

# **Migration in the Face of Climate Change: Assessing the Potential of UPG Programs**

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# Climate Vulnerability in the Developing World

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- ▶ The effects of **climate change** already are, and will continue to be, concentrated in developing countries (Desmet and Rossi-Hansberg, 2015; Costinot et al., 2016)
- ▶ Ultra-poor agrarian communities are **disproportionately exposed and at risk**
- ▶ Migration is a **potential adaptation strategy**, offering vulnerable households:
  - Less risky income sources (Dell et al., 2014; Hirvonen, 2016)
  - Protection from the labor productivity and health impacts of climate stress (Graff Zivin and Neidell, 2014; R. Burgess et al., 2017)
  - Less dependency on local markets sensitive to climate shocks (Jessoe et al., 2018)

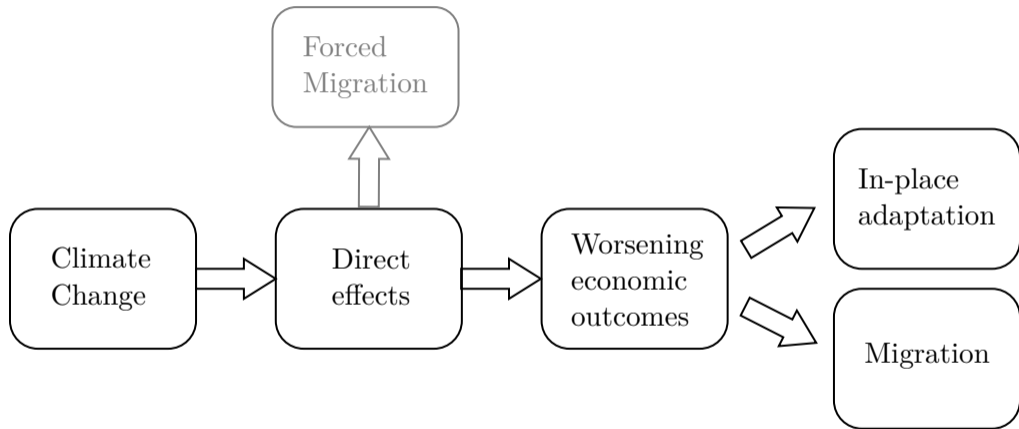
# This Project

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1. How do Ultra-Poor Graduation (UPG) programs, which target poverty alleviation, affect shape households' capacity to adapt to climate change in place vs. through migration?  
*⇒ UPG impacts exposure to climate stress; we empirically test how exposure affects ultra-poor households' migration decisions, plans and preferences*
2. Which ultra-poor households will eventually migrate away from climate-stressed areas, what will this migration look like, and who will be left behind? What features of the design of UPG programs drive these patterns?  
*⇒ Leverage bespoke survey data to structurally estimate a dynamic discrete-choice model to study household migration trajectories*

# Theory of Change

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We focus on **slow onset climate change** (ie: heat stress and drought), as opposed to natural disasters, which displace people immediately

## Context – Upper Egypt



# Sample

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- ▶ **3,469 ultra-poor rural households** across the two poorest governorates
  - Full sample from an ongoing RCT of the UPG Program in Upper Egypt
  - Three treatment arms – full-value (50%), half-value (25%) and control (25%)
  - **Surveys:** baseline (2019), midline (2021), endline I (2023) and **endline II (ongoing)**
- ▶ **Sample for this presentation** – 2,619 individuals (1,396 female, 1,223 male)
- ▶ Baseline profile about a typical HH
  1. **HH Size** - 7 individuals in median household (3 males, 3 females, 1 child)
  2. **Typical Occupations** - agriculture, street vendors/merchants, construction
  3. **Livestock** - 50% own livestock, 20% own “big” livestock (sheep, cow, buffalo etc.)

## Endline II Survey - Five Years After UPG

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- ▶ Up to three surveys per HH – main female respondent and 1 or 2 working-aged males. We will conduct a total of 5,416 surveys across Assuit and Sohag.
- ▶ Elicit patterns, plans and desires on *different types* of migration –
  - **Male survey** – individual's past trips, plans and desires for migrating
  - **Female survey** – fill in gaps for men currently migrating
- ▶ Additional modules on livestock, climate beliefs, water use, occupation, productivity, and crops to pin down exposure to climate stress
- ▶ Staggered treatment rollout  $\Rightarrow$  four batches surveyed at different times throughout the year, allowing us to capture seasonal migration trends
- ▶ Will match to main UPG surveys for income, expenditure, etc.

