Data Analysis of Correlation between Singapore Weather Conditions and Construction Site Fatalities

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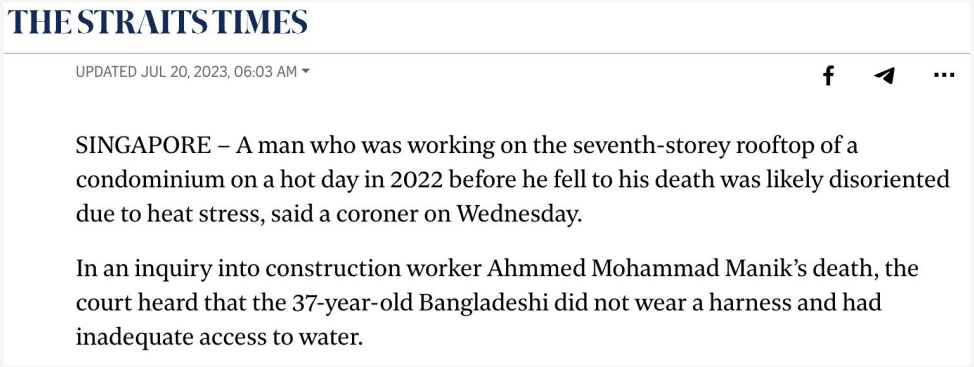
Agenda

- Background & Research Goals
- Correlation Overview
- Mean Sunshine and Construction Fatalities
- Relative Humidity and Construction Fatalities
- Rainy Days and Construction Fatalities
- Mean Temperature and Construction Fatalities
- Rainfall and Construction Fatalities
- Conclusions and Recommendations

Background



THE STRAITS TIMES

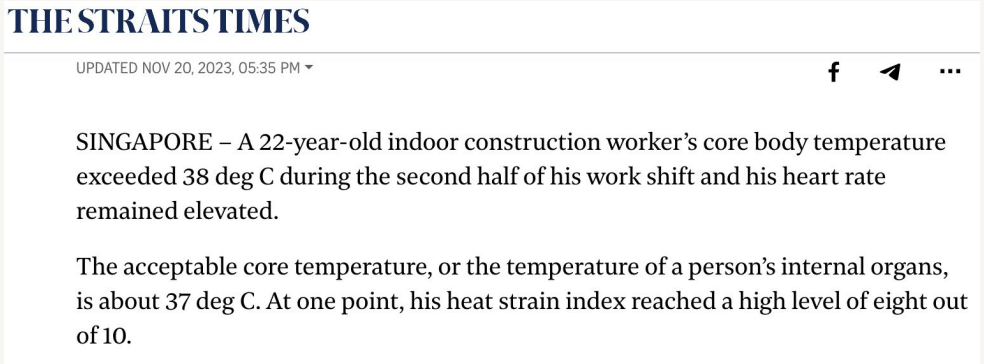
UPDATED JUL 20, 2023, 06:03 AM

SINGAPORE – A man who was working on the seventh-storey rooftop of a condominium on a hot day in 2022 before he fell to his death was likely disoriented due to heat stress, said a coroner on Wednesday.

In an inquiry into construction worker Ahmmed Mohammad Manik's death, the court heard that the 37-year-old Bangladeshi did not wear a harness and had inadequate access to water.

Heat is a notable challenge for construction workers and may be worsening with global warming.

This research aims to analyse weather and accident data to identify the correlation between weather conditions and deaths among construction workers.



