

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

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Climate Vulnerability in the Developing World

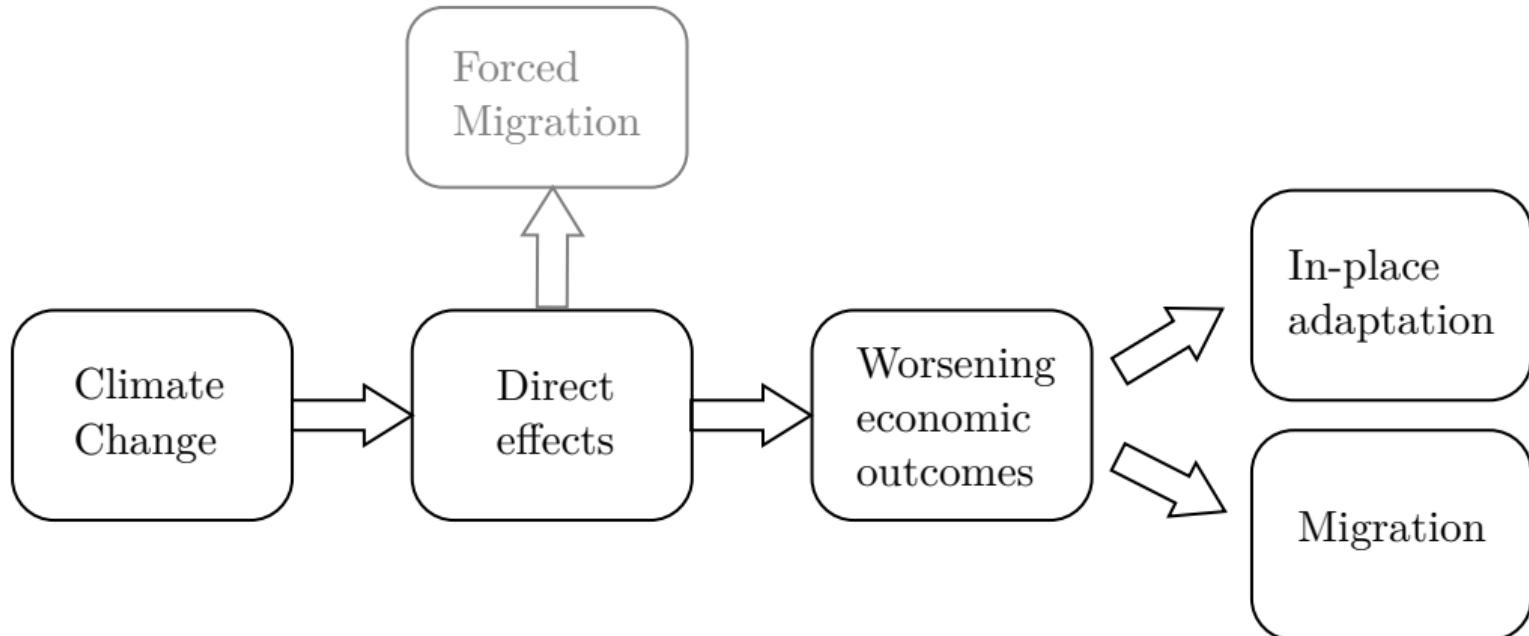
- ▶ The effects of **climate change** already are, and will continue to be, concentrated in developing countries (Desmet and Rossi-Hansberg, 2015; Costinot et al., 2016)
- ▶ Ultra-poor agrarian communities are **disproportionately exposed and at risk**
- ▶ Migration is a **potential adaptation strategy**, 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

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



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

- ▶ **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

- ▶ 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 ⇒ 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

From Climate Data:

