



# Health Impacts of droughts: current evidence and challenges

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## Background

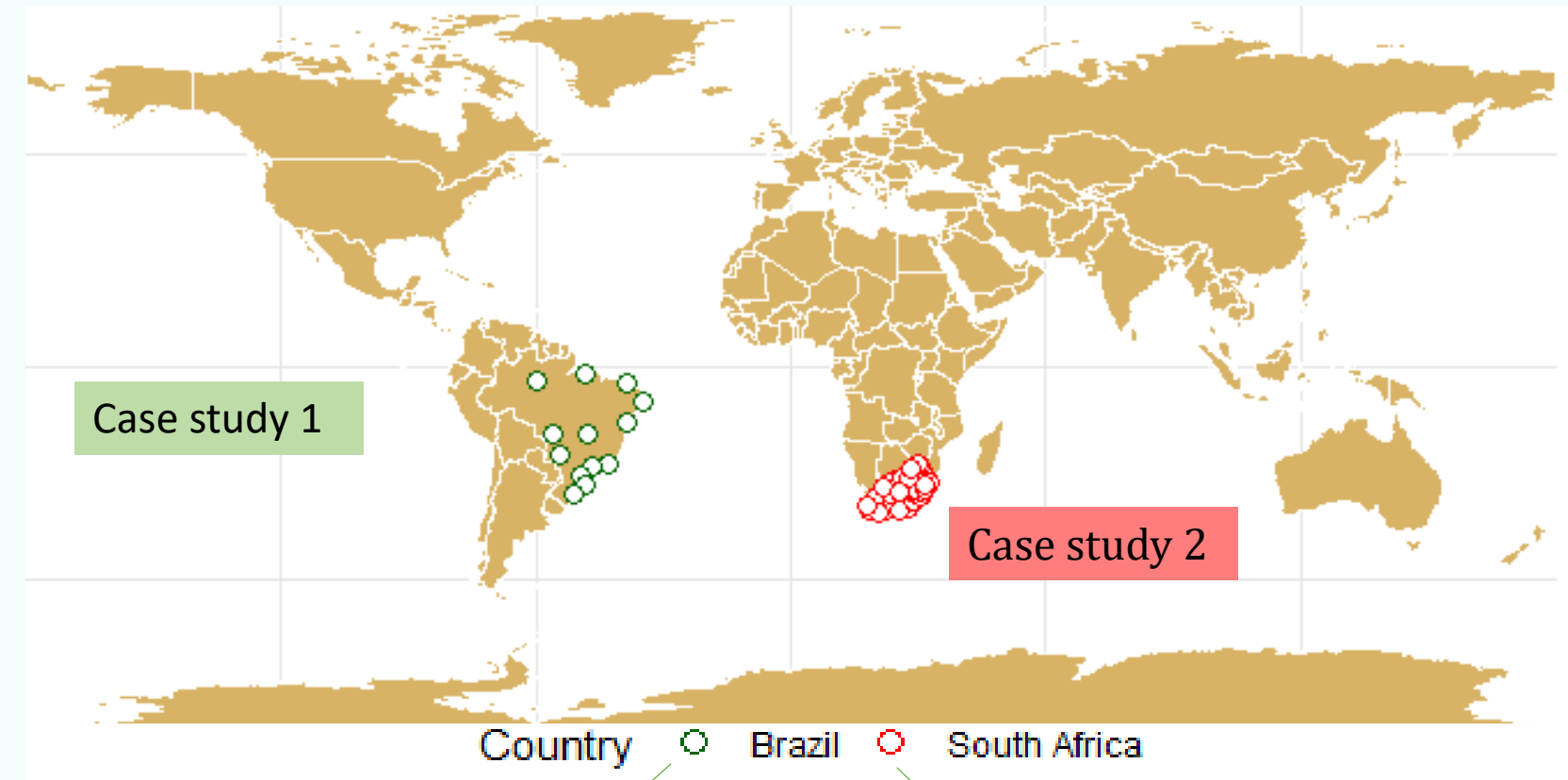
Climate change is a global pressing challenge today. Exposure and vulnerability to extreme weather events are expected to increase due to climate change, contributing to a growing health burden, economic losses, and social inequalities worldwide. **Drought**, in particular, is the leading weather-related cause of death. However, quantitative evidence on the health impacts of droughts is limited and inconsistent, with the mechanisms mediating the association and the factors contributing to vulnerability remaining unclear. **These knowledge gaps are pronounced in communities in the Global South**, which face resources constraints and reduced adaptative capacity to address climate change-related risks.

