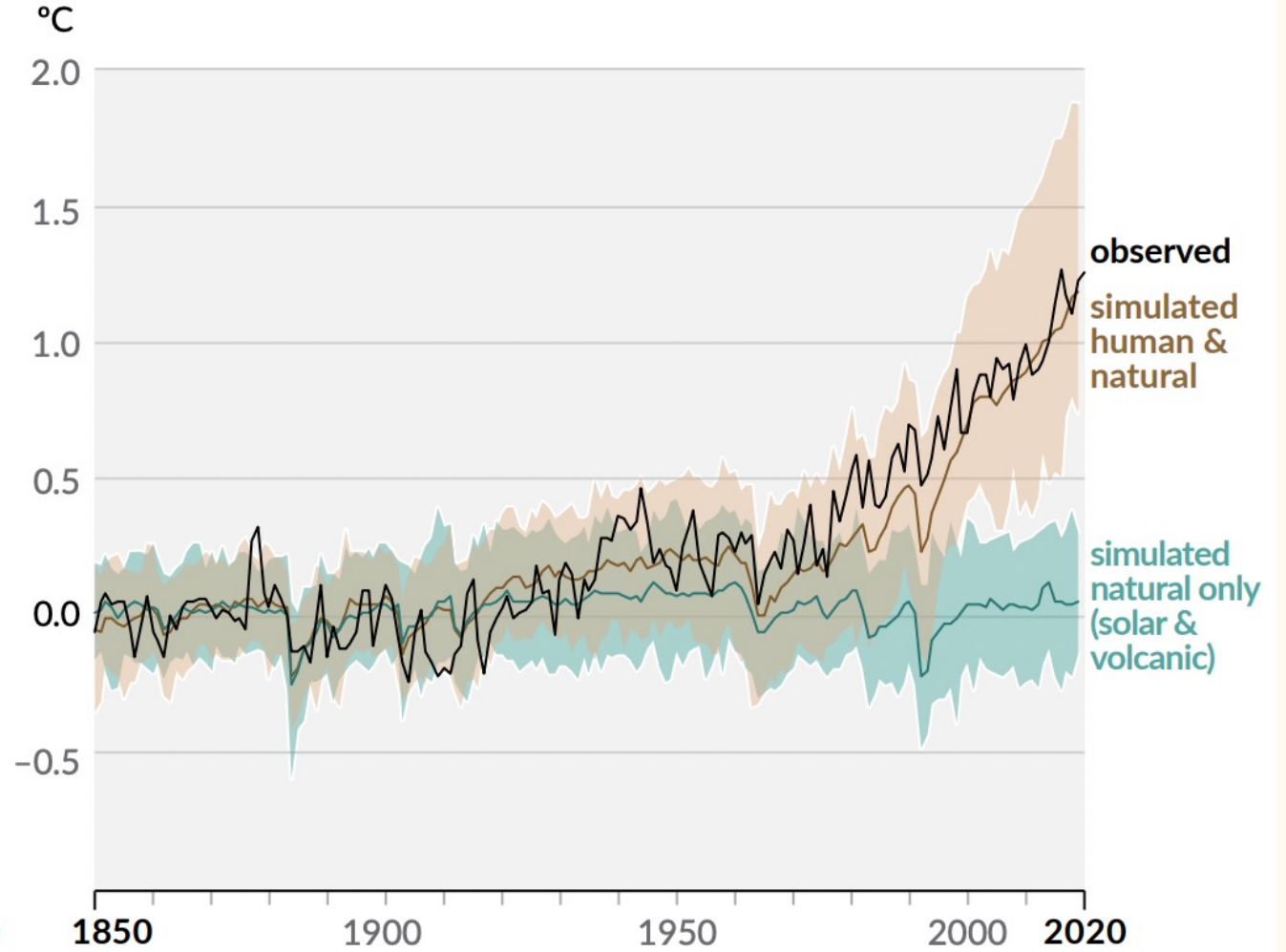
***Global & Regional Level***

# Changes in global surface temperature relative to 1850–1900

(a) Change in global surface temperature (decadal average) as **reconstructed** (1–2000) and **observed** (1850–2020)

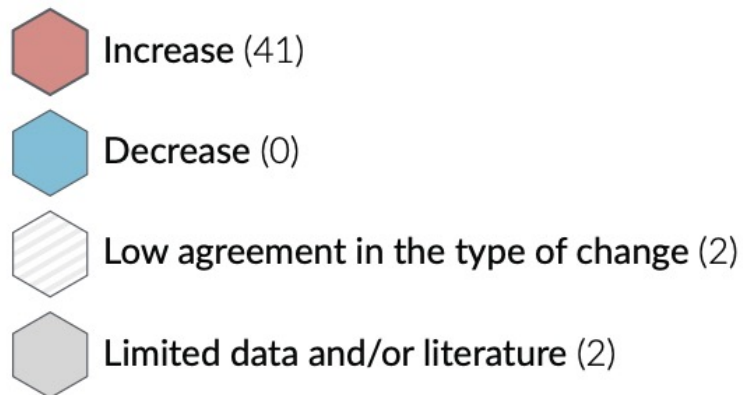


(b) Change in global surface temperature (annual average) as **observed** and simulated using **human & natural** and **only natural** factors (both 1850–2020)