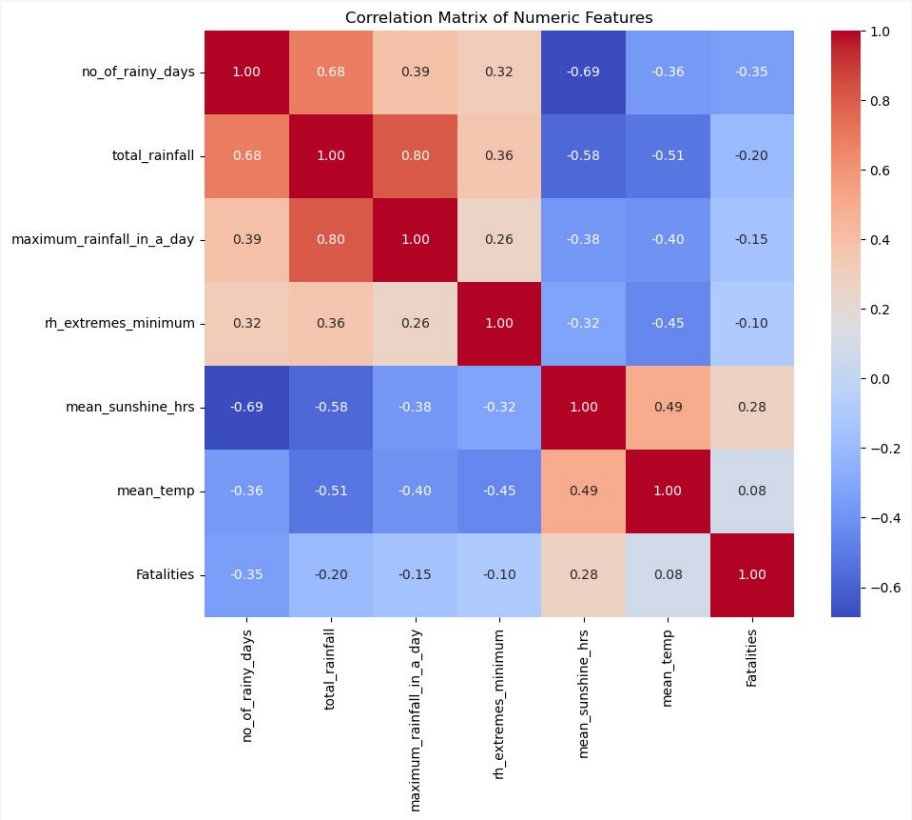
THE STRAITS TIMES

UPDATED NOV 20, 2023, 05:35 PM

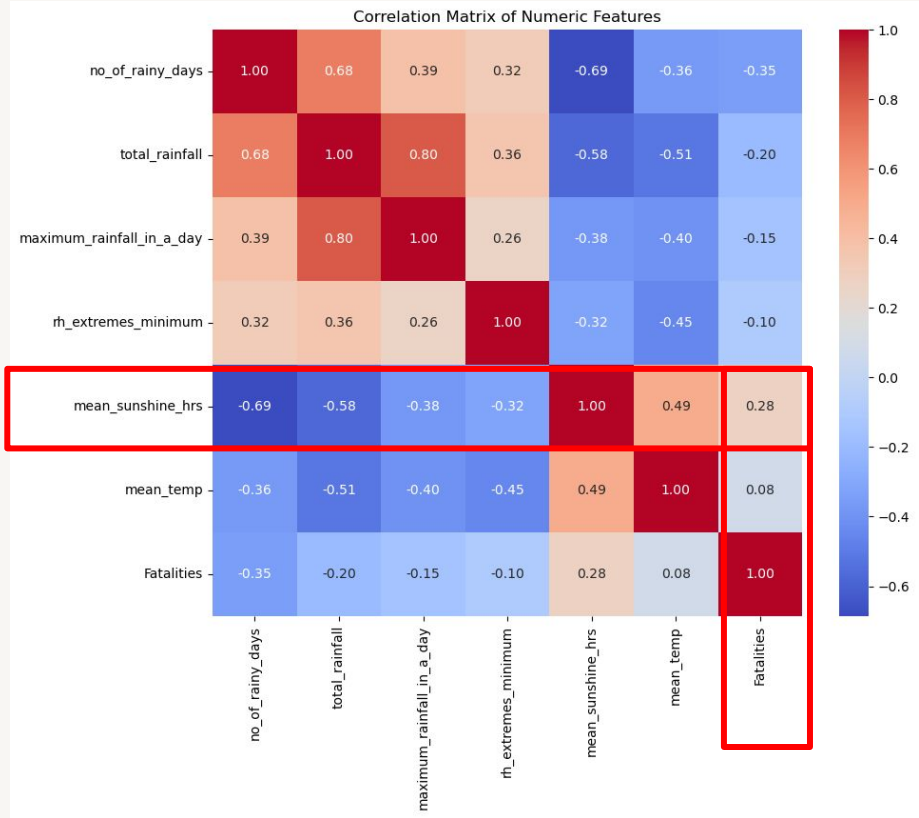
SINGAPORE – A 22-year-old indoor construction worker's core body temperature exceeded 38 deg C during the second half of his work shift and his heart rate remained elevated.

The acceptable core temperature, or the temperature of a person's internal organs, is about 37 deg C. At one point, his heat strain index reached a high level of eight out of 10.

