Heat Exposure and Health Risks in the Durban Minibus Taxi Sector

Report prepared by the South African Medical Research Council for the World Bank

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WORLD BANK GROUP

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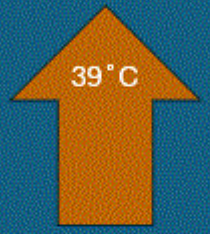
Why worry about heat in minibus taxis?

- Heat, especially extreme heat, can make you feel unwell and affect how your body functions.
- Heat can cause heat stroke; affect any pre-existing conditions you have and can even lead to death.
- Temperatures inside vehicles can get dangerously hot.
- Global warming from climate change could make heat in minibus taxis a problem
- About 16 million people travel daily in minibus taxis South Africa.
- *In hot weather, how hot does it get inside taxis and what can we do about it?*

Study Dates

19-23 March 2024

Temperature inside taxis

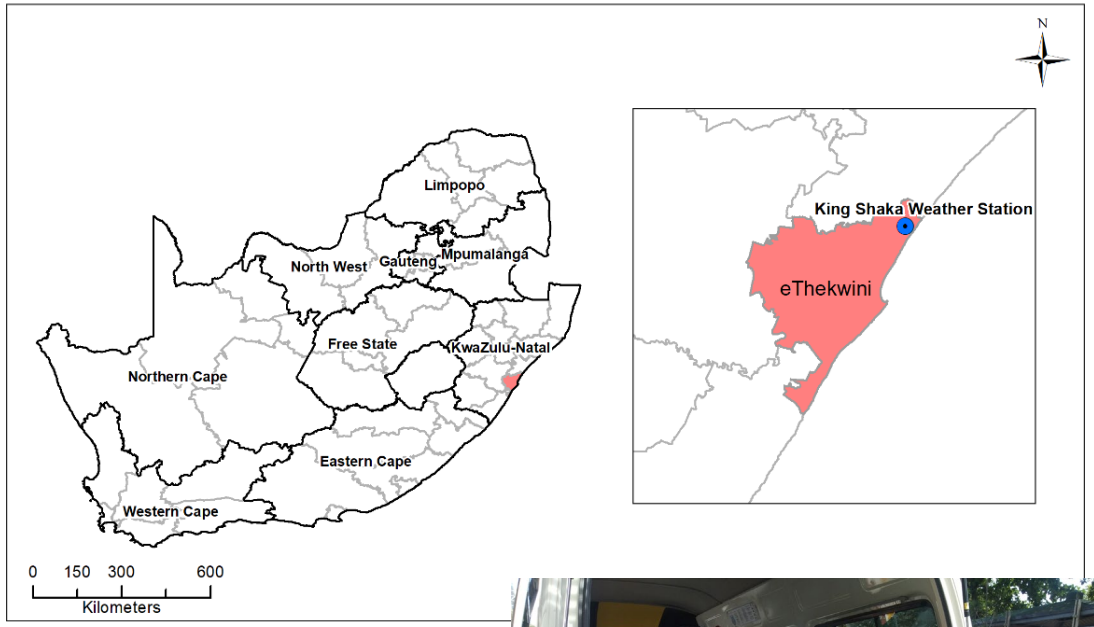


12 Ranks

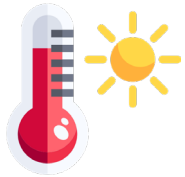
2 250 data points

What did we do?

- We worked with the Chesterville Taxi Association (Dbn).
  - Piloted the study activities in Pretoria.
- Put instruments into 16 minibus taxis.
- Observed taxi ranks and asked drivers about heat.
- Put together the findings and make recommendations.



How did we do it?