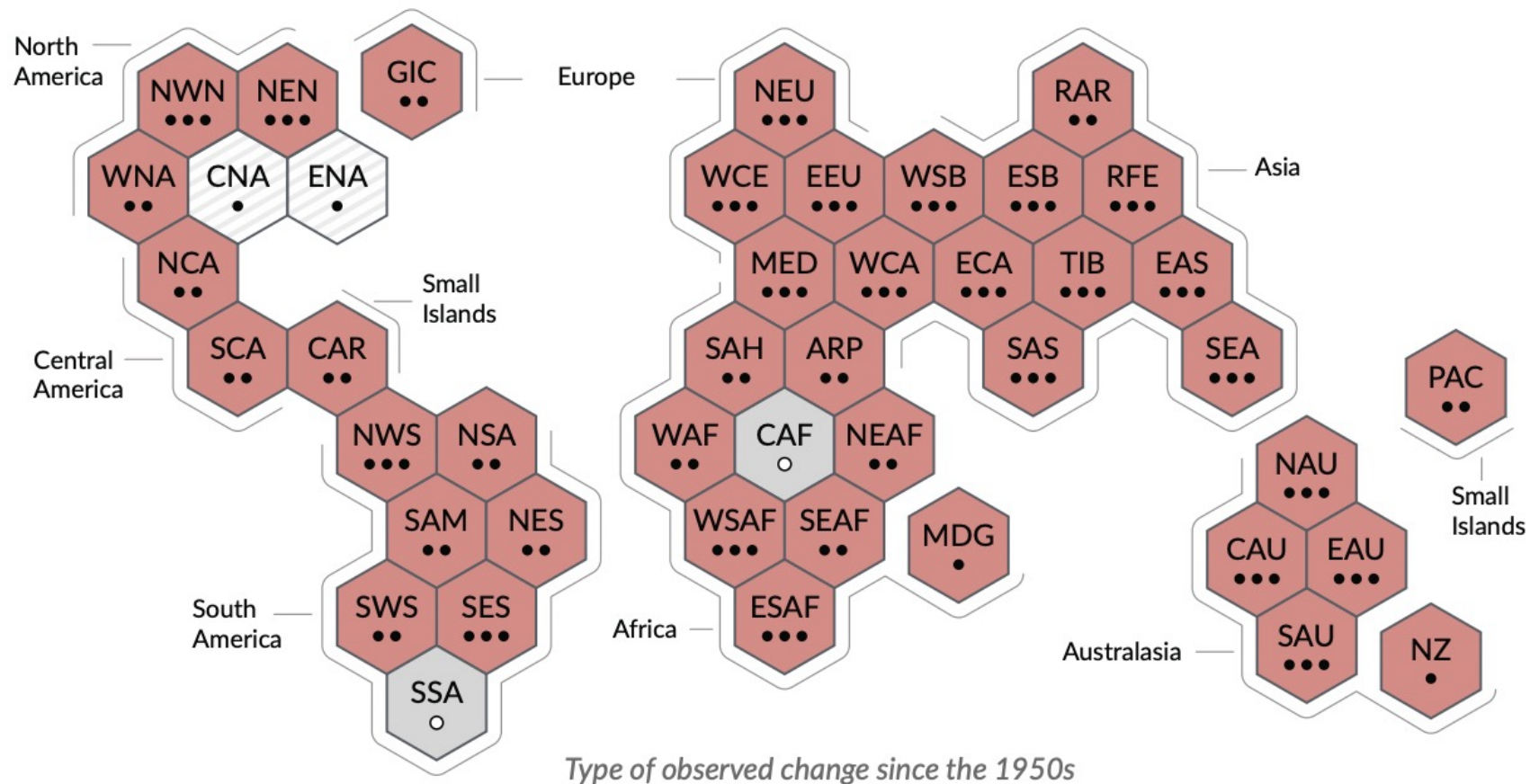
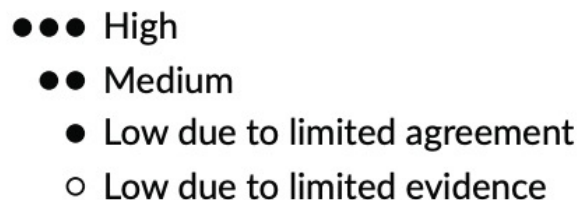


(a) Synthesis of assessment of observed change in **hot extremes** and confidence in human contribution to the observed changes in the world's regions