## Objectives

1. Overview of recent evidence on short-, medium-, and long-term droughts-related health effects: two case studies: 13 macro-urban areas in Brazil [1] & 52 municipality districts in South Africa [2].
2. Discuss the latest methodological advances in climate epidemiology and new interdisciplinary initiatives (IGIA-SETH project) to address existing uncertainties and potential future challenges.

## Data & Methods

### STUDY REGIONS



### DATA (WEEKLY)

**Mortality (by age groups and causes) (SUS in Brazil)**  
Non-external (A00-R99)  
Circulatory (I00-I99)  
Respiratory (J00-J99)

**ERA5-reanalysis climate data (Tmean)**  
Drought index: SPEI-1  
(<https://lcsc.csic.es/es/>)

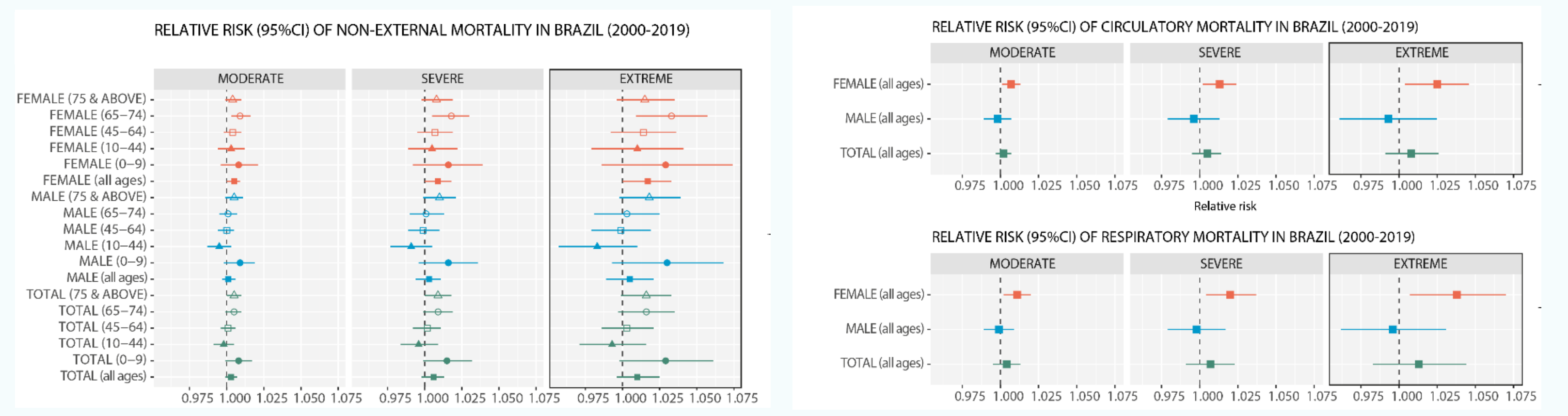
**Mortality (by age groups and causes) (SA statistics)**  
Total; Circulatory; Respiratory; Nutritional, endocrine & metabolic (E00-E90); Certain infections (A00-B99)  
**ERA5 reanalysis climate data (Tmin, Tmean, Tmax, Precipit.)**  
Drought indices: SPEI-1,6,12,15