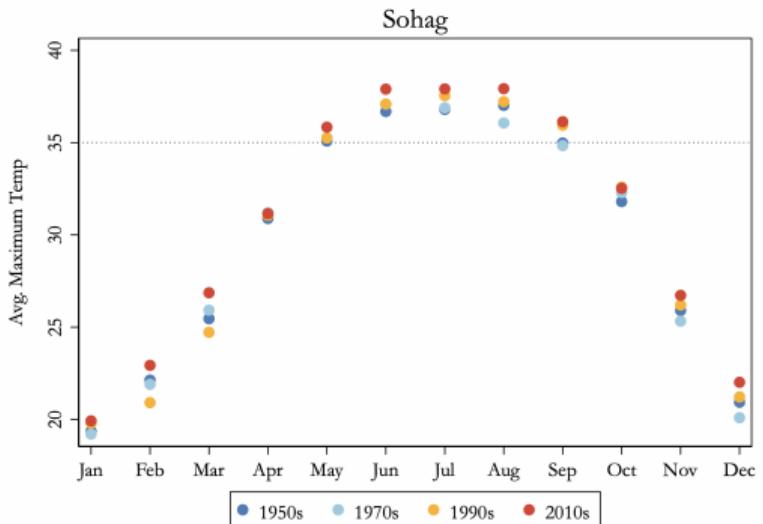
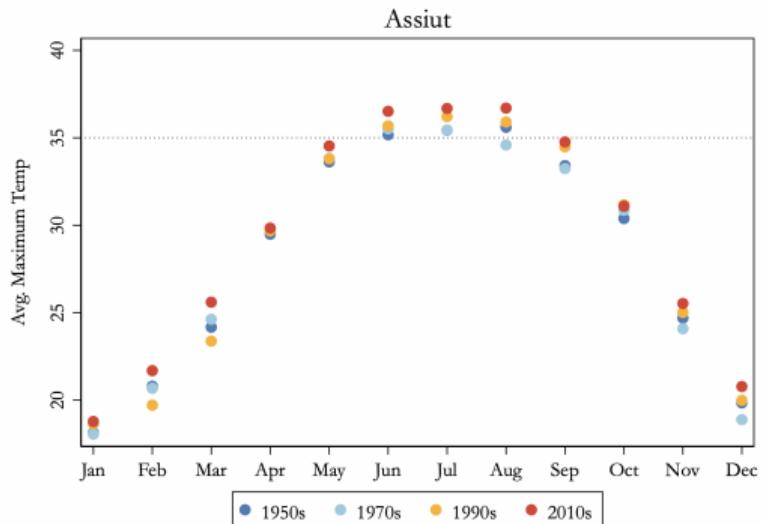
1. Climate in Upper Egypt is becoming increasingly hotter, drier and unpredictable

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?