**Type of observed change in hot extremes**



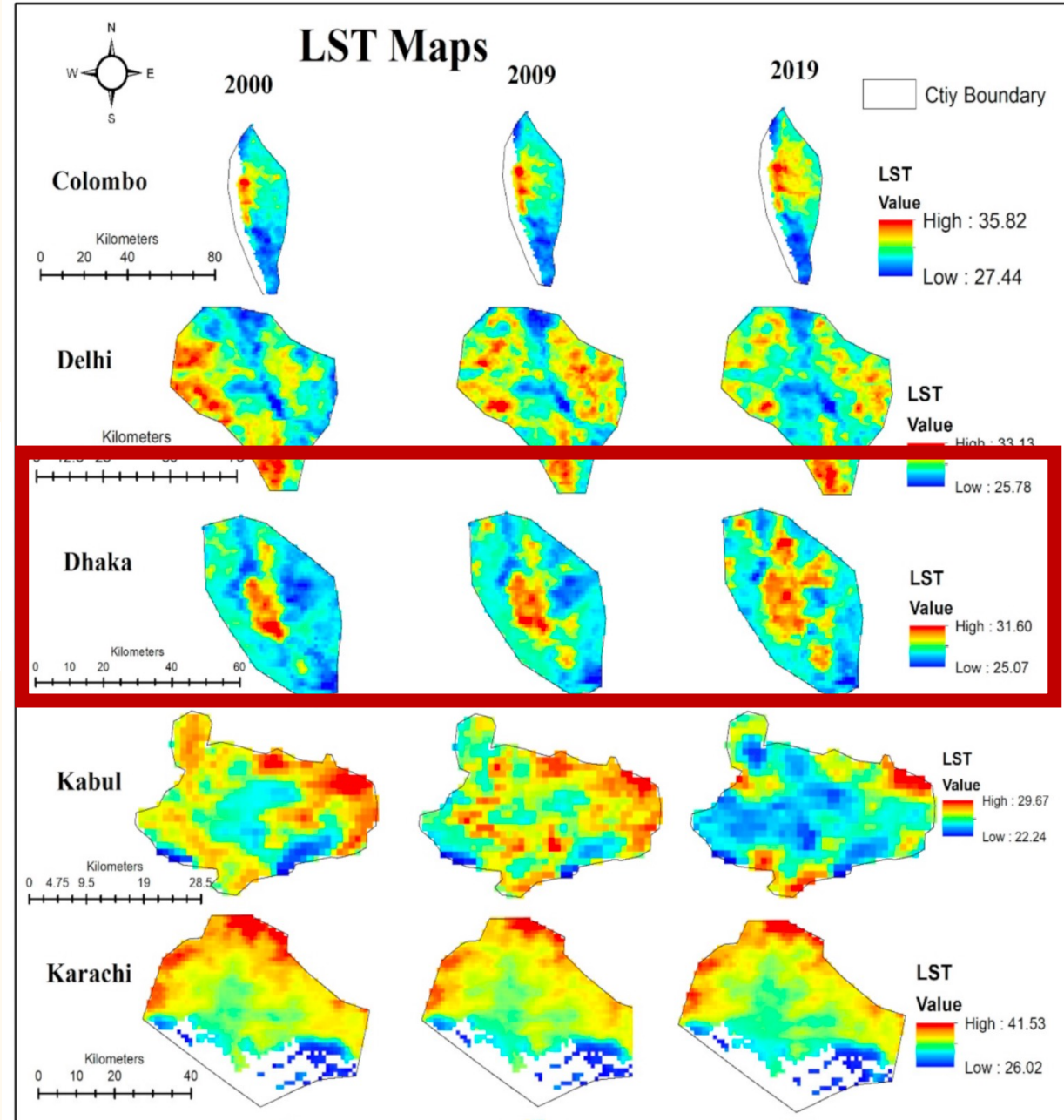
**Confidence in human contribution to the observed change**



Article

# Surface Urban Heat Islands Dynamics in Response to LULC and Vegetation across South Asia (2000–2019)

Talha Hassan <sup>1,2</sup>, Jiahua Zhang <sup>1,2,\*</sup>, Foyez Ahmed Prodhon <sup>1,2,3</sup>, Til Prasad Pangali Sharma <sup>1,2</sup> and Barjeece Bashir <sup>2,4</sup>





# Heat & Health

## Barisal rickshaw puller dies of heatstroke

Anisur Rahman Swapan, Barisal Published at 11:22 pm April 27th, 2021



News | Climate Crisis

### Extreme heat kills at least 25 in India's Maharashtra state

Maharashtra health official says the deaths were from 'suspected heat stroke', with many reported in rural areas.