# Stylized Facts

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## From Climate Data:

1. Climate in Upper Egypt is becoming increasingly hotter, drier and unpredictable

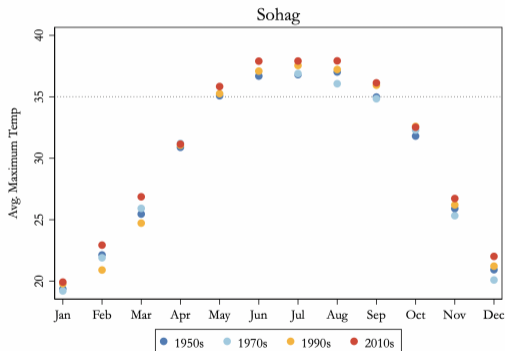
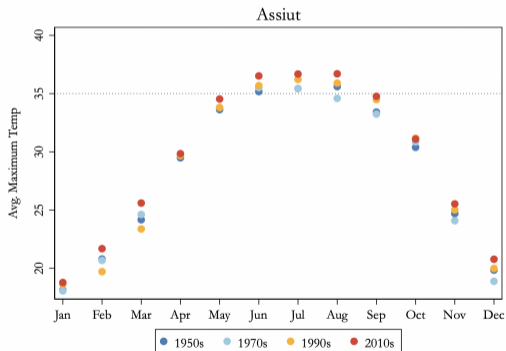
## From Our Survey Data:

2. Households are aware and worried about mounting climate stress
3. Concern and stress coincide with in-situ adaptation
4. **Migration patterns** - who moves? how many move? where do they go?

# 1a. Upper Egypt is getting hotter

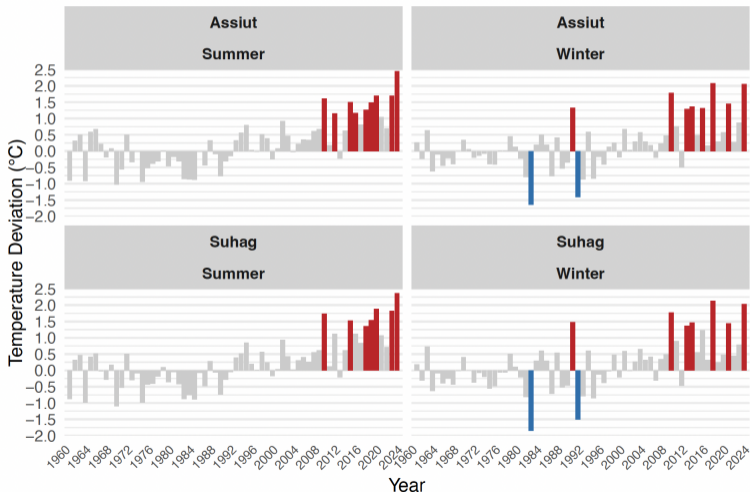
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Each summer, Assiut and Sohag average 16.7 and 24.7 days above 40 degrees.



# 1a. Upper Egypt is getting hotter

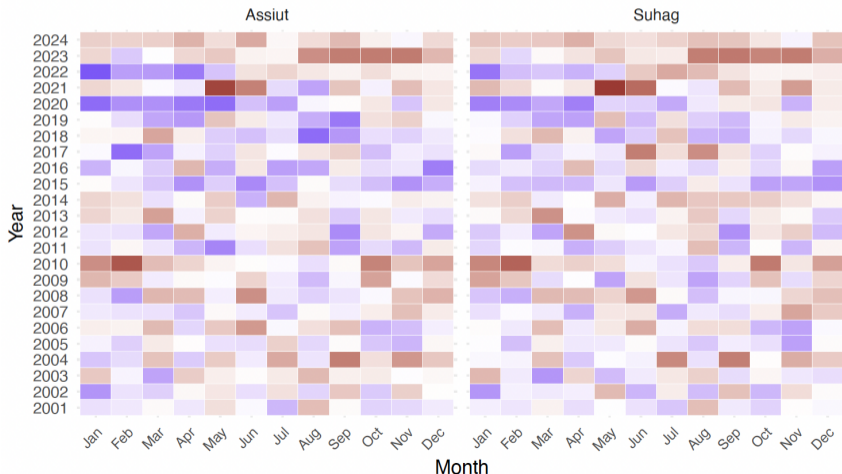
Annual Mean Temperature, relative to 1960-2010 seasonal means



## 1b. Upper Egypt is getting drier

Monthly Evapotranspiration Stress Index (**drought stress** to **wet anomalies**)