Weather Conditions and Construction Fatalities



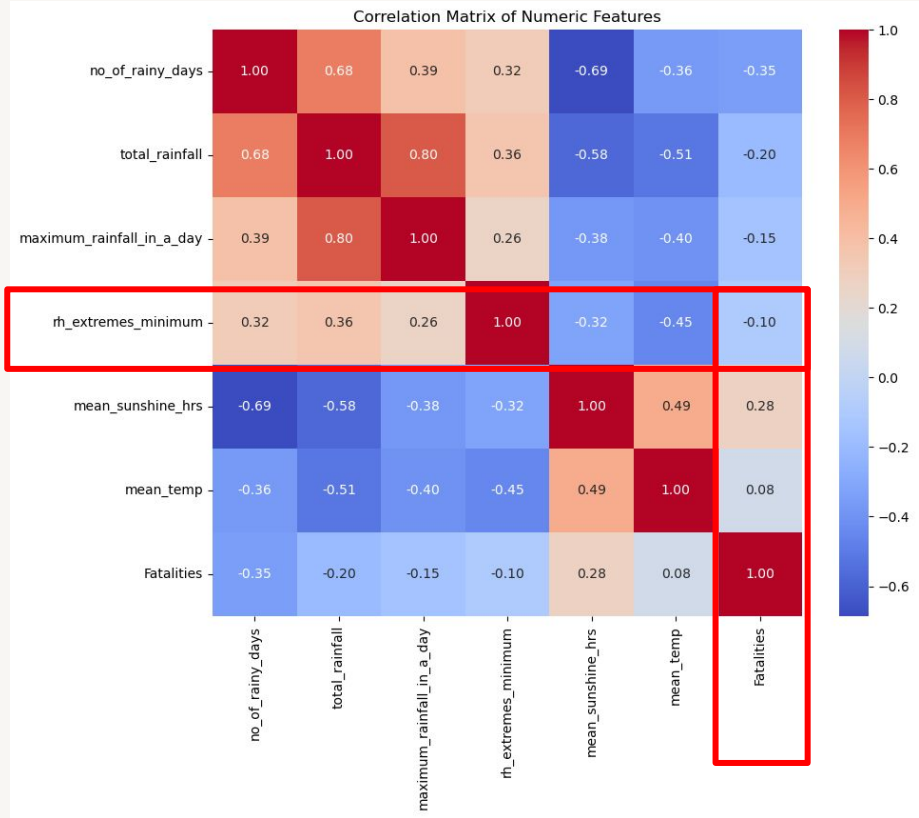
Mean Sunshine and Construction Fatalities



Key Findings

- Fatalities & Mean Sunshine Hours (0.279): The positive correlation could indicate that more sunshine hours, potentially leading to hotter conditions, might increase the risk of heat-related incidents in construction settings. Construction activities might not cease under sunny conditions, possibly elevating the risk of heatstroke or dehydration.

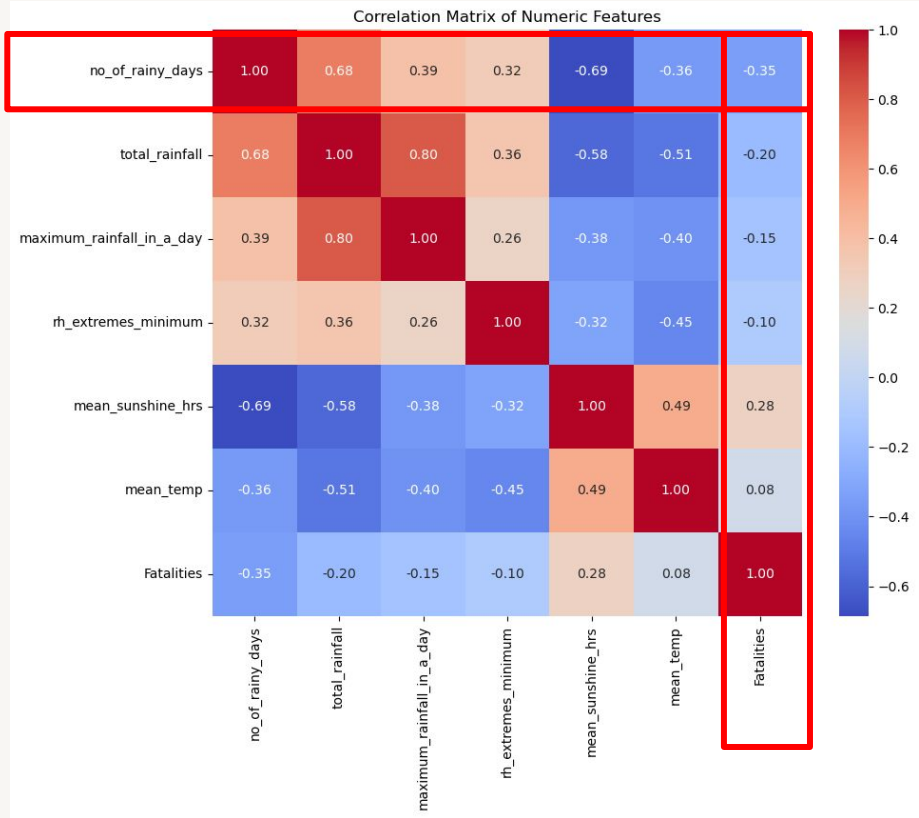
Relative Humidity and Construction Fatalities