VICE World News

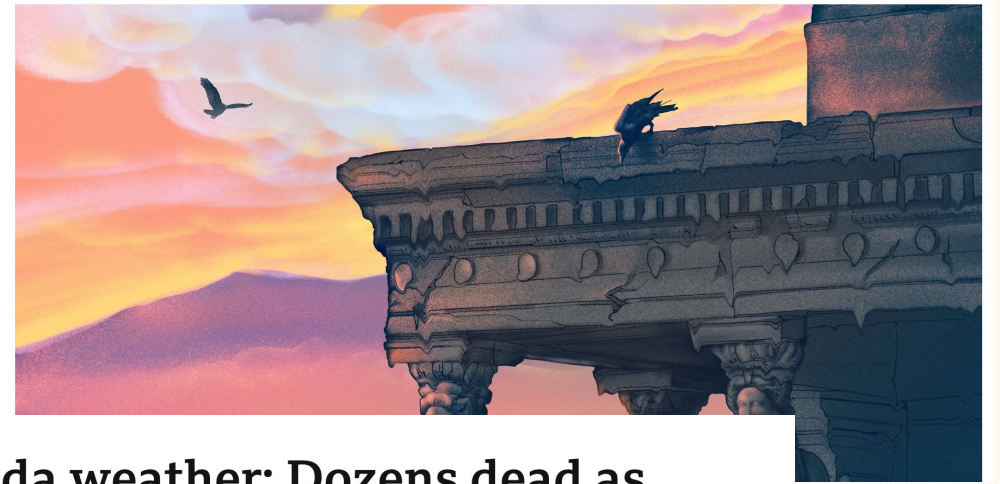
## India Is Getting So Hot That Birds Are Coming Down With Heatstroke

A record number of birds are getting treated at an animal hospital in northern India.

# Heat Stroke

## The death toll of Europe's heat wave

Preliminary data shows thousands of excess heat-related deaths across the Mediterranean.



### Canada weather: Dozens dead as heatwave shatters records

30 June 2021



Brief Review

**High temperatures and nephrology: The climate change problem<sup>☆</sup>**

Alberto de Lorenzo\*, Fernando Liaño

# Kidney Disease

## Climate Change and the Emergent Epidemic of CKD from Heat Stress in Rural Communities: The Case for Heat Stress Nephropathy



Perspective  
AUGUST 22, 2019

A New Era of Climate Medicine — Addressing Heat-Triggered Renal Disease

RESEARCH ARTICLE

**Risk of chronic kidney disease in patients with heat injury: A nationwide longitudinal cohort study in Taiwan**

**Heat-related chronic kidney disease mortality in the young and old: differing mechanisms, potentially similar solutions?**

Annals of  
**Nutrition & Metabolism**

Climate Change, Labor, and Kidney Health

Ann Nutr Metab 2019;74(suppl 3):38–44  
DOI: 10.1159/000500344

Published online: June 14, 2019

**Climate Change and the Kidney**



Research

A Section 508-comformant HTML version of this article is available at <https://doi.org/10.1289/EHP5688>.

## Association between Heat Exposure and Hospitalization for Diabetes in Brazil during 2000–2015: A Nationwide Case-Crossover Study

Ronohin Xu,<sup>1,2\*</sup> Qi Zhao,<sup>2\*</sup> Micheline S.Z.S. Coelho,<sup>3</sup> Paulo H.N. Saldiva,<sup>3</sup> Sonhja Zoungras,<sup>2</sup> Rachel R. Huxley.<sup>4</sup>

BMJ Open  
Diabetes  
Research  
& Care

## Diabetes incidence and glucose intolerance prevalence increase with higher outdoor temperature

Lisanne L Blauw,<sup>1,2</sup> N Ahmad Aziz,<sup>3</sup> Martijn R Tannemaat,<sup>3</sup> C Alexander Blauw,<sup>4</sup> Anton J de Craen,<sup>5</sup> Hanno Pijl,<sup>1</sup> Patrick C N Rensen<sup>1,6</sup>

# Diabetes



ELSEVIER

Science of The Total Environment

Volume 711, 1 April 2020, 135098



## Geographical disparities in the impacts of heat on diabetes mortality and the protective role of greenness in Thailand: A nationwide case-crossover analysis

<https://doi.org/10.1016/j.scitotenv.2020.135098>

Themed Paper – Original Research

## Associations between high ambient temperatures and heat waves with mental health outcomes: a systematic review

Research | Environmental Medicine

### The Effect of Heat Waves on Mental Health in a Temperate Australian City

Alana Hansen,<sup>1</sup> Peng Bi,<sup>1</sup> Monika Nitschke,<sup>2</sup> Philip Ryan,<sup>1</sup> Dino Pisaniello,<sup>1</sup> and Graeme Tucker<sup>2</sup>

<sup>1</sup>Discipline of Public Health, School of Population Health and Clinical Practice, Faculty of Health Sciences, The University of Adelaide, Adelaide, South Australia, Australia; <sup>2</sup>South Australian Department of Health, Adelaide, South Australia, Australia

**OBJECTIVE:** The goal of this study was to identify mental, behavioral, and cognitive disorders that are associated with heat waves, making the climate ideal for the study of the health effects of heat waves.