### TWO-STAGE TIME SERIES ANALYSIS DESIGN

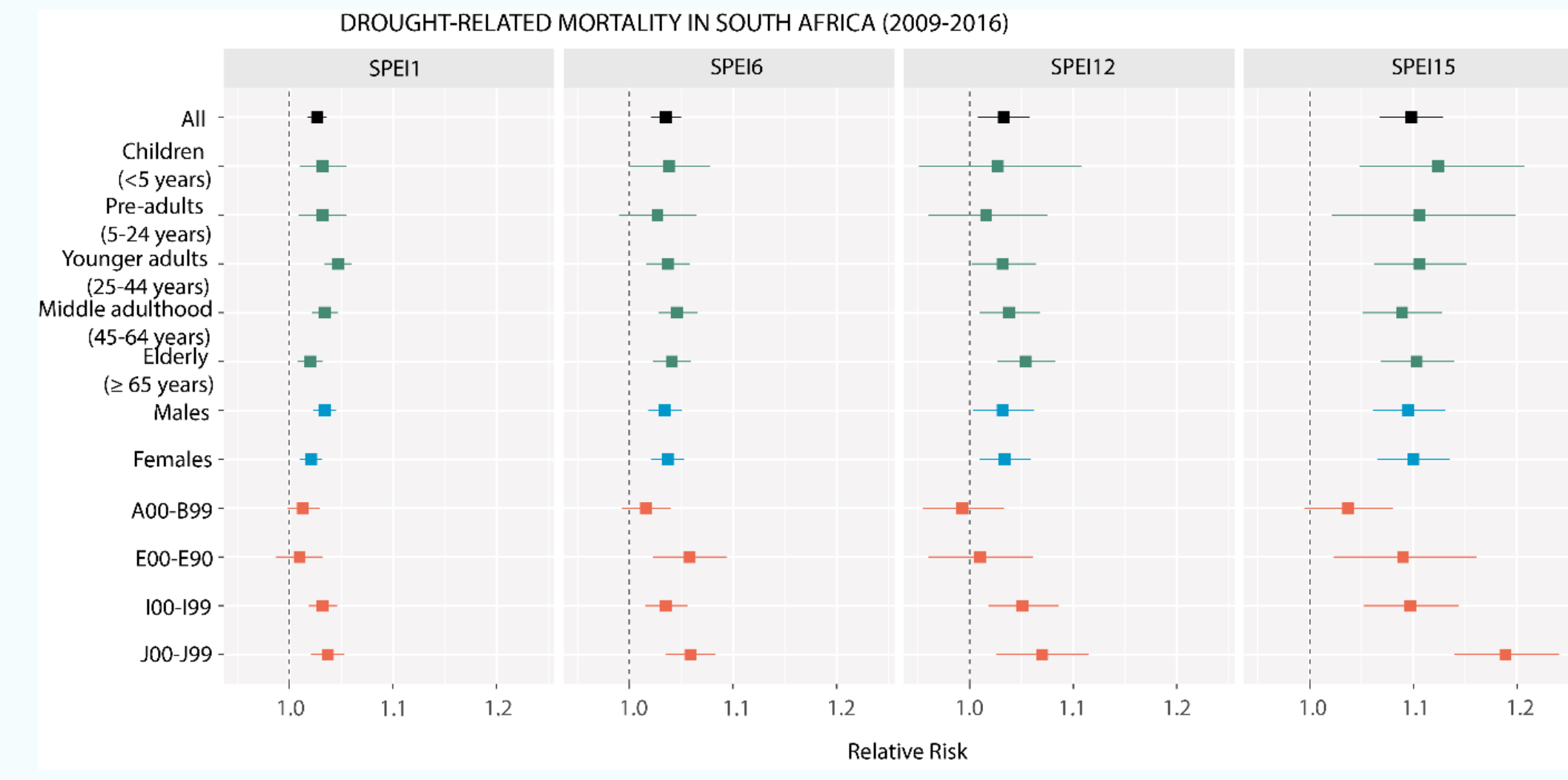
- 1) location-specific drought- related mortality associations using quasi-Poisson models with DLNMs [3]
- 2) meta-analytical models to derive pooled associations
- 3) stratified analysis by population groups and diagnoses

## Results

**Risk increases when SPEI-1 increases from 0 to values indicating moderate (SPEI=-1.28), severe (SPEI=-1.65), and extreme (SPEI=-2.33) severity [1]**



