

studied. This study aimed to assess the interaction effect of extreme heat and PM on daily mortality across mainland Portugal. We conducted a two-stage time series analysis for the summers (May–September) from 2003 to 2023, using daily data on maximum temperature, mean PM<sub>10</sub> and PM<sub>2.5</sub> concentrations separately, and all-cause mortality across all mainland districts. Extreme heat and high PM levels were defined as values above the 90th percentile. To account for delayed effects, a 7-day moving average was used for PM, and distributed lag non-linear models (DLNM) with a 10-day lag for temperature. In the first stage, we estimated cumulative relative risks (cRR) of the interaction between exposures on mortality, using the minimum mortality temperature (MMT) and high PM as reference. District cRR were pooled using a random-effects meta-analysis, with the European Deprivation Index (EDI-PT) as a meta-predictor. An interaction effect between extreme heat and high PM pollution on mortality was found in most districts. cRR ranged from 1.01 (95% CI: 0.93; 1.11) to 1.35 (95% CI: 1.17; 1.56) for extreme heat and high PM<sub>2.5</sub>, and from 1.02 (95% CI: 0.86; 1.22) to 1.34 (95% CI: 1.16; 1.55) for extreme heat and PM<sub>10</sub>, compared with MMT and high PM. The overall interaction effect in mainland Portugal, for temperatures at the 90th percentile, both showed an overall cRR of 1.03 (95% CI: 1.01; 1.05). EDI-PT was excluded as it did not explain the heterogeneity between districts. There is a synergistic effect between extreme heat and PM on mortality in Portugal. This highlights the need to integrate this evidence into public health measures, enhancing health surveillance systems to better monitor and respond to the joint effects of extreme heat and air pollution.

**Key messages:**

- Extreme heat and air pollution have a synergistic effect on mortality across Portugal, highlighting the need for climate-adaptive public health strategies.
- Findings support enhancing health surveillance systems to better monitor and respond to the combined effects of extreme heat and air pollution on mortality.

**Abstract citation ID: ckaf161.952**

**Combined effect of extreme heat and particulate matter on daily mortality in mainland Portugal**

Filipa Canha

*F Canha<sup>1</sup>, A Leite<sup>2,3</sup>, V Gaio<sup>2,3</sup>, SP Silva<sup>2</sup>*

<sup>1</sup>Public Health Service, Local Health Unit Almada-Seixal, Almada, Portugal

<sup>2</sup>Department of Epidemiology, Instituto Nacional de Saúde Doutor Ricardo Jorge, Lisbon, Portugal

<sup>3</sup>Public Health Research Centre, ENSP, CHRC, LA-REAL, CCAL, NOVA University Lisbon, Lisbon, Portugal

Contact: filipa.canha@ulsas.min-saude.pt

Rising temperatures and air pollution in the context of climate change pose increasing health risks. Evidence suggests a synergistic effect between heat and PM, but few areas of Portugal have been