# Mental Health

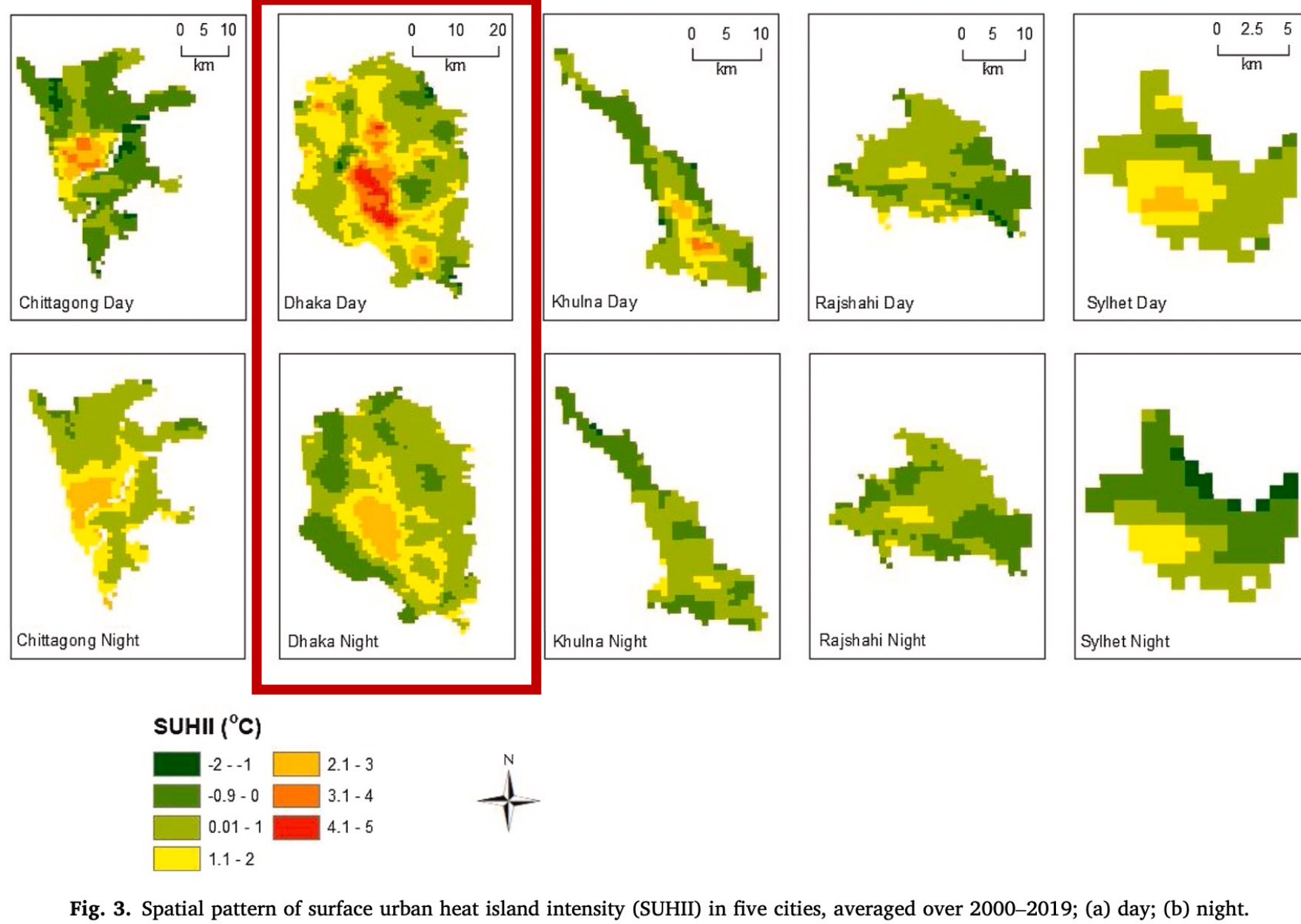
Open Access Article

## Influence of Heat Waves on Daily Hospital Visits for Mental Illness in Jinan, China—A Case-Crossover Study



# Heat Wave in Bangladesh

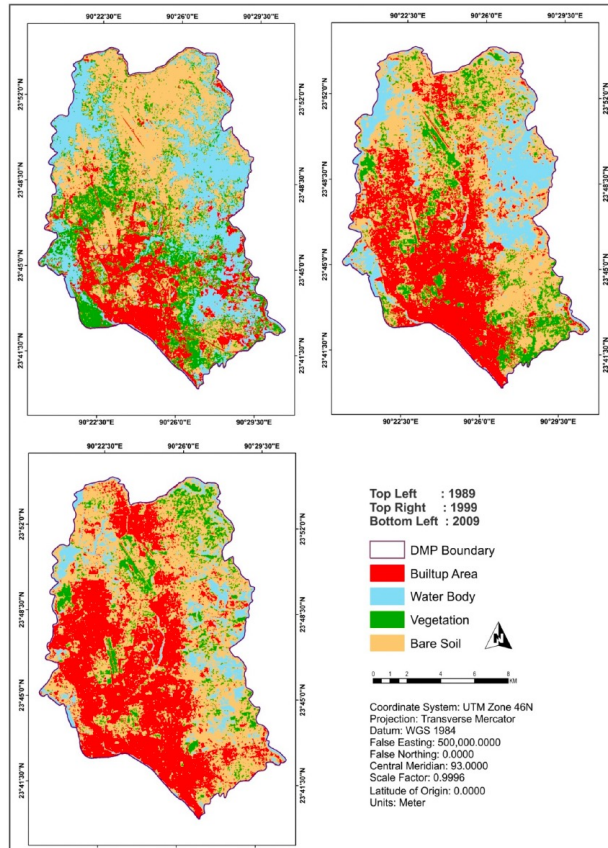
- <https://www.thedailystar.net/backpage/news/the-heat-continue-few-days-2084309#lg=1&slide=0>



Dewan, Ashraf, Grigory Kiselev, Dirk Botje, Golam Iftekhar Mahmud, Md Hanif Bhuian, and Quazi K. Hassan. "Surface urban heat island intensity in five major cities of Bangladesh: Patterns, drivers and trends." *Sustainable Cities and Society* 71 (2021): 102926.