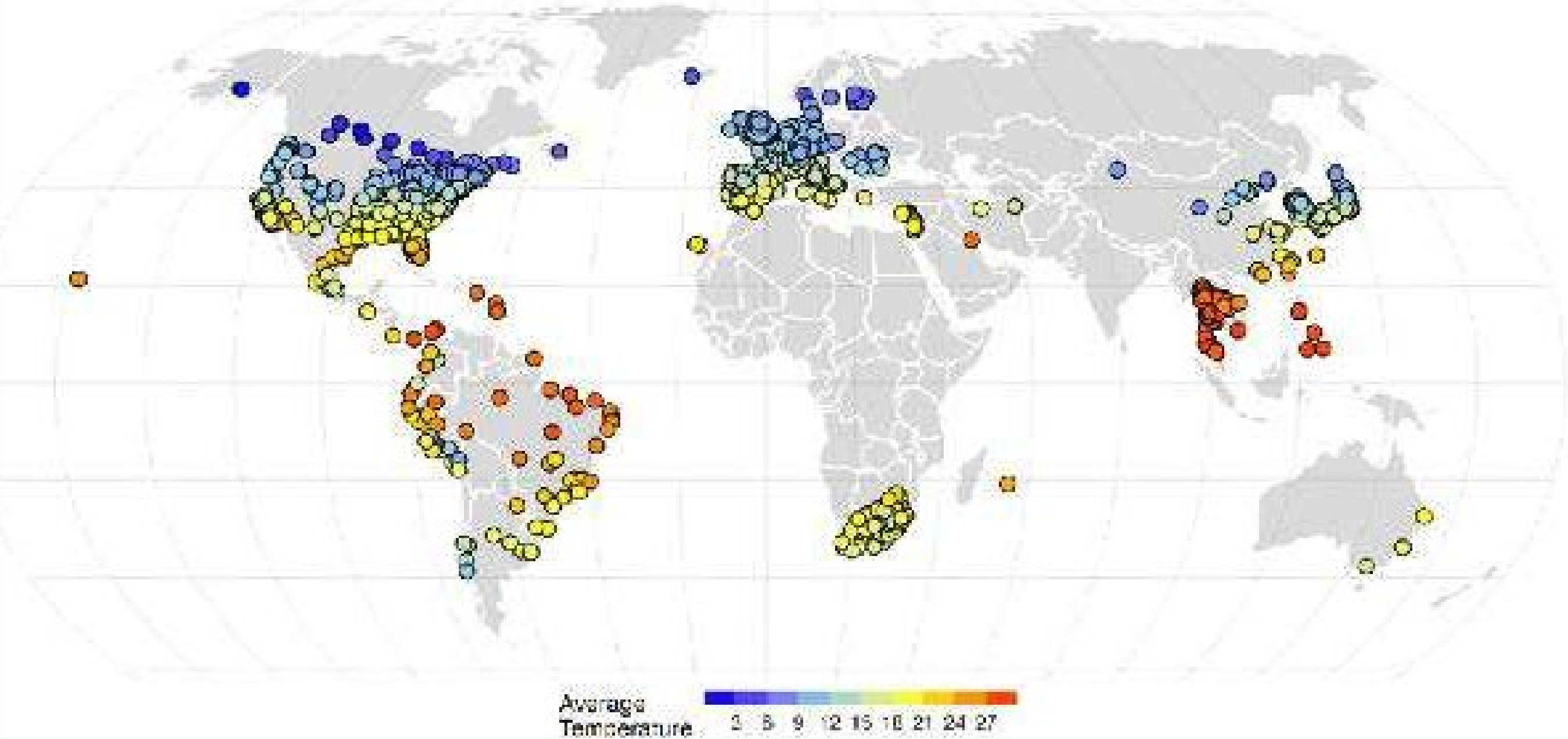
**Risk increases when SPEI-n increases by one unit of severity from 0 [2]**



