

## **Leveraging data science and machine learning for urban climate adaptation in two major African cities: a HE2AT Center study protocol**

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### **Abstract**

**Introduction** African cities, particularly Abidjan and Johannesburg, face challenges of rapid urban growth, informality and strained health services, compounded by increasing temperatures due to climate change. This study aims to understand the complexities of heat-related health impacts in these cities. The objectives are: (1) mapping intraurban heat risk and exposure using health, socioeconomic, climate and satellite imagery data; (2) creating a stratified heat–health forecast model to predict adverse health outcomes; and (3) establishing an early warning system for timely heatwave alerts. The ultimate goal is to foster climate-resilient African cities, protecting disproportionately affected populations from heat hazards.

**Methods and analysis** The research will acquire health-related datasets from eligible adult clinical trials or cohort studies conducted in Johannesburg and Abidjan between 2000 and 2022. Additional data will be collected, including socioeconomic, climate datasets and satellite imagery. These resources will aid in mapping heat hazards and quantifying heat–health exposure, the extent of elevated risk and morbidity. Outcomes will be determined using advanced data analysis methods, including statistical evaluation, machine learning and deep learning techniques.

**Ethics and dissemination** The study has been approved by the Wits Human Research Ethics Committee (reference no: 220606). Data management will follow approved procedures. The results will be disseminated through workshops, community forums, conferences and publications. Data deposition and curation plans will be established in line with ethical and safety considerations.