# Urbanization

Figure 3. Land cover maps of DMP area.



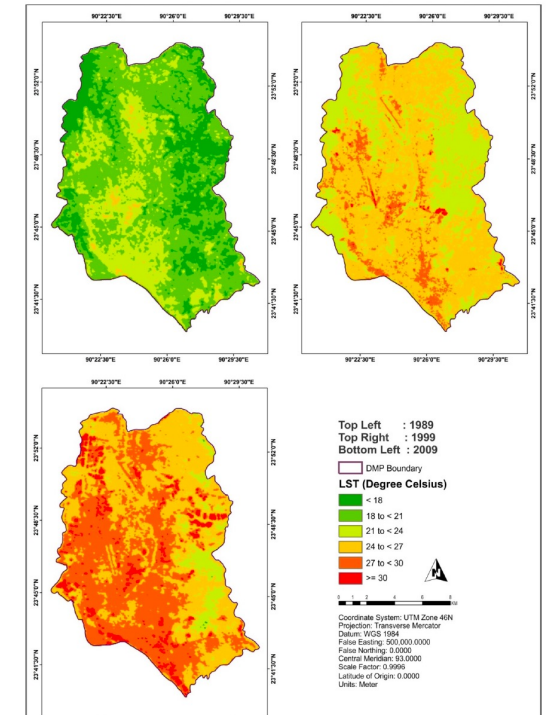
1  
9  
8  
9  
  
2  
0  
0  
9

1  
9  
9  
9

Urbanization  
increasing  
Temperature

# Temperature

Figure 4. Spatial distribution of land surface temperature (LST).



1  
9  
8  
9  
  
2  
0  
0  
9

1  
9  
9  
9



**Cooling?**

***Active or Passive? An Informed Choice!!***

# Active Cooling

*Unsustainable Solution*

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## AC keeps you cool in summer. But experts warn it comes at a high cost to the environment

