

South Africa

Addressing heat-health threats among women, infants and children in primary healthcare settings

Case study prepared by:
Caradee Y. Wright

Focus

Extreme heat and heatwaves are having physiological and psychological impacts on people's health in South Africa. Extreme heat affects productivity and is associated with morbidity and mortality, especially among vulnerable groups (Kapwata *et al.*, 2022).

Until recently, South Africa has not had any heat-health guidelines. Neither has it had any education materials that healthcare professionals and practitioners can use to help raise awareness about the threats of heat to health and wellbeing. Filling these gaps is central to this research, which aims to protect communities and prevent adverse heat-health impacts in South Africa.

The focus of this case study is to find national and local solutions that can help strengthen health systems, especially in healthcare settings and other high-risk places where mothers and children may be exposed to high temperatures. A systemic, multi-pronged and multi-stakeholder approach was adopted by the local, provincial and national team (outlined below) to undertake research, co-create a risk tool and develop National Heat Health Action Guidelines.

Team

The team comprised Climate Change and Health Research Programme researchers at the South African Medical Research Council, the National Department of Health (NDoH): Environmental Health Directorate, the South African Weather Service and the National Department of Forestry, Fisheries and the Environment (DFFE). Non-governmental organizations (NGOs) were also involved including groundWork (a non-profit environmental justice organisation working primarily in South Africa), the Centre for Environmental Rights, the World Health Organization (WHO), the United Nations Environment Programme (UNEP) and the United Nations International Children's Emergency Fund (UNICEF). Other stakeholders (e.g. universities and local and provincial municipalities), collaborated throughout the project timeframe.

Initially, the team worked in an uncoordinated fashion but, in 2023, the National Climate Change and Health Steering Committee (NCCHSC) was inaugurated, thereby creating a formal body to implement and oversee the National Climate Change and Health Adaptation Plan, National Heat Health Action Guidelines and other climate change and health activities within the National Departments of Health and Environment. The NCCHSC, naturally, became the custodian of the work set out in this case study.

Methods

The methods adopted in the case study involved the following steps (expanded on, below):

1. Research to understand temperatures and heat-health risks in primary health-care facilities in rural areas;
2. Co-creation of a heat-health risk vulnerability assessment tool (called HEAT) for small towns in South Africa (Wright *et al.*, 2023);
3. Drafting and publishing the National Heat Health Action Guidelines (NDOH, 2022).

Temperature measurements in primary healthcare facilities

Temperature loggers, called iButtons, were installed in eight clinics in Giyani, Limpopo Province, to measure the indoor temperatures of waiting rooms in eight rural, primary healthcare facilities. Temperatures in each setting were measured 24-hours a day from December 2015 to May 2016. The data retrieved was analysed for trends to assess potential health risks to mothers and infants.

HEAT tool development

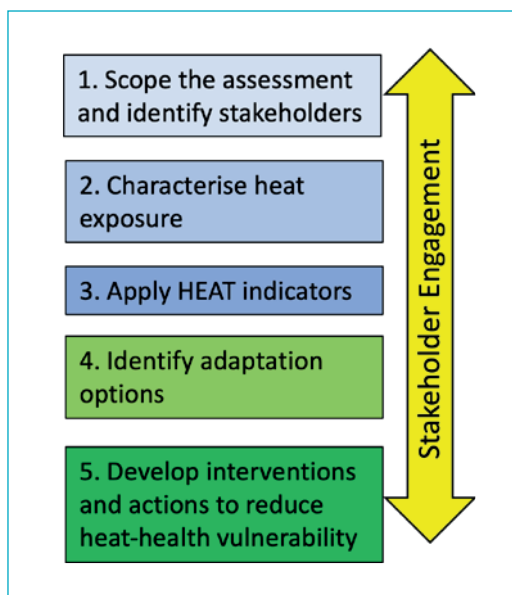
Results from temperature logging informed the development of a Healthy Environment Assessment Tool (HEAT) to assess heat-health risks in local communities. HEAT was co-developed with stakeholders, practitioners and professionals from the Rustenburg Local Municipality (RLM) – a setting in which heat had already been identified as a risk (Scovronick *et al.*, 2018).

To ensure inclusive and robust stakeholder engagement, a five-step framework was applied to the HEAT tool development process (Figure 1). Feedback from this framework was used to:

1. Identify vulnerable groups and settings in the RLM;
2. Consider the opportunities and barriers for interventions;
3. Conceptualize a heat-health vulnerability assessment tool for a heat-resilient town.

Using the HEAT tool, areas were evaluated for their heat-resilience and vulnerability at the ward level (45 wards altogether). Indicators included population, poverty, education, access to medical facilities, sanitation, public transport, recreation and community centres and green spaces.

Figure 1: Five-step stakeholder engagement framework



Results

Clinic temperature and health risks for patients

Inside the clinics, mean monthly temperature measurements were warmer during summer months (December to February) and cooler during autumn months (March to May) (Wright *et al.*, 2017). The highest mean outdoor temperature (approximately 32 degrees Celsius) was recorded in February 2016. In some clinics, however, maximum daily indoor temperatures exceeded 38 degrees Celsius. Overall results showed temperatures in clinic waiting rooms were higher than outdoor temperatures by an average of between two and four degrees Celsius.

