A time-series analysis of temperature-related mortality in South Africa between 1997 and 2012

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Introduction: There is an extensive literature reporting estimates of temperature-related mortality in developed countries, but far fewer in the developing world, particularly in Africa. Furthermore, these studies report results for only one or a few cities and over relatively short time periods.

Methods: We conducted a time-series analysis of the temperature-mortality relationship in South Africa using a national dataset covering all 8.5 million deaths that occurred in 1997-2013. Relationships were estimated with a distributed lag non-linear model with 21 days of lag, and pooled in a multivariate meta-analysis. Relative risks (RR) were then calculated for cold and heat (at 99th and 1st percentiles) using the 75th percentile as the reference.

Results: Preliminary assessment of nine urban districts did not find a clear association between heat and all-cause mortality, with a flat relationship beyond the reference and a pooled RR of 0.98 (95%CI: 0.92-1.04). Cold effects were evident but modest if compared to other country-level analyses, with a pooled RR of 1.19 (1.11-1.28). Results were similar across district, with limited heterogeneity. Future analyses will expand to include all remaining districts, compare effects over time and space and evaluate effect modification by individual and area-level characteristics.

Conclusions: A preliminary assessment of the largest ever dataset for analyzing temperature-mortality associations in (South) Africa indicates all-cause mortality burdens associated with cold but not heat. In addition to its rarely explored geographic region, the dataset allows for investigation of a number of unique factors not possible in most previous studies, including the impacts of a rapidly developing economy, a young population structure and a high prevalence of HIV.