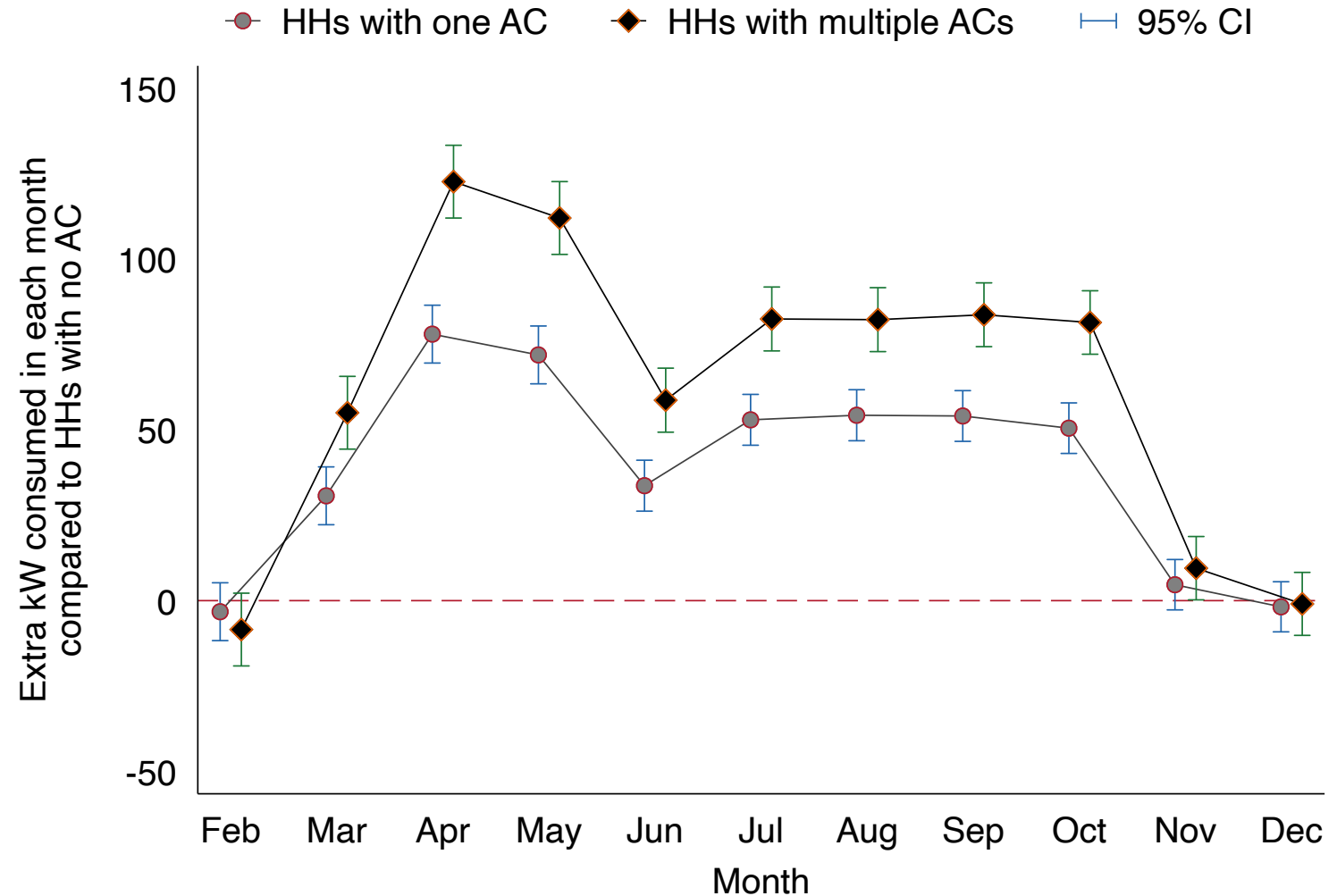
Meherun Naher Meghla, [bdnews24.com](http://bdnews24.com)  
Published: 03 Oct 2020 11:41 AM BdST | Updated: 04 Oct 2020 12:44 AM BdST





## Extra Energy Use Attributable to Air Condition Use

- Sample size = 2,306 HHs in Dhaka
- Energy use data collected directly from the power distributor
- Based on 24 months of consecutive energy use data with HH fixed effect model



Source: Preliminary analyses of data from an ongoing project entitled “Engineering Energy-Efficient Behaviours and Conservations in Household Electricity Market in Urban Dhaka” at BRAC James P Grant School of Public Health.