Key Findings

- Fatalities & Minimum Relative Humidity (-0.096): The negative correlation here could reflect that lower humidity, often associated with hotter days, marginally affects safety. However, its impact is relatively weak, suggesting that humidity alone isn't a significant risk factor in construction fatalities.

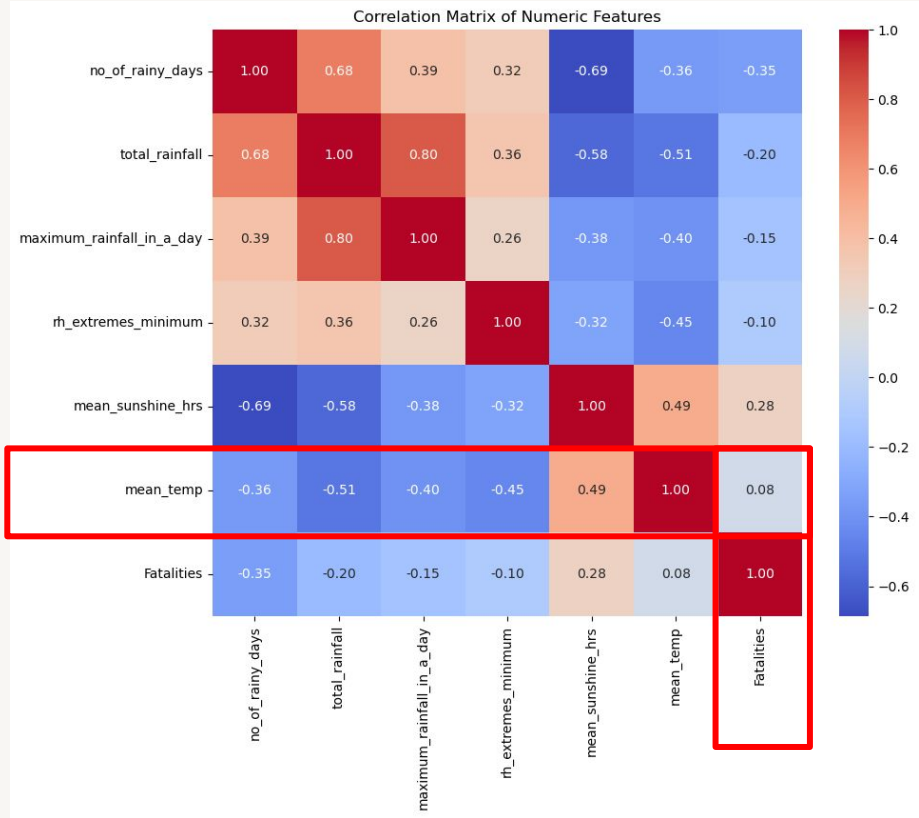
Number of Rainy Days and Construction Fatalities



Key Findings

- Fatalities & Number of Rainy Days (-0.345): The strongest negative correlation suggests that more rainy days, which might also lead to less active construction work outdoors, correlate with fewer fatalities. This could be due to reduced work pace or postponed activities during wet weather, indirectly reducing exposure to risks.

