

## Project Brief: HE<sup>2</sup>AT Center

Full Title of Study/Programme	The HEat and HHealth African Transdisciplinary Center (HE <sup>2</sup> AT Center): Developing data science solutions to mitigate the health impacts of climate change in Africa
Technical Focus Area/Key Words	Global Warming, Climate Change
Background (max 200 words)	Heat waves and rising temperatures have major, though underappreciated, health implications, particularly among vulnerable populations in low-income settings in Africa. Big data and data science methods can identify promising adaptation interventions and optimise programmes to reduce the impacts of climate change. The current Early Warning Systems in Africa function poorly and are not based on actual health outcome data. Moreover, there is limited knowledge on how to monitor the burden of climate change on health and the effectiveness of relevant health services.
Primary Objectives	The HE <sup>2</sup> AT Center aims to develop innovative solutions to mitigate the health impacts of climate change in Africa, including Early Warning Systems and monitoring systems. The Center also aims to build capacity on data science and climate change, and to be a resource for climate change initiatives across the continent.
Methods	The HE <sup>2</sup> AT Center is a U54 grant within the NIH Harnessing Data Science for Health Discovery and Innovation in Africa (DS-I Africa) programme. DS-I Africa is the NIH flagship programme of research in Africa, with USD 62,000,000 funding. The consortium consists of a trans-disciplinary group of academic and non-academic partners from three regions of Africa, and the United States. The study includes partners in South Africa, Côte d'Ivoire and Kenya, with a focus on activities in these countries. The Center includes two sub-projects. Firstly, a project to document the impacts of extreme heat on maternal and newborn health across Africa using existing data from research projects and routine health information systems. We will draw on data from all countries on the continent where data are available. These analyses will also test different indicators of the impacts of extreme heat on health. The second project will investigate the urban heat island effect in Johannesburg, South Africa and Abidjan, Côte d'Ivoire, using multiple data sources from satellites on the natural (e.g., vegetation) and the built environment, combined with weather, air pollution, and health outcome data. We will use health outcome data from large clinical trials and cohorts which has the geolocation of participants houses allowing for very precise measurements of the exposure of these individuals to heat and other environmental risk factors. Based on these analyses we will design an Early Warning System that can warn people when an

	<p>extreme heat event is forecast. Risk strata will be generated in the Early Warning System, based on the risk profiles of specific risk groups, determined by a machine learning algorithm which takes into account forecasted weather conditions, characteristics such as age, geolocation and other factors that drive risk. The current approach to Early Warning Systems involves a single cut-off temperature threshold that is meant to represent risk for all members of the population. This approach lacks sensitivity as the health risks of extreme heat vary between population groups several fold. We will pilot a range of communication channels to deliver risk warnings tailored to different risk groups. This includes using an existing smartphone App (ClimApp). Most importantly, the HEAT Center serves as a platform for other research projects or programmes related to climate change and health in Africa.</p>
Relevance to the Green Climate Fund	<p>The HE<sup>2</sup>AT Center provides a platform which has the potential to monitor projects funded by the Green Climate Fund, and to identify which interventions should be prioritised in funding proposals. Data science analytics could make a major contribution to optimising climate change and health projects. The prototype Early Warning Systems and monitoring systems that we develop could be adapted to different settings and population groups included in Green Climate Fund applications.</p>
Timelines and anticipated impact	<p>Over a five to ten year period, the HE<sup>2</sup>AT Center will have established a data science and analytical platform capable of documenting the impacts of extreme heat, informing sensitive Early Warning Systems and monitoring systems across sub-Saharan Africa.</p>
Investigators	<p>Prof. MF Chersich</p>
Other Partners & Collaborators	<p>University of Cape Town, South Africa; Aga Khan University, Kenya; University Peleforo Gon Coulibaly of Korhogo, Côte d'Ivoire; IBM Research Africa; University of Michigan; and University of Washington</p>
Sponsors/Donors	<p>US National Institutes of Health (NIH)</p>
Briefing owner and date	<p>Prof. MF Chersich, October 2021</p>