# Passive Cooling

*Cost-Effective Solution*

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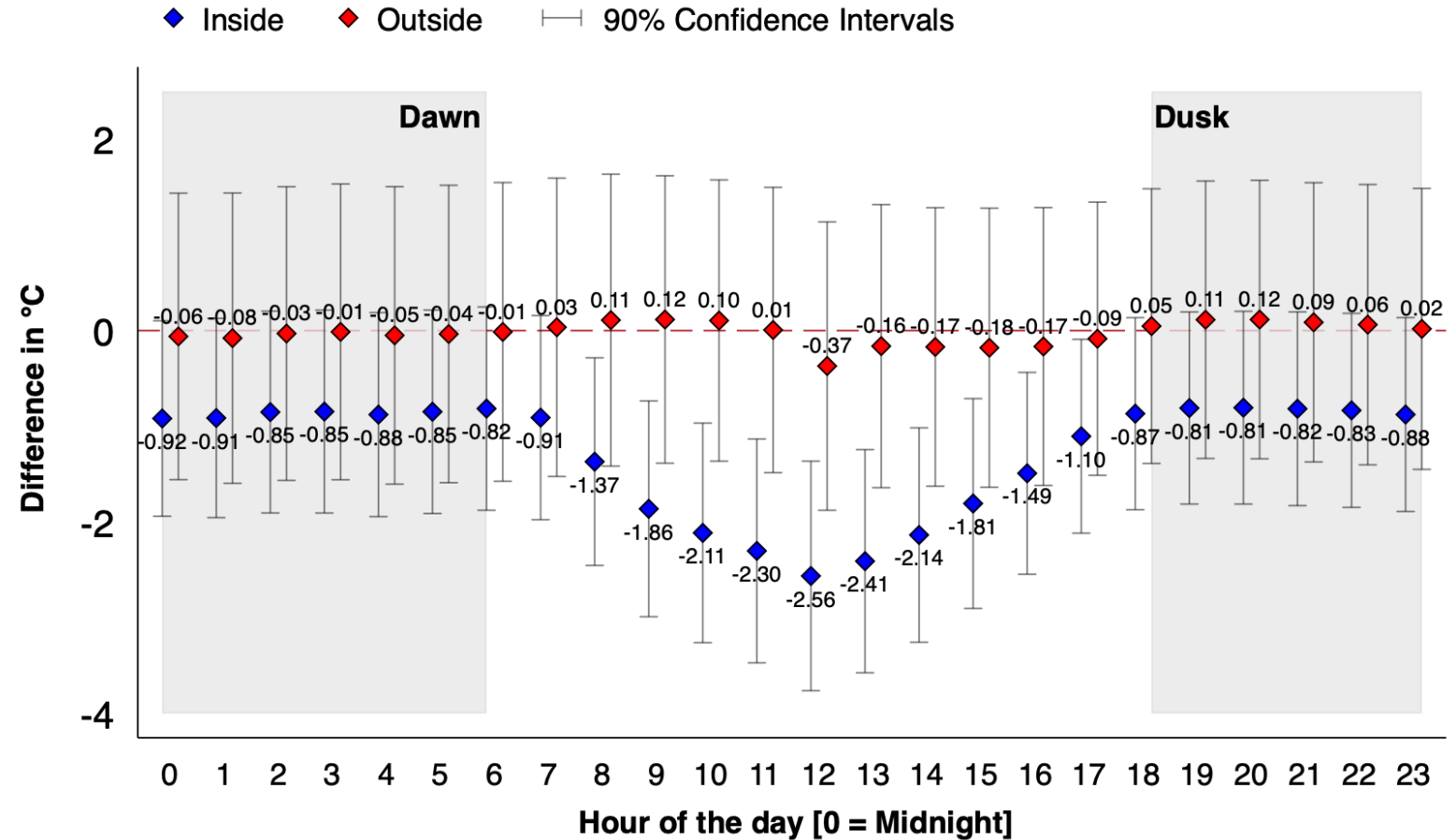


A coated roof  
Area: Karail slum



# Painting Roof to Make it Cooler

Figure 2: Impacts on Temperature of Cool Paint by Hours



## Pre-Post- Intervention- Control Temperature Difference

- Sample size = 100 HHs in Dhaka
- Staggered Experimental Design
- Thermal data collected for 72 hours and 288 observation per structure

# **Cool to be Cool**

***Eco-Friendly Solution***

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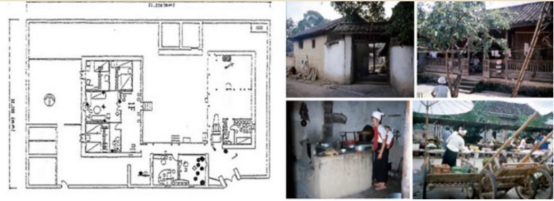
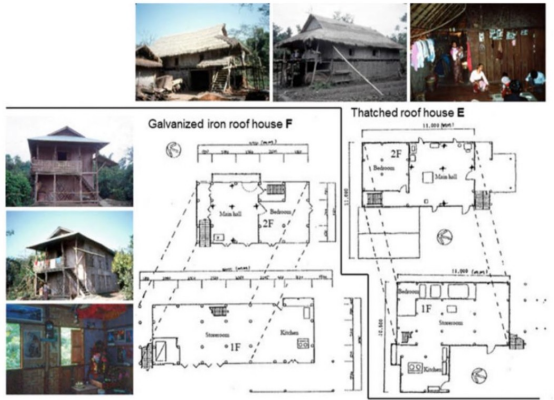


Fig. 7.5. The outside appearances, interior & plan of Han-Dai people house D and the market in Mangshi City



A coated roof  
Area: 1000



# Micro Roof Painting Cross Ventilation House



# **Meso** **Vegetation** **Urban Design**



**Macro**  
***Energy-Mix***  
***Planned Urbanization***



# Future Research

- Can passive cooling and early warning reduce the effect of heat waves on the health and productivity of the healthworkers working in the health facilities?
- Does passive cooling reduce the energy consumption in ready made garments (RMG) industry and improve well being of the workers?

# *Thank You with a few Provocative Questions to ponder*

- Requesting a rich person not to buy AC, is it ethical??
- Is sustainable energy a pragmatic and ethical solution for new non-poor ( LMICs)?

Is aspiration for a comfortable life unacceptable?

# Acknowledgement

- Professor Atonu Rabbani
- Asst Prof. Mrityika Barua
- Dr. Mehedi Hasan
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- Google Images