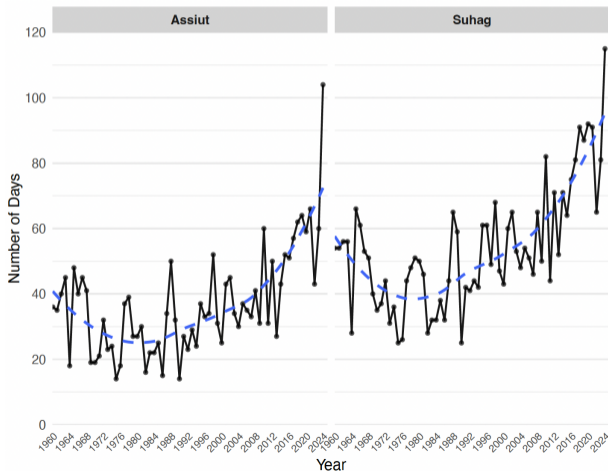
Drought stress is increasing, particularly in traditionally wetter months (Aug-Nov)



## 1c. Upper Egypt is getting more unpredictable

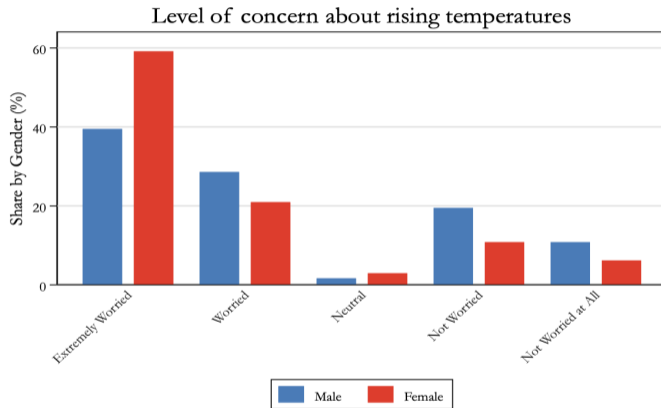
**Number of Days with Average Temp.  $> 32^{\circ}\text{C}$  by Governorate**

2020-25 was a particularly unpredictable period in terms of [heat-waves](#) and [hot days](#)



## 2a. Concern over Rising Temperatures

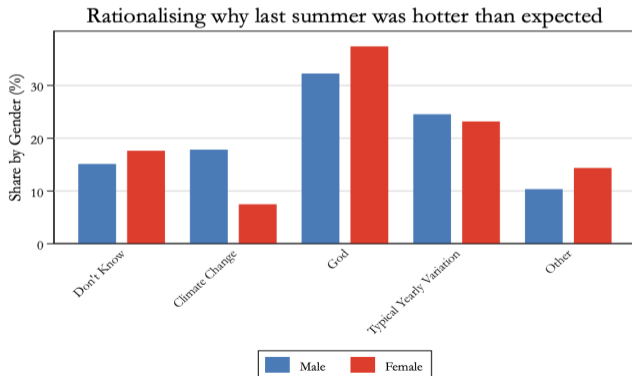
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Similar patterns for concern over: (i) effect of temperature on own and livestock health and productivity, (ii) quality/availability of livestock fodder in summer and (iii) water shortages

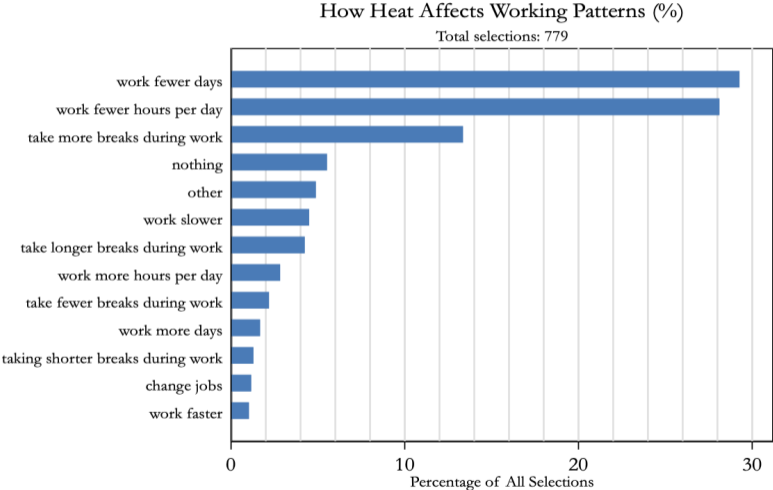
## 2b. Interpreting Signals as Climate Change

- ▶ 31% of the sample has heard of the phrase “climate change”
- ▶ Of these, 86% correctly identify the local consequences of climate change (rising temperatures, less predictable/more extreme seasons etc.)



