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159 - EXPLAINING MORTALITY DURING HEATWAVES IN SPAIN, 2015-2025: DRIVERS, PATTERNS AND FUTURE RISKS

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Resumen

Background/Objectives: Heatwaves have become more frequent, longer, and more intense in recent decades across much of the world due to climate change, with Europe among the most affected regions, posing a growing threat to public health. The summer of 2025 was unprecedentedly warm in Spain, marking it one of the most extreme heat seasons on record and highlighting the need to better understand its health impacts.

Methods: We analyzed the relationship between heat and mortality across the 2015-2025 period, leveraging Spain’s high-resolution mortality surveillance and meteorological data. We systematically evaluated multiple heat metrics and spatial scales using generalized additive models (GAMs) to identify relevant drivers of heatwave-related mortality. We combined the resulting estimates with Global Climate Models to obtain risk projections of heat-attributable mortality for upcoming years (2021-2040).

Results: Mortality increased by 15-25% per unit rise in heat metrics, with national mortality best explained by indices of extreme temperature and provincial mortality by cumulative exposure. Heat-attributable deaths declined annually by 3.9% (provinces) to 5.8% (nationwide), suggesting partial adaptation, yet forecasts largely overestimated the exceptional heatwaves of 2025. Regional differences emerged as a key factor, with varying province-specific associations capturing spatial heterogeneity in vulnerability and adaptation. When combined with climate projections, results indicate increased risks in inland regions where warming and vulnerability converge.

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Conclusions/Recommendations: Spain’s experience offers valuable lessons for other regions facing increasingly frequent and intense heatwaves. Targeted prevention and mitigation measures seem mandatory for the regions under increased risk. Extreme heatwave events are still challenging from a predictive point of view.

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