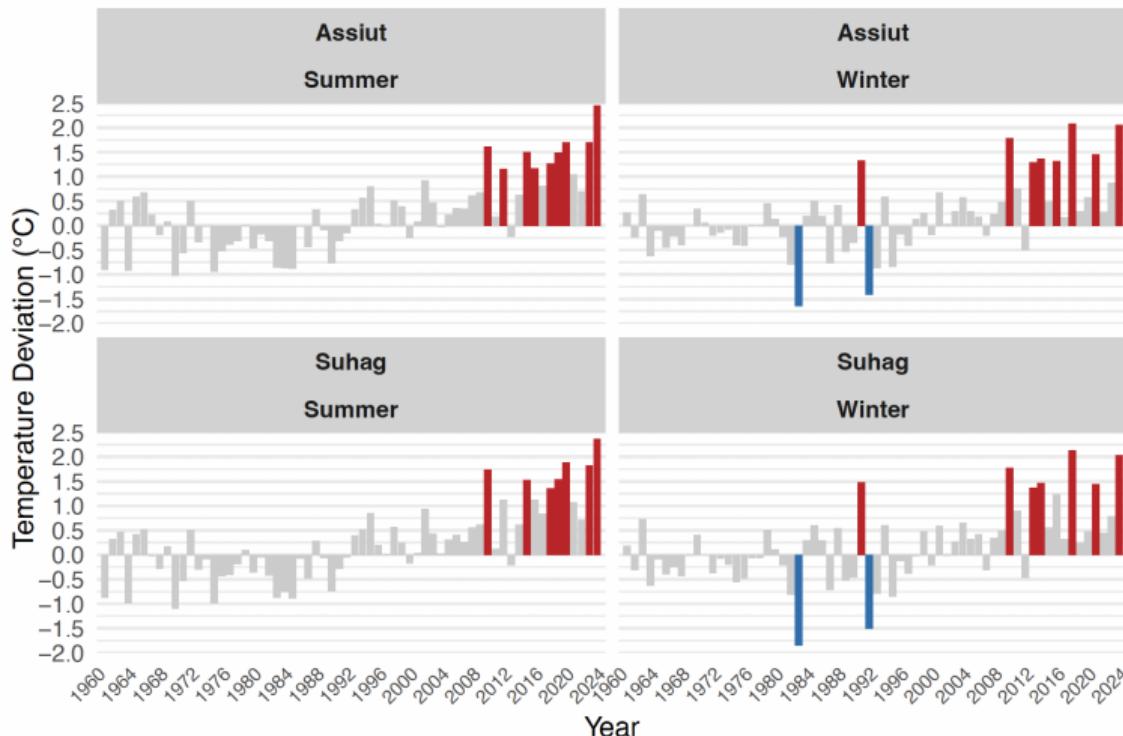
1a. Upper Egypt is getting hotter

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



1a. Upper Egypt is getting hotter

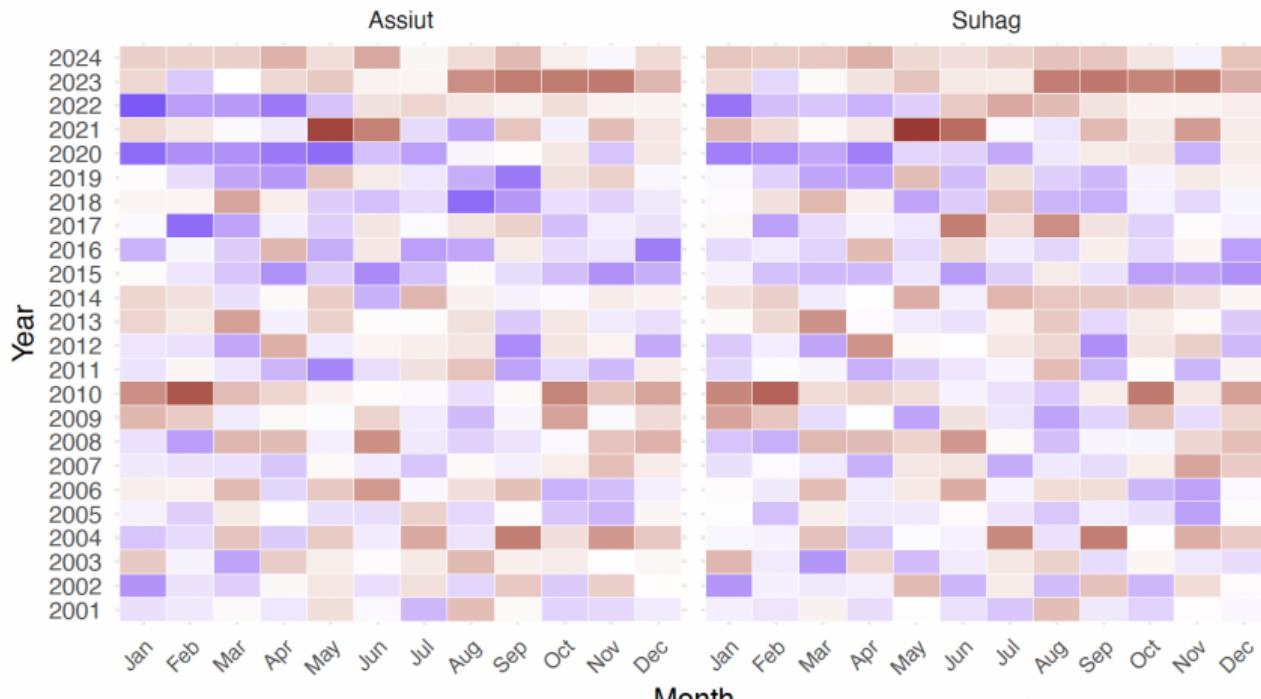
Annual Mean Temperature, relative to 1960-2010 seasonal means