Step 1: Install temperature loggers

Loggers were installed **inside taxis** and **at the taxi rank**. Temperature & relative humidity were measured for 5 days **hourly.**

Step 2: Conduct a taxi rank observation

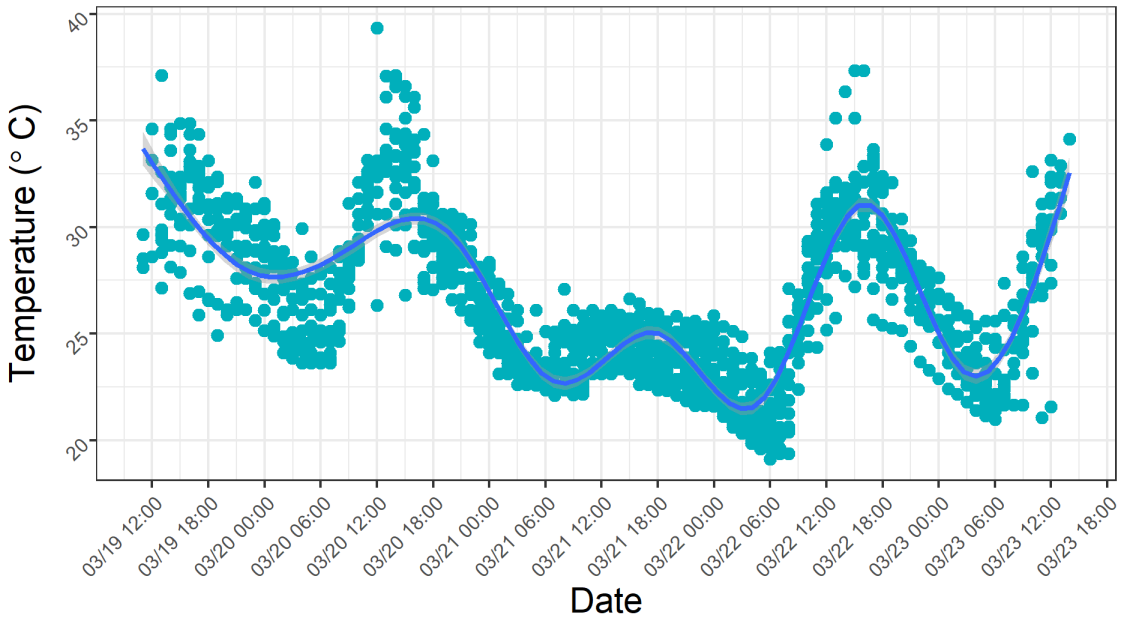
The observation sheet collected **taxi rank infrastructure, commuter needs** and **waiting areas**, and **land cover.**

Step 3: Administer questionnaires

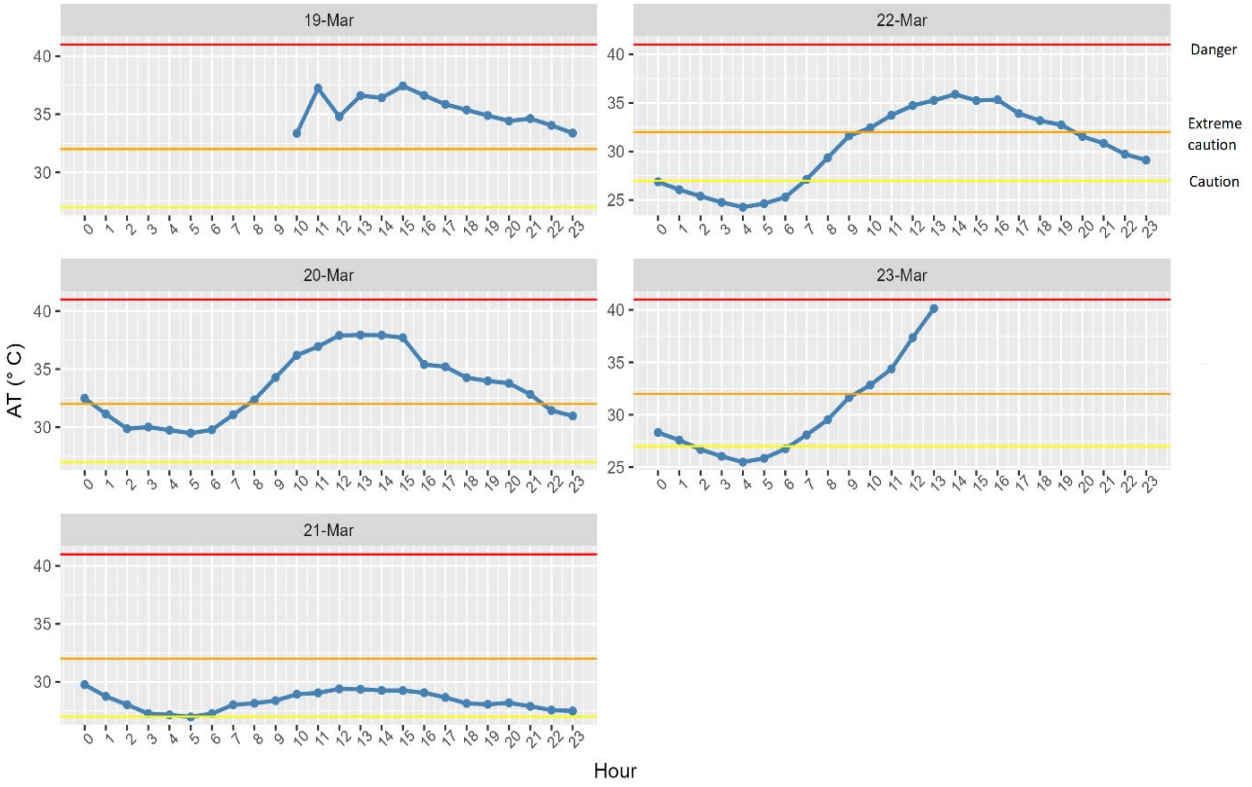
Data collected included demographics, personal experiences with **heat**, thoughts on the **rank infrastructure**, and **heat mitigation.**