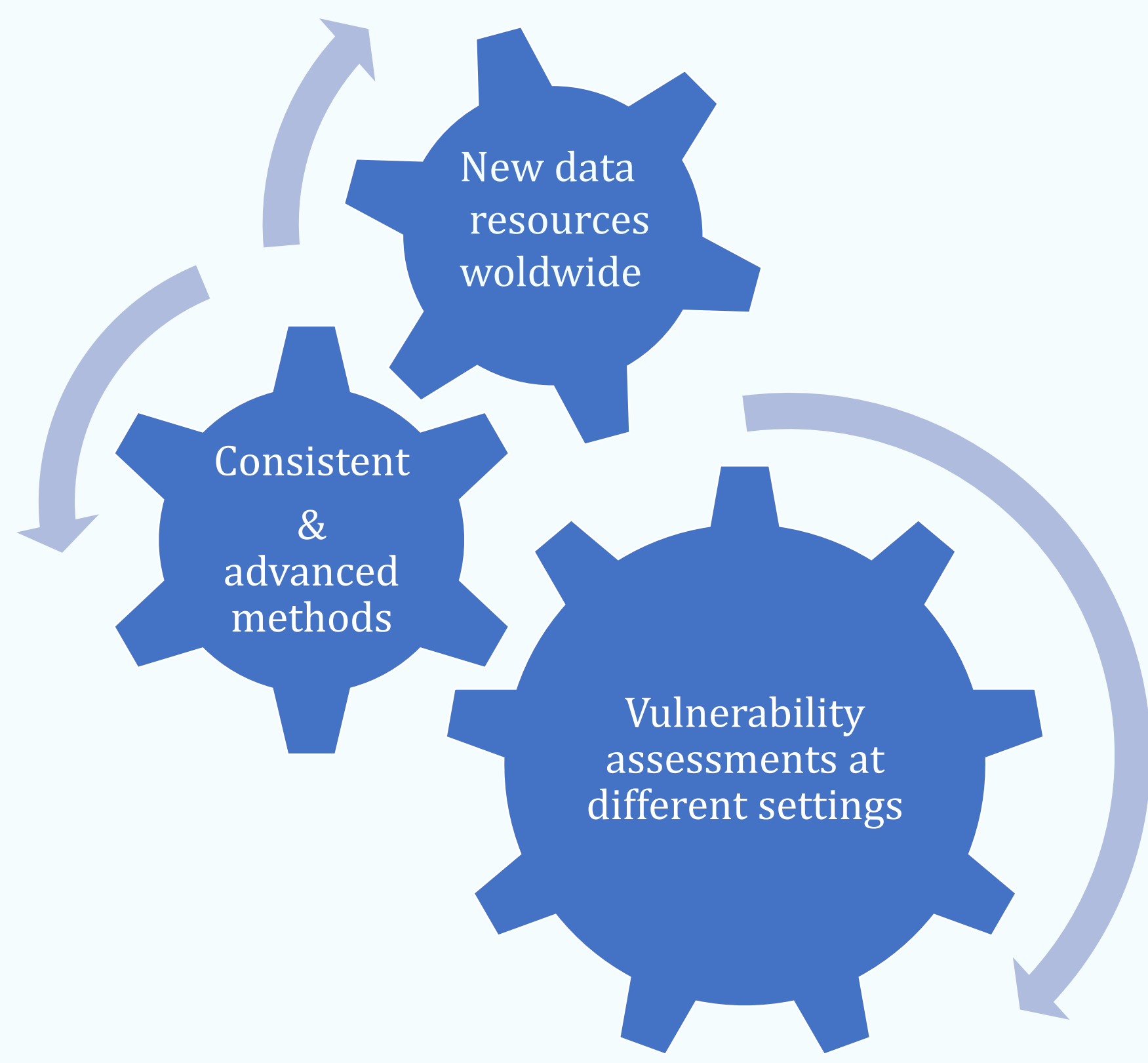
**n=1,6,12,15 corresponded to the accumulation of deficit over the last 1,6,12, and 15 months, respectively**

## IGIA-SETH: unravellnG the ImpActs of droughtS on human healTH—Ambizione grant

### International collaboration



Multi-Country Multi-City collaborative research network [4]



## Conclusions

**Drought** is a public health crisis. Drought events have been related to an increased risk of death due to a selection of causes in urban areas of Brazil and South Africa. Different characteristics of droughts (i.e., severity and duration) may influence drought risks across populations. Further assessments are needed to clarify the role of demographic, socioeconomic and contextual conditions as potential modifiers in drought-related health impacts. Larger datasets, international collaborations and consistent methods are needed to advance knowledge on the associations between droughts and health.

## References

- [1] Salvador et al. (2022). Effects of drought on mortality in macro urban areas of Brazil between 2000 and 2019. GeoHealth. Doi: 10.1029/2021GH000534
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- [3] Gasparrini (2010). Distributed lag non-linear models. Stat. Med. 0.1002/sim.3940
- [4] Multi-Country Multi-City research network. URL: <https://mccstudy.lshtm.ac.uk/>