1b. Upper Egypt is getting drier

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

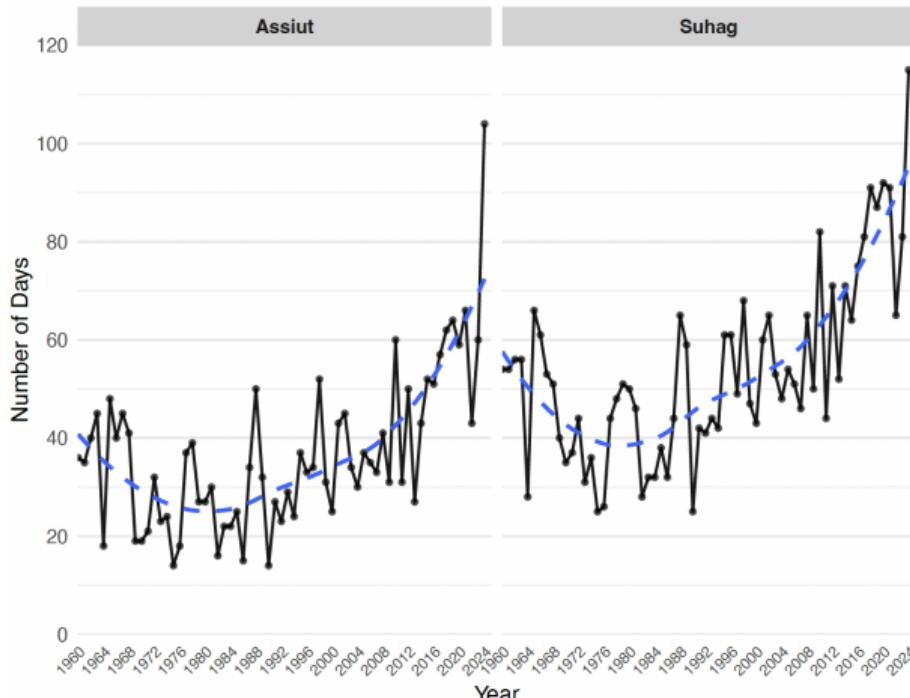
Drought stress is increasing, particularly in traditionally wetter months (Aug-Nov)



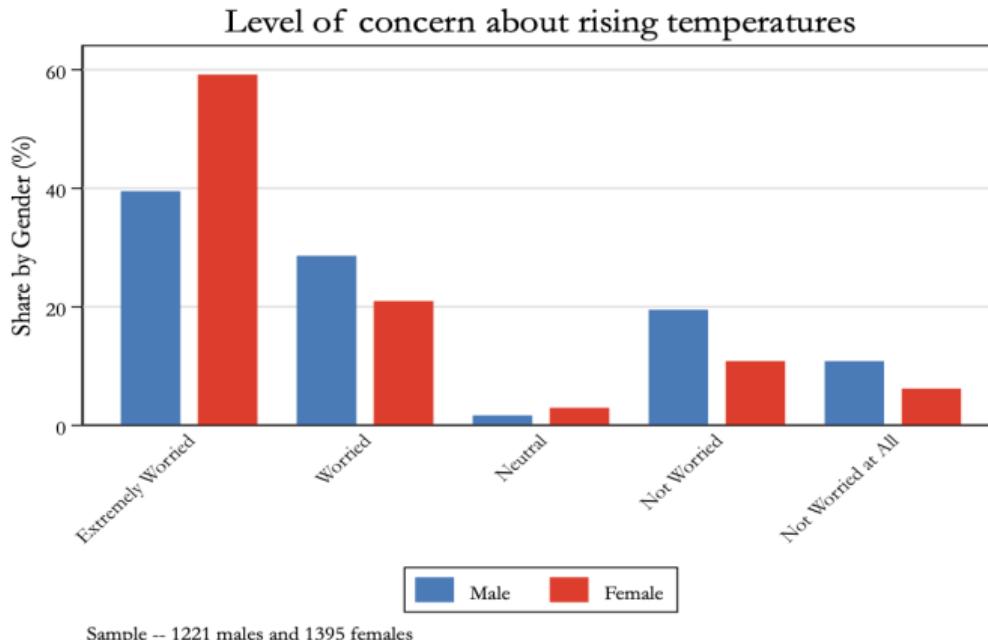
1c. Upper Egypt is getting more unpredictable