What did we find?

Apparent temperature (AT) combines temperature and humidity to make a ‘real-feel’ temperature metric.

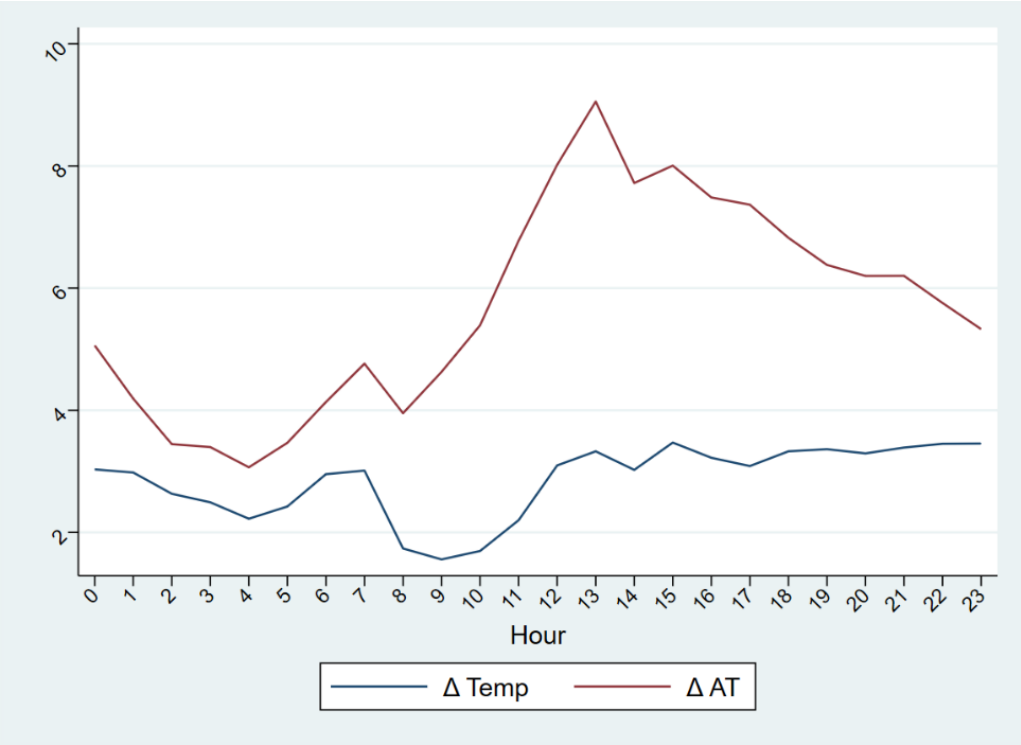


Temperatures inside taxis during the study period ranged from 19°C – 39°C, with a mean of 27°C.