When researchers incorporated the relative humidity readings made in the clinics, the results implied that ‘real-feel’ apparent temperatures were more than four degrees Celsius higher than actual measured indoor temperatures. This suggests people may have experienced a feeling of ‘stuffiness’ and discomfort in the waiting room areas.

Overall, during typical clinic operational hours, mean apparent temperatures reached levels associated with heat warning categories of ‘caution’ and ‘extreme caution’. These two risk categories are associated with fatigue and heat stroke (caution) and heat cramps and heat exhaustion (extreme caution). It is likely that patients in these waiting rooms experienced these heat symptoms during the measurement

campaign, but whether these conditions are a barrier to mothers and patients visiting the facilities, is unclear.

HEAT tool implementation and findings

Throughout the stakeholder engagement exercise, and with application of the five-step conceptual framework (described above), indicators for the HEAT tool were identified to assess heat and health vulnerability and resilience. Traffic-light colours were used to signify critical risk (red), medium-high risk (yellow) and low risk (green).

Out of 45 wards in the Bojanala District Municipality, three were identified as critical risk (red), 28 as medium-high risk (yellow) and six as low risk (green) in relation to heat-health vulnerability. Short-term solutions and actions to improve community heat-health resilience were proposed by participants. These included: increased shade at bus ranks, the installation of water fountains in parks and sports fields, heat protection uniforms for schoolchildren, and green building designs in all new buildings and dwellings (among many others).

Products

In addition to the HEAT tool, researchers produced the first National Heat Health Action Guidelines for South Africa. The aim of the guidelines is to assist local health providers to reduce the burden of disease from heat exposure. The HEAT tool itself, can be used in the short-term to help policy makers identify interventions to prevent adverse heat-health impacts, especially among vulnerable groups such as women, infants and children.

Additionally, the team co-developed posters and flyers (Figures 2a-b and 3) as well as a video for children (YouTube: <https://youtu.be/FPj75DZKIRA>), that described actions people could take to keep cool and reduce heat risk. These included drinking more water, staying in the shade, wearing a hat, using an umbrella and avoiding heavy physical exercise during the hottest times of the day.

In addition to the preparation and dissemination of these awareness materials, the study incorporated a visioning exercise (Figure 4) to promote physical changes to primary healthcare facilities that would reduce the impact of heat. Wide roof awnings, planting trees for shade, benches placed in the shade and access to clean drinking water were all proposed and illustrated in the exercise.

