Extended abstract

Background

Climate change poses growing challenges across political, socioeconomic, and public health dimensions. The rising frequency, duration, and intensity of environmental hazards, such as heatwaves, cold spells, floods, and air pollution, has made it increasingly urgent to identify who is most at risk, in order to develop effective protection and adaptation strategies (Yadav & Upadhyay, 2023). Vulnerable groups such as children, individuals with pre-existing health conditions, women, and older adults are particularly at risk due to a combination of biological, social, and structural factors that may limit their capacity to adapt to environmental stressors (Figueiredo et al., 2024). While a growing body of literature has examined the (short-term) health impacts of climate change-related exposures (with a focus on mortality), less is known about the morbidity consequences for older adults, especially when disaggregated by sex and examined across a set of health outcomes. Morbidity outcomes are understudied compared to mortality, yet they are critical: they may signal early declines in health before individuals are hospitalised or die and may be more observable also among populations with limited healthcare access, allowing for a larger sample size (Midões et al., 2024). The same applies to the group under study: while there is literature covering women and the elderly (separately), both are far from being homogeneous groups. They vary in age, socioeconomic status, health conditions and so on. Combining older age with biological sex introduces additional complexity: a 65-year-old woman and a 90-year-old man can differ meaningfully in health status, environmental exposure, and socioeconomic vulnerability. These differences are seldom captured in aggregate analyses. Using longitudinal SHARE data, this study aims to capture early stages of climate-related health impacts arising from different environmental exposures (temperature variability, radiation, air pollution, precipitation, and flood events), offering a sex- and age-sensitive understanding of climate vulnerability among older Europeans.

Theoretical framework and RQ

This study applies an intersectional life course framework, recognising that both biological sex and gender roles shape vulnerability to climate-related health risks. Women tend to live longer, earn less, and take on more unpaid care and domestic work, which can increase long-term exposure to environmental stressors and reduce adaptive capacity. Biological differences (e.g., BMI, disease risk, life expectancy) and gendered health patterns further compound this (Anjum & Aziz, 2025; Figueiredo et al., 2024; Gamble et al., 2013). These risks accumulate over time, making older women, and especially the oldest-old, particularly vulnerable.

The research question guiding this study is: How do climate-related exposures influence health outcomes in older Europeans, and do these associations differ by sex?

With this, I want to test the following hypotheses:

- **H1:** Higher levels of environmental exposures are associated with poor health outcomes among older adults.
- **H2:** The associations between environmental exposures and health outcomes differ between older women and men.
- **H3:** The strength and direction of associations between exposures and health vary across different health outcome domains.
- **H4:** Associations between exposures and health outcomes vary by age group, with the oldest-old potentially showing greater vulnerability, including possible sex-specific patterns.

Data

The study uses data from the Survey of Health, Ageing and Retirement in Europe (SHARE), a longitudinal, multidisciplinary panel covering health, socioeconomic status, and social networks across 28 countries. Its harmonised design enables international comparisons and captures the dynamic ageing process through rich data on health, biomarkers, economics, and social support (Börsch-Supan et al., 2013). These are merged with the SHARE-ENV module, which is a publicly accessible, individual-level longitudinal dataset that links the SHARE survey with detailed environmental exposure data (on temperature (hot/cold), air pollution, precipitation, radiation, floods) to enable research on the health and social impacts of climate change. It links respondents to region-level climate indicators based on NUTS-2 codes and interview timing (Midões et al., 2024). I restrict my sample to individuals aged 65 and older from multiple European countries, allowing for cross-national variation and the inclusion of country fixed effects.

Method

This study applies a longitudinal panel analysis using individual fixed-effects regression models to examine whether changes in environmental exposures over time are associated with changes in health outcomes among adults age 65+. The fixed-effects approach controls for all time-invariant individual characteristics, isolating the impact of within-person changes in exposure. Separate models are estimated for five health domains, where I group SHARE variables into: health status,

mental health, healthcare utilisation, functional health, and cognitive health. To assess heterogeneity, the analysis incorporates interaction terms (e.g., exposure × female) to test whether the effects differ by sex. Further, I estimate stratified models by sex and age group (65–74, 75–84, 85+) to explore whether climate-related health impacts vary across demographic subgroups. Sensitivity analyses test alternative lag structures and exposure specifications to assess the robustness of results. Due to limited data coverage and event rarity, exposures such as pollution, precipitation, and floods are incorporated in an exploratory capacity.

Expected findings and contribution

I expect to find that higher levels of heat and solar radiation are associated with declines in mental, functional and cognitive health, increased healthcare use, and worsened health status (although effects may differ by outcome group). Older women may show greater susceptibility, particularly in domains related to physical health and healthcare use, reflecting both physiological and social vulnerabilities. Mental health outcomes may show more nuanced patterns, depending on social support and adaptation behaviours. I also expect to find an age gradient, with the oldest-old facing the most pronounced health impacts. The interaction of age and sex may reveal that older women in this group are particularly at risk, aligning with the intersectional framework. With this study, I aim to contribute to the growing literature on climate change and health by: Using longitudinal, individual-level data with validated health outcomes, incorporating region-linked environmental exposures across multiple climate hazards, and by testing for sex-specific and age-specific vulnerability. Findings may inform demographers and public health preparedness in the context of climate change adaptation. Recognising heterogeneous vulnerabilities is essential for developing targeted interventions for ageing populations.

References

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