

**Abstract** Both gradual changes in climate as well as extreme events have been shown to influence human migration patterns in many regions of the world. Given the implications of migration for the well-being and security of migrants, as well as that of the communities sending and receiving them, it is important for policymakers from both the federal and international level to be prepared for the extent and manner in which climate change will alter migration flows. Here we provide an overview of a new line of research aimed at identifying the relative influence of climate on recent internal migration decisions in South Africa. We focus on South Africa as it is a country that has high-volume internal migration flows, is projected to experience dramatic shifts in climate, and has a large population base that is vulnerable to climate change through, for example, its reliance on rainfed agriculture. We utilize the results of the nationally representative National Income Dynamics Survey (NIDS) to construct statistical models that predict the probability of an individual decision to migrate based on individual characteristics (e.g. age, gender, race, and education-level), household-level characteristics (e.g. assets and migration-network connections), and local climate (e.g. minimum) and maximum temperature, as well as precipitation over monthly, seasonal, and annual time periods). We also incorporate local agricultural production data into the models as a proxy for the indirect effects of climate on local conditions. With this study, and together with a macro-level study being carried out in parallel, we consider the potential for projected changes in climate to influence South African migration patterns, as well as identify the characteristics of individuals whose decisions to stay or move will most likely be influenced by changing climate.

### **Climate and Migration**

- Climate change potential to dramatically alter human migration flows.<sup>8</sup>
- For example, rural residents may seek additional sources of income in other rural or urban locations as crop growing conditions change.<sup>7,9</sup>
- Individuals may also move in increased numbers as a result of natural hazards.<sup>8</sup>
- Increased movement as a result of climate change is projected to have adverse consequences for human security.<sup>1</sup>
- To begin to understand how climate change will affect human migration: - Many studies look at the relationship between climate variability and mobility.<sup>2,6,10</sup>

An important country to examine potential South Africa effects of climate change on migration

#### **Highly mobile population**

- 1996-2001: 12% of population moved, 0.3% international, 11.7% internal<sup>5</sup>
- High rate of temporary labor migration Legacy of Apartheid



# The Influence of Climate Change on Human Migration: A Case Study of South Africa

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Statistical model - Probability of individual carrying out an internal migration given:

- Individual characteristics { e.g. age, gender, race, education, labor status }
- Household characteristics { e.g. income, assets, network connections }
- Local characteristics { e.g. monthly, seasonal & annual climate, annual maize & wheat yield ]

## **Poster Number CC-14**

### Data

### **Climate data**

Variables:

- Annual, Seasonal, Monthly -- Precipitation & Tmin, Tmax, Tave
- Derived from 0.25 degree daily reanalysis data<sup>3</sup>

#### Individual & Household Data

- NIDS Survey (University of Cape Town)<sup>13</sup>: 2008, 2010, 2012, 2014\* (in progress)
- Nationally representative panel study
- Tracks individuals
- Question themes include:

Migration; Livelihoods; Health & Education; Household Composition & Structure; Labour Market Participation & Economic Activity



#### Between Wave 1-3: 3190 individuals moved

- 1 out of 7 South Africans<sup>13</sup>
- 80% individuals, 20% whole household
- 40% of Wave 1 individuals shared household with a migrant
- Attrition high for migrants in Wave 2, Negative between Wave 2 & 3

#### **Next Steps**

- Development of statistical models test of approaches that account for attrition
- Testing & selection of predictor variables
- Comparison of results with parallel macro-level study

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