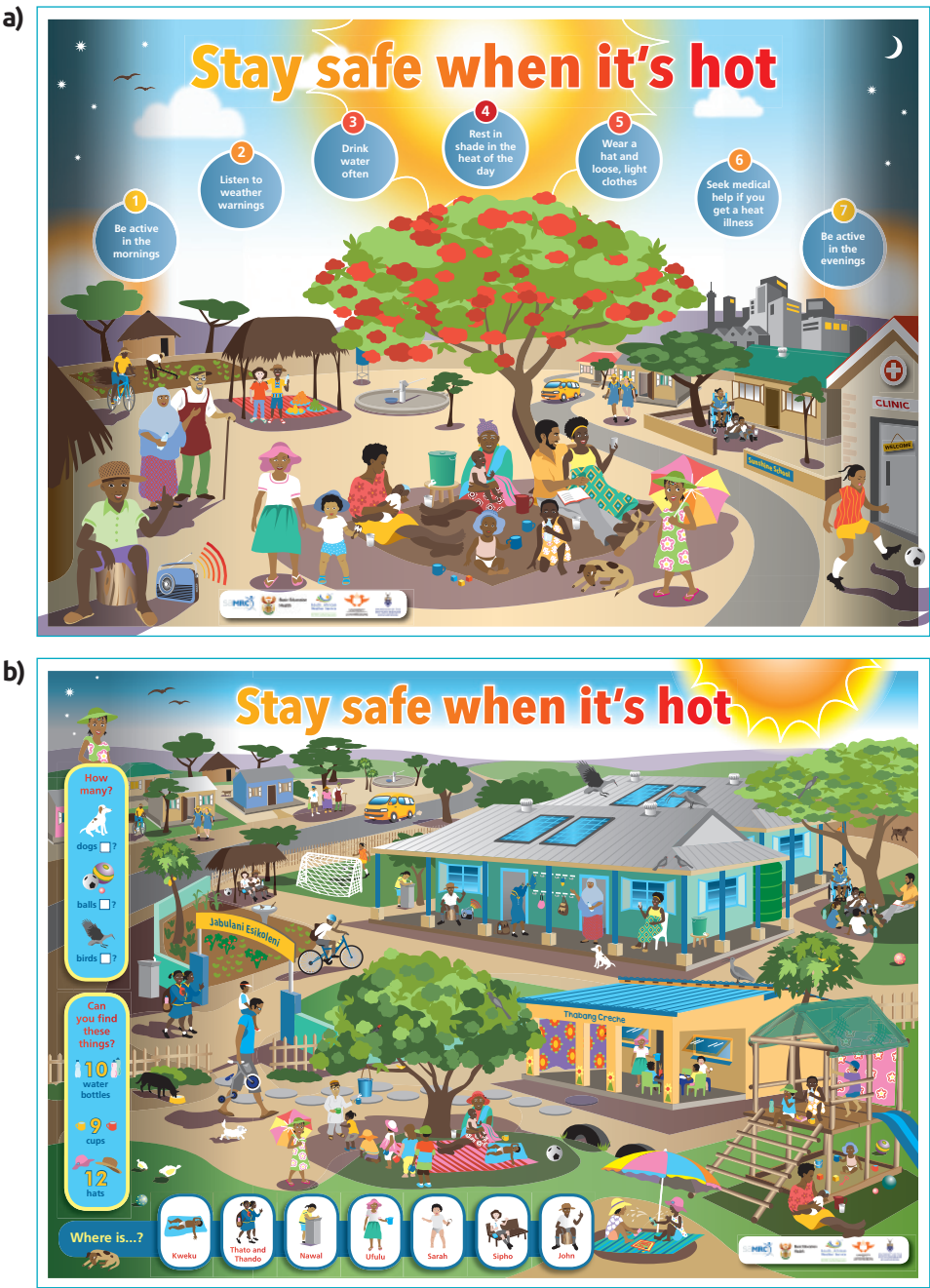


Figure 2 a-b: Two posters for primary school children designed to a) illustrate the best ways to protect yourself from extreme heat and b) have fun and play a game while learning about safe behaviours during hot weather



Figure 3: Flyer illustrating what to do to keep infants and children safe during periods of extreme heat

These products were co-developed with leading health and education stakeholders which led to their approval and uptake by a wide audience. For example, in February 2023, during a period of extreme heat, around 1,000 flyers and posters were dis-



Figure 4: Results of a visioning exercise to promote potential heat-health actions for primary healthcare facilities

tributed to municipalities across South Africa by the National Department of Health (NDoH).

End-users

At the heart of this research is the health of the South African people through an improved awareness of heat risks in local communities. The end-users for the research, therefore, are decision makers and professionals who can expand on, implement and deliver the products and tools that have arisen from this study. These are:

1. Researchers: Temperature measurements made in primary healthcare facilities helped inform researchers of the additional work required to identify vulnerable settings in relation to maternal and child health.
2. Policy makers: Temperature measurements also prompted policy writers to include a special section in the National Heat Health Action Guidelines on the specific interventions in antenatal and childbirth facilities in relation to heat exposure and extreme heat events. These measurements helped inform the interventions stated in the second National Climate Change and Health Adaptation Plan.
3. Officials, practitioners and professionals: The HEAT tool was co-created by its intended end-users in the Rustenburg Local Municipality and the Bojanala District Municipality. These stakeholders implemented the tool and found it easy to use and effective in identifying simple interventions to reduce heat-health risks. Since then, the National Department of Health has promoted the use of the HEAT tool in all 52 District Municipalities in South Africa.

Finally, the National Heat Health Action Guidelines were co-developed by members of the NCCHSC (described in the team section). Their intended audience is broad, but targets officials and practitioners in health and environmental health to prevent adverse heat-health impacts.

Limitations

A key challenge was the lack of funding for training sessions in different provinces. The proposed solution to reduce costs was to transport core team members to on-site venues and have presenters join and present their training slides online. However, this was not always possible due to power outages and technical issues, and so slides were shared via email (although this was less effective than face-to-face training).

Lessons learned

Collaboration and political will

Successful policy implementation around climate change and health (especially heat exposure) requires an effective approach, a positive attitude, strong commitment, tangible and visible political and administrative will, and high cooperative collaboration between all stakeholders and role players.

Training

Training sessions are essential to raise awareness and understanding of the National Heat Health Action Guidelines. Additional capacity for training will be required in the future.

For the next steps in this project, the research team recommends an assessment of the effectiveness and impact of both the National Heat Health Action Guidelines and the HEAT tool on healthcare facilities and vulnerable communities. Uptake can be evaluated using three measures:

1. Engagement with healthcare staff: healthcare professionals at all eight clinics were engaged with the research team, and heat-health risks and actions to mitigate them were discussed.
2. Distribution of newly made and revamped materials: more than 5,000 posters and flyers were distributed nationally in 2024.
3. Uptake of the guidelines and materials by the National Department of Health (NDoH): in the second part of 2023, over 2,500 posters and flyers were collected and circulated by the NDoH to all nine provinces in South Africa.

However, more work is required to identify in-depth metrics to evaluate the effectiveness of the guidelines and materials.

Conclusion

The research, tools and products developed in this study are applicable to low- and middle-income countries facing the challenges of extreme heat and health risks as a result of climate change. Effective implementation was also boosted by the political will shown by the establishment of the NCCHSC in 2023 that coordinated actions among different agencies. However, co-development with health and education stakeholders is key to their approval and uptake by a wide audience. Ultimately, it is hoped that these findings will help inform the development of locally

appropriate tools and products to prevent heat-health impacts among vulnerable groups – especially women, infants and children.

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