Daily mean apparent temperature inside taxis was above 27°C on all five days, with the highest mean being 35°C.

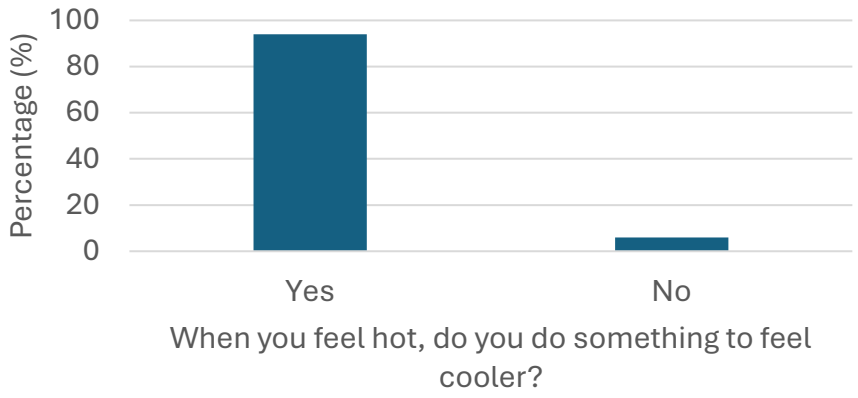
What did we find?



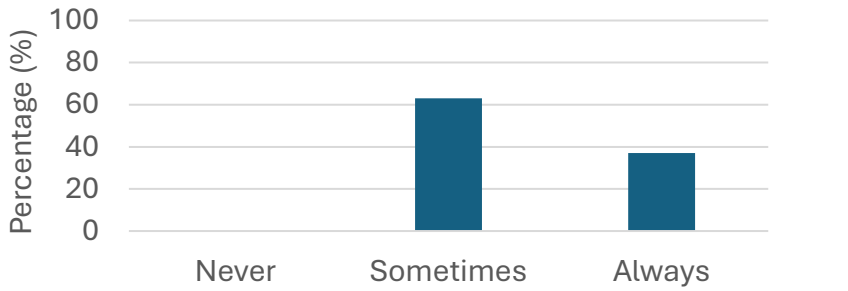
Mean apparent temperature inside taxis was on average 6°C higher than outdoor apparent temperature.

Apparent temperature inside taxis and at the taxi rank were both higher than outdoor ambient temperatures.

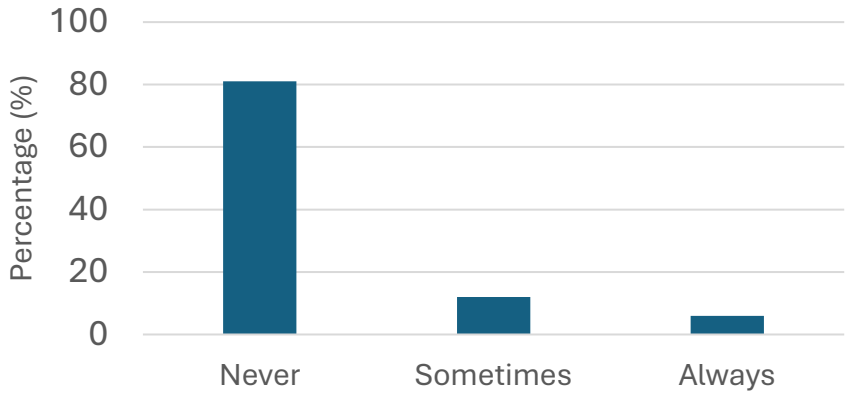
What did taxi drivers think?