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



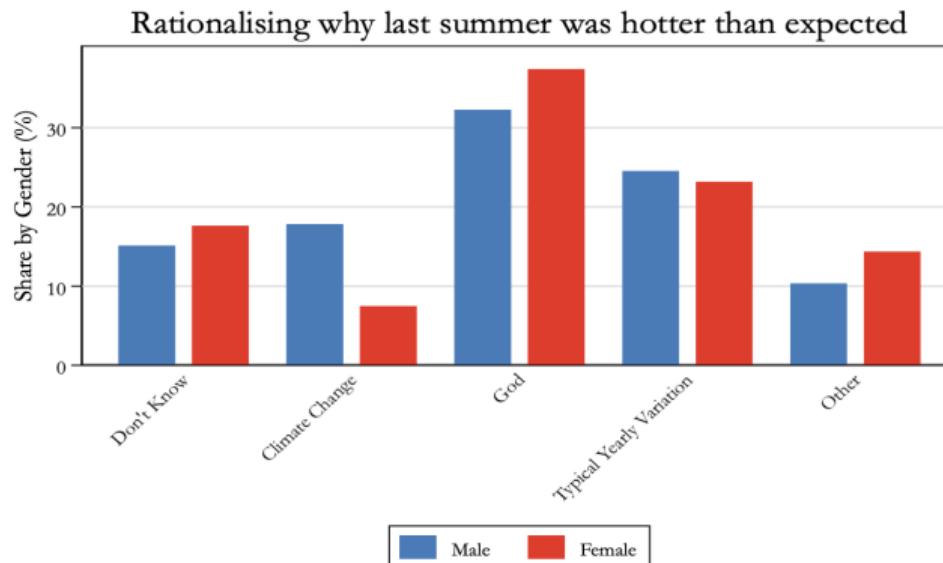
2a. Concern over Rising Temperatures



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

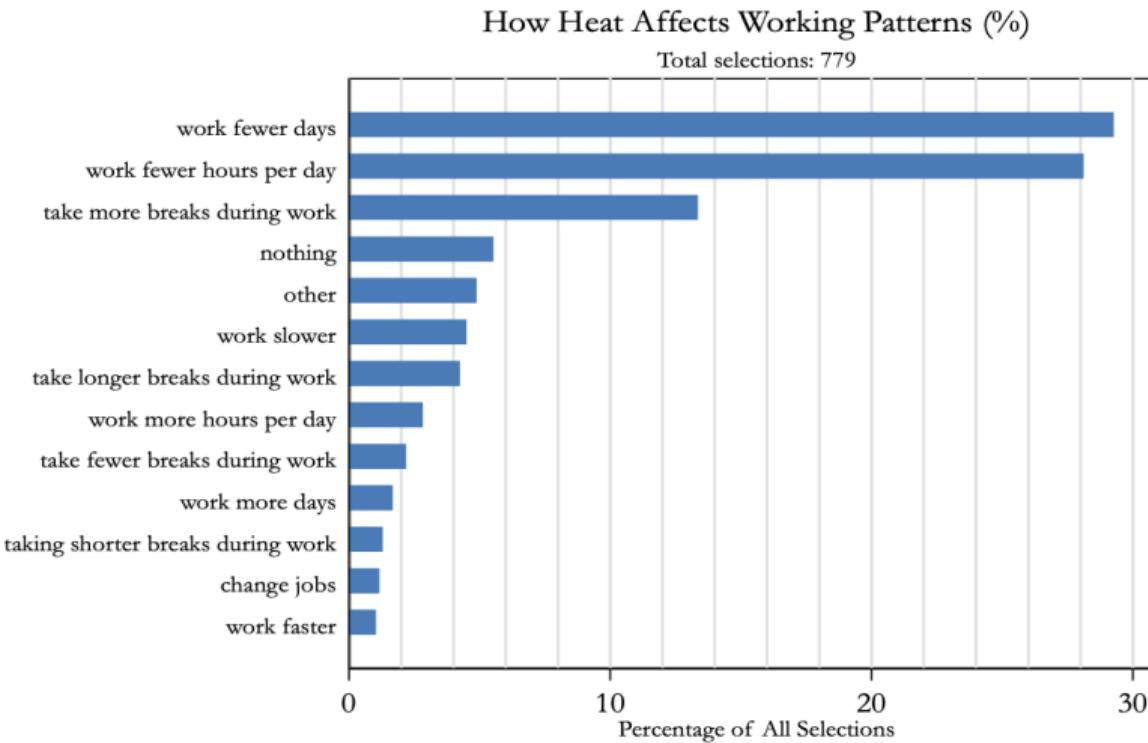
2b. Interpreting Signals as Climate Change

- ▶ 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.)