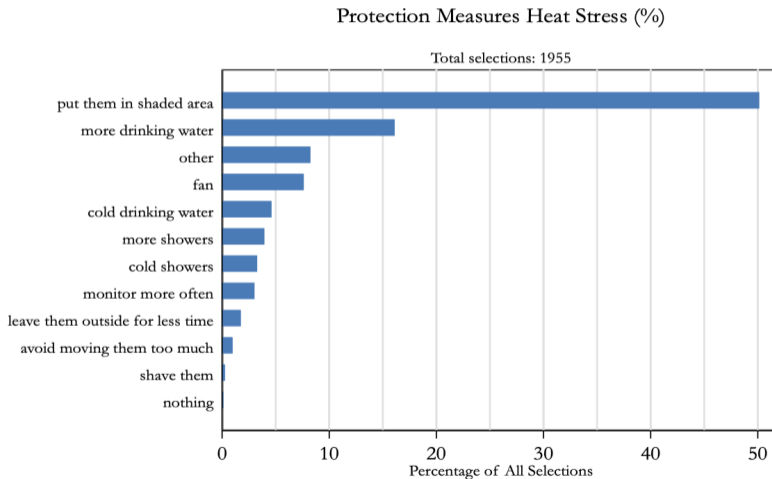
Sample -- 775 males and 976 females, conditional on thinking it was hotter than expected  
73.1% of females, 66.8% of males report it being hotter than expected

# 3a. In-Situ Adaptation



N = 544 males, conditional on having worked in the past 30 days

## 3b. In-Situ Adaptation



N = 1103 HHs, conditional on a HH owning livestock

## 4. Migration Patterns

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- ▶ 66.8% of working-age males engage in work-related temporary migration<sup>1</sup>
  - Average of 1 trip per year with a median duration of 60 days
- ▶ 16.1% of working-age males engage in work-related long-term migration
  - On average, they spend 8 months away from the HH in a year
- ▶ Majority go to urban areas in the north of Egypt
  - Complementarities → urban wage premium + more productive in cooler climate
- ▶ Occupation distribution surprisingly comparable in origin / destination
  - 67% of migrants work in construction, agriculture or unskilled service jobs
  - 55% report having the same occupation as when they are in the village

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<sup>1</sup>Working-aged males are those between 18-60. We define temporary migration as Banerjee et al. (2021) do – more than 2 consecutive nights spent away from the HH, in this case for work.

# Measuring Climate Exposure

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- ▶ Heat and drought stress are the primary direct effects of climate change
- ▶ We construct a **novel index of exposure to climate stress**, combining:
  - *Exogenous* spatial variation in [climate shocks](#) and [access to water](#) to cope with them
  - *Endogenous* household-level variation in [occupation](#) and [livestock holdings](#)
- ▶ We [instrument for contemporaneous climate exposure](#) using randomized receipt of the UPG program and baseline household characteristics. We also adjust our instrument for a household's expected exposure to climate stress.<sup>2</sup>

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<sup>2</sup>We simulate counterfactual climate shocks and program randomization to re-center our instrument. This adjusts for the fact that certain ultra-poor households are more likely to be exposed, and exploits randomness in realized climate exposures relative to expected levels (Borusyak and Hull, 2023)

## (Preliminary) Climate Exposure $\Rightarrow$ Migration

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We estimate the following specification:

$$M_{i,t=5} = \beta_0 + \beta_1 Exposure_{i,t=5} + \gamma' Controls_{i,t=0} + \eta_v + \epsilon_{i,t=5}, \quad (1)$$

where  $M_{i,t=5}$  is a migration outcome captured in our five-year endline survey,  $Exposure_{i,t=5}$  is our (standardized) contemporaneous climate exposure index (which we instrument for),  $Controls_{i,t=0}$  are baseline controls and  $\eta_v$  are village fixed-effects.

### Some (very) preliminary findings:

- ▶ A 1SD increase in exposure results in a 17% increase in the number of men migrating from the HH and a 528 EGP more in received remittances.
- ▶ These effects are largest for the control group, while those who receive the half-cost treatment experience a reduction in the number of migrating men.

## Next Step: Structural Model

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Embed a **dynamic discrete-choice** of the decision to migrate in **general equilibrium**

### **Key Ingredients:**

- ▶ Rationalise different migration decisions (seasonal, temporary, permanent)
- ▶ Incorporate salience of, and beliefs surrounding, climate change
- ▶ Endogenous savings, asset holdings and occupational choice, which are chosen, jointly with migration, in response to climate shocks and UPG program receipt
- ▶ Equilibrium adjustments in local wages and asset prices (Jessee et al., 2018)

**Key insights:** (i) who chooses to migrate and when, (ii) who is left behind, (iii) how do alternative UPG program designs (e.g. eligibility) change these findings

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