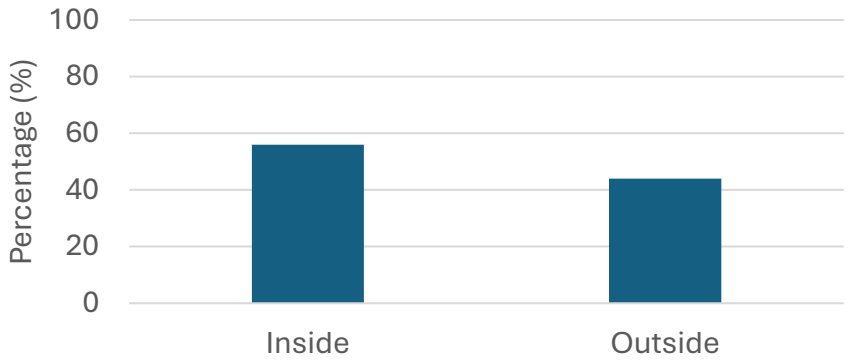
When you feel hot, do you do something to feel cooler?



When you are driving or travelling in the taxi, do you feel hot?



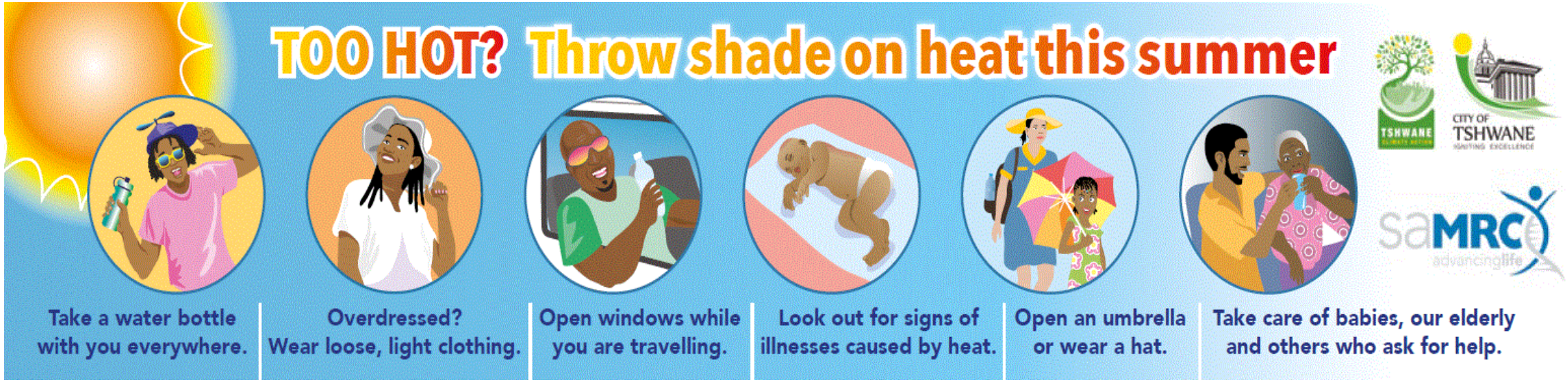
Do you use the fan setting in the taxi?



Do you feel it is hotter inside the taxi rank or outside?

Is this heat risky for our health?

Symptom Band	Classification	Apparent Temperature Range (°C)	Possible health effects on the body
I	Caution	27–32	Fatigue possible with prolonged exposure and/or physical activity
II	Extreme caution	32–39	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
III	Danger	39–51	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
IV	Extreme Danger	51	Heat stroke highly likely



What does this mean?

- Hot days are projected to increase.
- Hot days will happen all year round.
- If temperatures inside taxis are hotter than those outdoors, this is a health risk.
- Since more than 16 million South Africans use taxis, and drivers spend more than 10 hours a day in hot taxis, we need to act now to protect health.