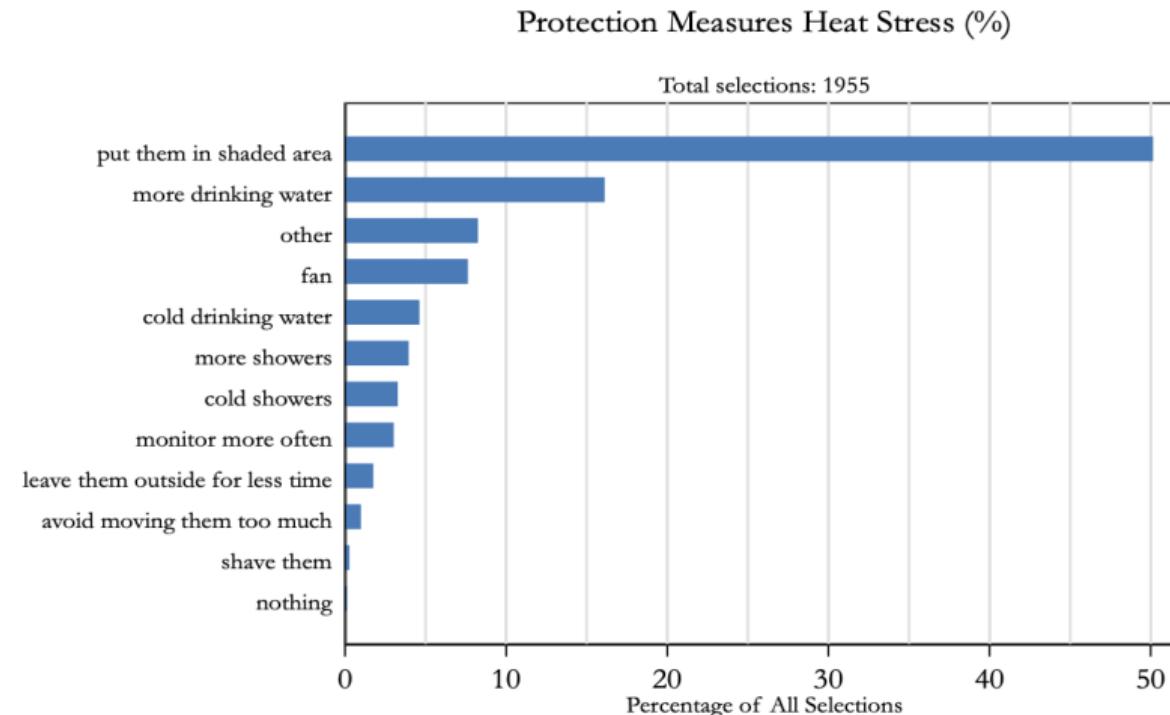
Sample -- 775 males and 976 females, conditional on thinking it was hotter than expected
73.1% of females, 66.8% of males report it being hotter than expected

3a. In-Situ Adaptation



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

3b. In-Situ Adaptation



4. Migration Patterns

- ▶ 66.8% of working-age males engage in work-related temporary migration¹
 - 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

¹Working-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

- ▶ 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.²

²We 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

We estimate the following specification:

$$M_{i,t=5} = \beta_0 + \beta_1 \text{Exposure}_{i,t=5} + \gamma' \text{Controls}_{i,t=0} + \eta_v + \epsilon_{i,t=5}, \quad (1)$$

where $M_{i,t=5}$ is a migration outcome captured in our five-year endline survey, $\text{Exposure}_{i,t=5}$ is our (standardized) contemporaneous climate exposure index (which we instrument for), $\text{Controls}_{i,t=0}$ are baseline controls and η_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

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 (Jessoe 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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