Mean Temperature and Construction Fatalities



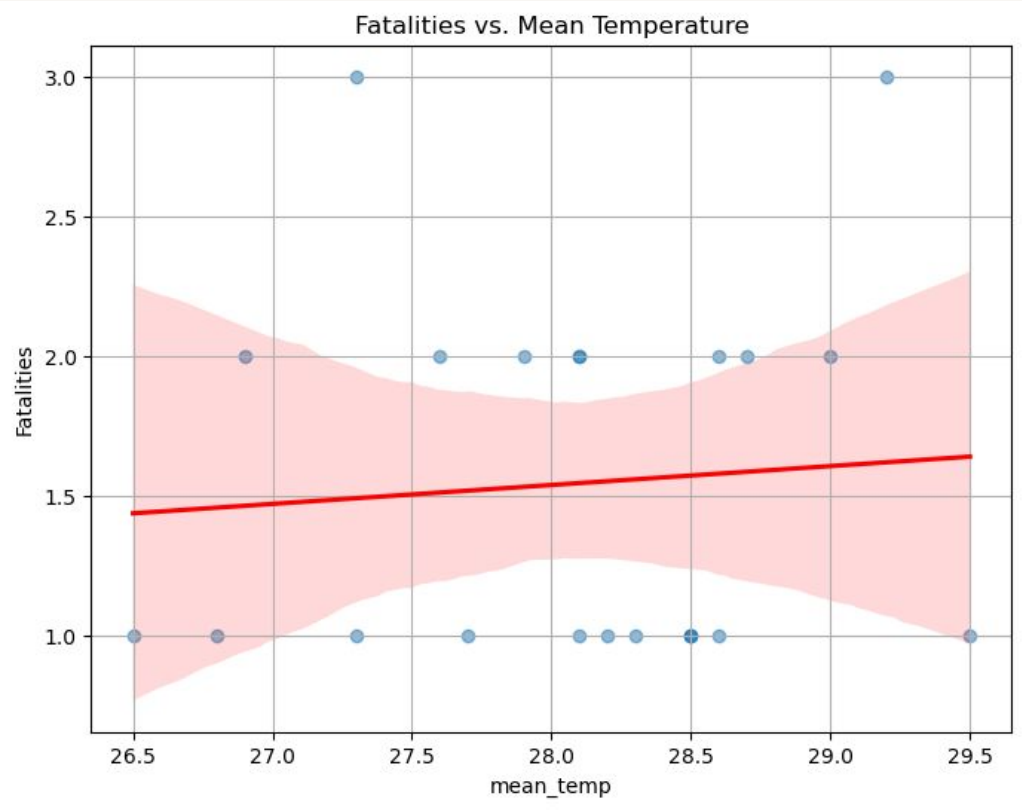
Key Findings

- Fatalities & Mean Temperature (0.079): Although the correlation is slight, higher temperatures might contribute to a riskier environment for construction workers due to heat stress. The impact is relatively minor, suggesting other factors significantly contribute to fatalities.

Mean Temperature and Construction Fatalities

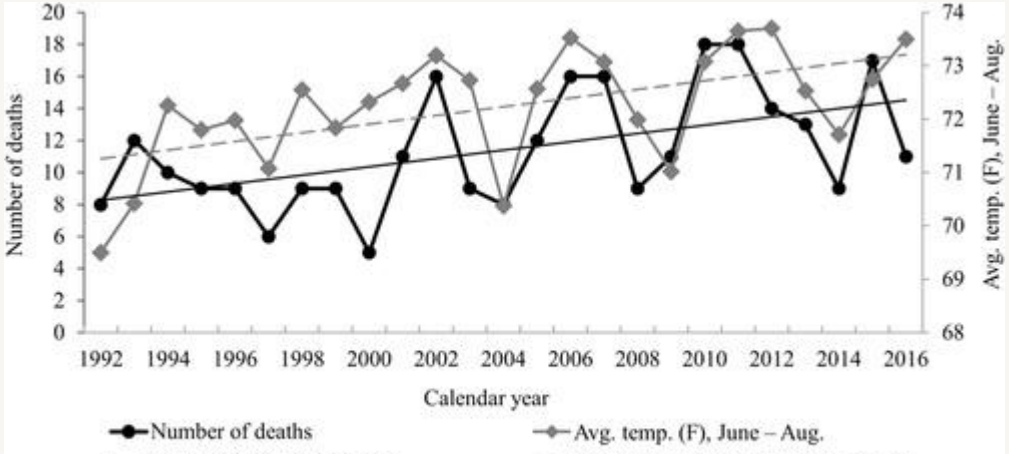
Correlation between Mean Temperature and Fatalities

There's a slight positive correlation between mean temperature and fatalities in the construction industry, indicating a potential increase in risk with higher temperatures. However, the correlation is not strong. This could be due to existing implementations of heat safety measures.