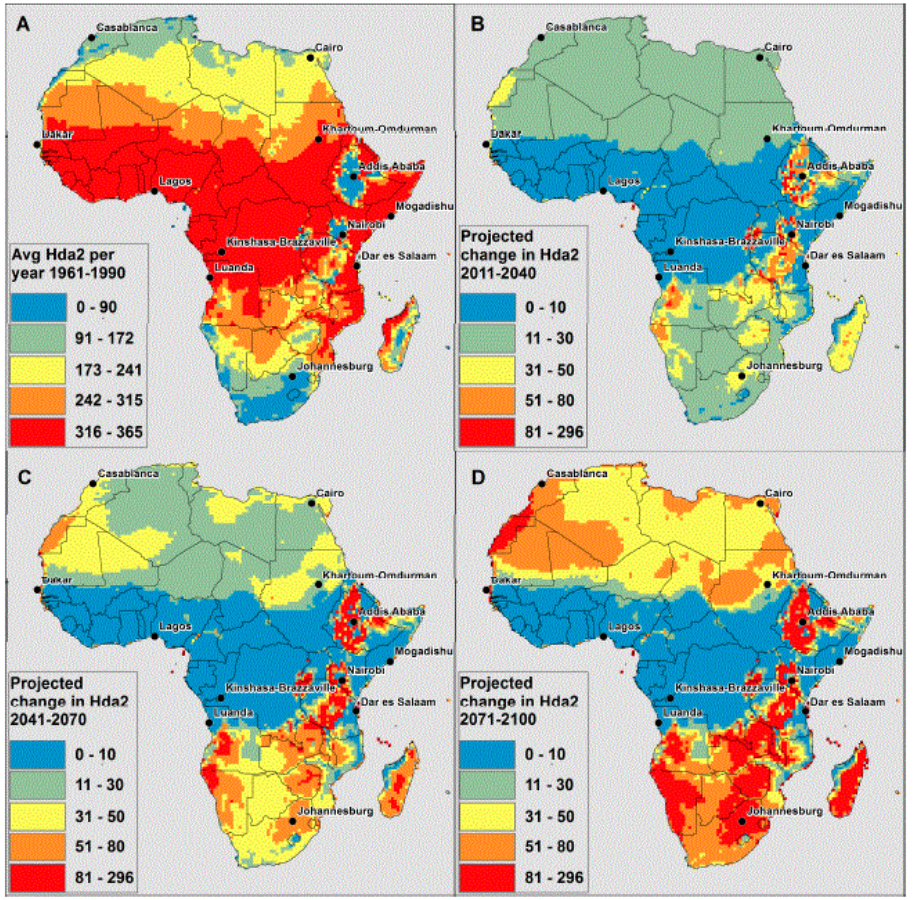


Figure 1. CCAM model derived (**A**) average number of Hda2 per year in present climate; (**B**) projected change in average number of Hda2 per year in 2011–2040 compared to 1961–1990; (**C**) projected change in average number of Hda2 per year in 2041–2070 compared to 1961–1990; (**D**) projected change in average number of Hda2 per year in 2071–2100 compared to 1961–1990.

Garland et al. Regional Projections of Extreme Apparent Temperature Days in Africa and the Related Potential Risk to Human Health. Int J Environ Res Public Health. 2015 Oct 12;12(10):12577-604. 10.3390/ijerph121012577.

What could be some next steps?

In the HiAce: The positioning of the engine under the driver could be reconsidered to reduce heat from the engine contributing to hot temperatures inside the taxi.

The windows could be tinted to reduce sunlight from entering the interior of the taxi and warming temperatures inside the taxi.

Fans could be placed at the front, middle and rear of the taxi to ensure air movement and windows should open wide to allow ventilation.

In the taxi rank: Have water for consumption readily available at drinking fountains or at the very least bathrooms with taps from which people can drink water.

Provide cooling centres where taxi drivers and communities can sit or stand to wait for the next trip. A cooling centre usually has fans or air conditioning.

Take-home messages

- Temperatures inside minibus taxis reached up to 39°C which is HOT and risky to health!
- The temperatures inside minibus taxis were between 3-6°C warmer than outdoors!
- For around 11 hours every day, temperatures inside minibus taxis were warmer than 27°C when temperature affect our health.
- With the projected increase in temperatures caused by climate change, it is imperative to co-develop mitigation and adaptation strategies to minimize heat-related human health risks in minibus taxis and taxi ranks.

Acknowledgements

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- We would like to express our gratitude for the CTA's support, protection services, and taxi drivers who agreed to participate in our study.
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