

Urban Heat Island Exposure and Mortality: Findings from a 20-Year Follow-Up Study in the EPIPorto Cohort

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Urban heat is one of the most severe health hazards intensified by climate change. Using georeferenced data from a representative population-based cohort, we found that living in Porto's urban heat island areas increases all-cause mortality during summer but decreases cardiovascular mortality during winter.

BACKGROUND

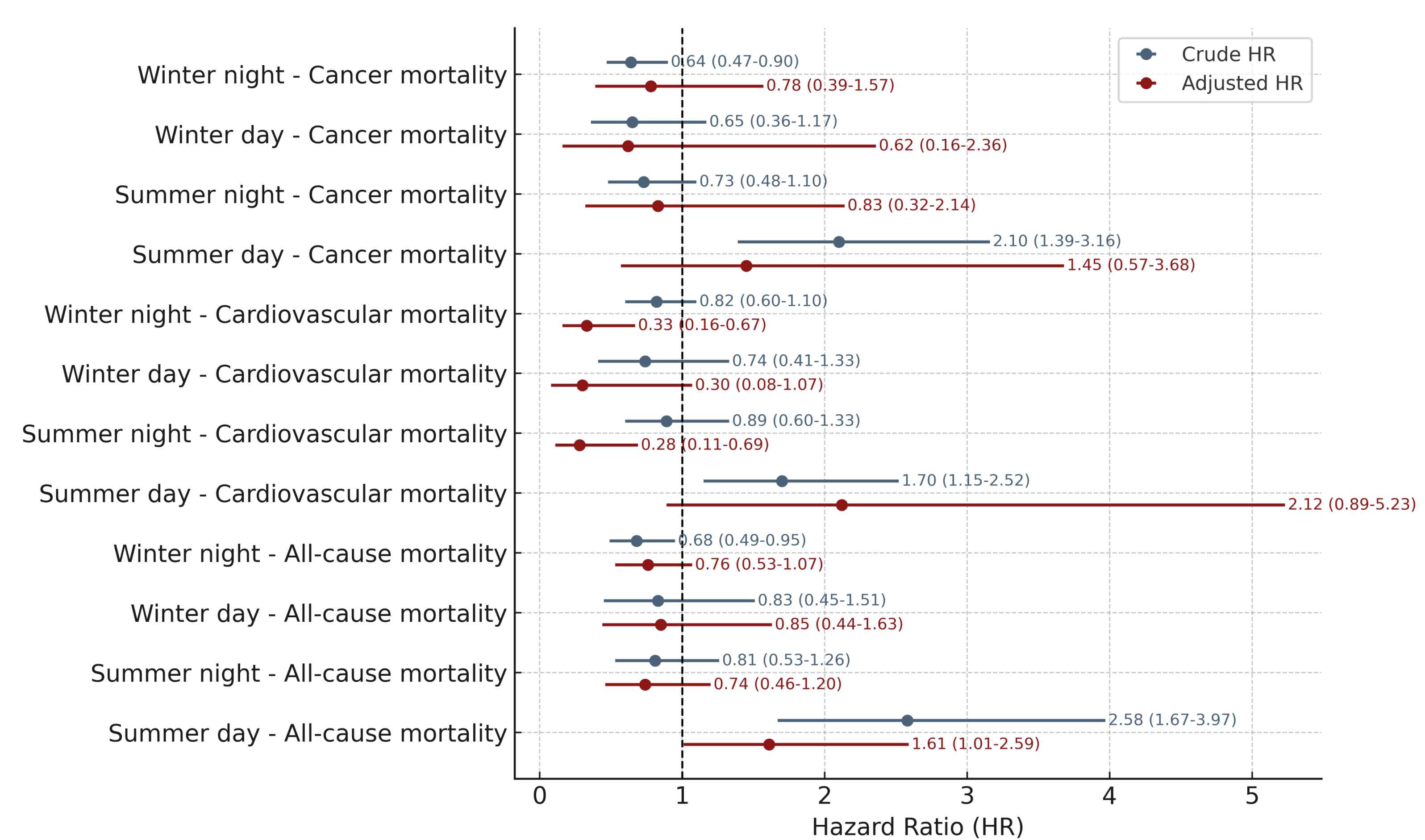
- Urban heat is a major health hazard driven by climate change.
- Urban Heat Islands (UHI)** increase daytime temperatures and hinder nighttime cooling.
- Limited research on lifelong UHI exposure, especially in cohort studies.
- This study investigates the **association between life-course UHI exposure and mortality**.

METHODS

- Study Design:** Longitudinal study based on the **EPIPorto cohort** from Porto in Portugal (n=2485).
- Mortality data:** All-cause, cancer (ICD-10 C00–C97), and cardiovascular disease (I00–I99) mortality.
- Urban Heat Island data:** UrbClim model, providing **100 m resolution data on temperature anomalies** (difference between urban and suburban/rural areas) during **summer and winter days and nights**.
- Statistical Analysis:**
 - Proportional hazard regression models.** Adjusted for age, housing typology, education, occupation, deprivation. Normalized Difference Vegetation Index, PM_{2.5} and NO₂.
 - Latent class linear mixed models** to determine **trajectories** of UHI exposure.

RESULTS

Associations (Hazard Ratio and 95% Confidence intervals) between mortality (all-cause, cardiovascular and cancer) and Urban Heat Island (life-long average temperature anomalies, °C) season and time of day (n=2485, EPIPorto, Porto, Portugal).



- Higher and positive temperature anomalies during summer days were associated with an increased risk of all-cause mortality.
- Winter night positive temperature anomalies were linked to a reduced risk of cardiovascular mortality.
- No associations were found when using the exposure trajectories.

CONCLUSIONS

- Living in Porto's Urban Heat Island areas increases all-cause mortality during summer but decreases cardiovascular mortality during winter.
- These findings emphasize the need for housing and urban planning strategies to mitigate both winter cold and summer Urban Heat Island.

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FUNDING

This work was supported by FCT - Fundação para a Ciência e Tecnologia, I.P. through the projects with references UIDB/04750/2020 and LA/P/0064/2020 and DOI identifiers <https://doi.org/10.54499/UIDB/04750/2020> and <https://doi.org/10.54499/LA/P/0064/2020>. Ana Isabel Ribeiro was supported by National Funds through FCT, under the 'Stimulus of Scientific Employment - Individual Support' program within the contract [CEECIND/02386/2018] and Cláudia Jardim Santos was supported by National Funds through FCT, under the Ph.D. fellowship [UI/BD/150782/2020].

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the participants enrolled in EPIPorto for their kindness.

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