Mean Temperature and Construction Fatalities (US)

Impact of Mean Temperature on Construction Fatalities



Source: American Journal of Industrial Medicine
https://onlinelibrary.wiley.com/doi/10.1002/ajim.23024

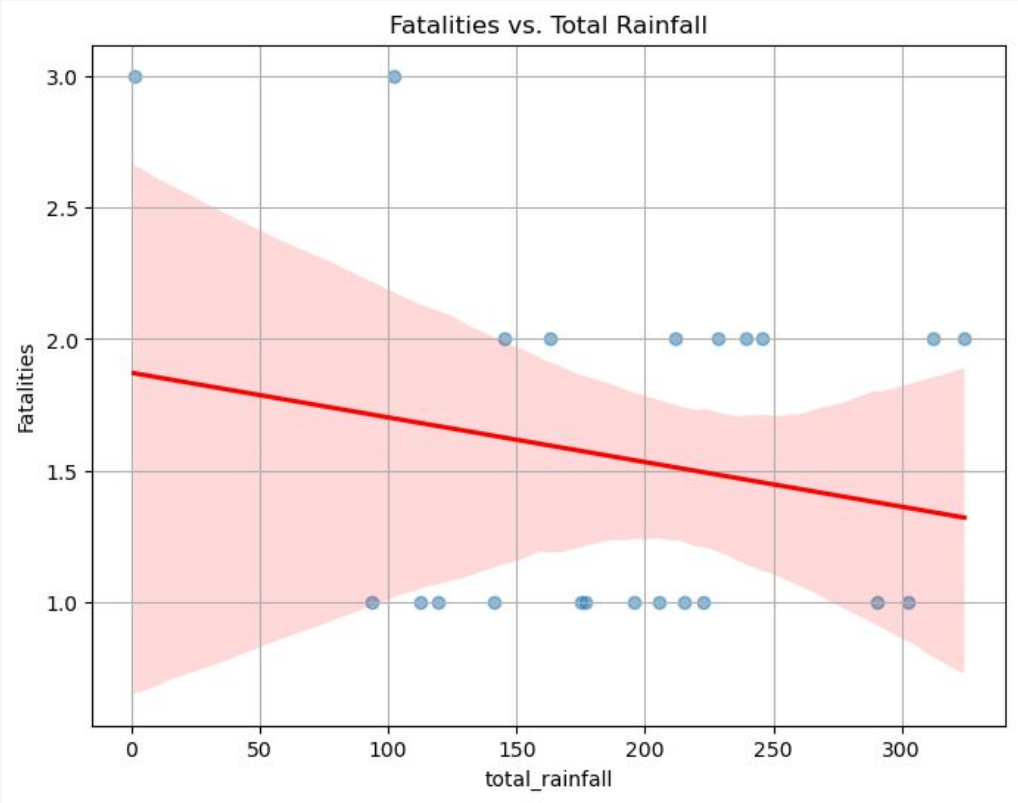
Key Insights:

- The graph illustrates the year-by-year variation in the number of construction fatalities in the US alongside the average temperature from June to August across the years 1992 to 2016.
- We can observe a similar pattern for both lines indicating a correlation between temperature and construction fatalities.

Rainfall and Construction Fatalities

Correlation between Total Rainfall and Construction Fatalities

A mild negative correlation is observed, suggesting that higher rainfall amounts might lead to fewer fatalities in the construction industry. The weak correlation and data variability indicate that rainfall is not a direct predictor of fatalities.



Conclusions and Recommendations

THE STRAITS TIMES

Heat strain a threat to construction workers even in cooler weather and out of sun: Study

UPDATED NOV 20, 2023, 05:35 PM

This article from The Straits Times highlights a study conducted by researchers from the National University of Singapore (NUS), which found that heat-related injuries in construction workers are a persistent risk in Singapore, not just during hot weather but also in cooler months.

Conclusions and Recommendations

Key Findings

The research revealed a slight positive correlation between mean temperature and construction site fatalities, as well as a mild negative correlation between total rainfall and fatalities. These relationships highlight the complexity of environmental factors impacting construction site safety.

Recommendations

Continue to enforce and uphold current safety measures and provide heat & wet-weather safety training, to maintain safety standards on construction sites.

As the climate evolves, ensure weather conditions are monitored closely at work sites and safety measures are taken in accordance to prevailing weather conditions.

Data Analysis Enhancements

Analyze long-term trends to identify patterns and check with MOM for historical data before 2021 to understand if the low correlation between weather conditions and construction fatalities is due to implementation of safety measures from 2021.

Likewise, if there is historical data for construction injuries by month, we can do further analysis since non-fatal accidents may display a correlation to weather conditions as well.

Datasets

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Thank you!