

Roadmap

What is causal inference?

Core questions in causal inference

Treatment Assignment Mechanisms

Takaful and Karama Impact Evaluation

Description of program and methodology

Takaful Impact

Karama Impact

Overview of Today's Talk

- Firstly, we'll explore *causal inference*:
 - What is it? Why is it important? What is at stake?
 - Emphasizing the importance of *controlled randomization* and options when that fails.
- Secondly, we'll delve into a recent evaluation by Breisinger and coauthors:
 - Focusing on the Takaful (Solidarity) and Karama (Dignity) programs.
 - Understanding the evaluation's findings and implications.

Important Distinctions: Causality vs. Causal Inference

What is causal inference? What is causality? They are related but not the same thing.

- *Causality* is a metaphysical concept which is stored within the branch of philosophy focusing on the nature of reality
- *Causal Inference* is an epistemological concept which is stored within the branch of philosophy focused on the nature of knowledge and beliefs

Important Distinctions: Correlation vs. Causal Inference

What is correlation? When is it causal and when is it not?

- *Correlation* is a purely statistical concept measuring movements between two things
- *Causal Inference* cuts into the causal relationships in data using credible methods

Causal Inference Gains

- What do we gain from the developments in causal inference?
- Discuss the advantages and the costs of not adopting it

Common errors

- Aliens from another planet come and notice that people on ventilators have higher mortality than those not on ventilators
- They conclude that ventilators are killing people
- Are they right? Or they have it backwards – maybe doctors are putting sick people on ventilators to help them
- How can separate the two? By understanding the behaviors that drove people into and out of programs first and combining that with statistical methodologies that take advantage of that

#1: Correlation and causality are different concepts

- Differences between causality and correlation
 - Causal is about understanding the effect of one unit changing on another. "If a person puts a patient on a ventilator, will her covid symptoms improve?"
 - Correlation, on the other hand, is about understanding relationships across many units. "How do changes in ventilators relate to changes in covid symptoms across a population?"
- Failure to understand the difference between causal inference and *description* can lead to major errors in assessment and therefore policy recommendations

#2: Coming first may not mean causality!

- Every morning the rooster crows and then the sun rises
- Did the rooster cause the sun to rise? Or did the sun cause the rooster to crow?
- What if cat killed the rooster? Would the sun never rise?
- Simply assuming things happening one after another represents causal effects is an extension of the previous error

#3: Causality may mask correlations!



Correlations, Causal Effects, and Selection Bias

- Comparing any two groups to one another has two main components:
 1. **Average causal effect:** What is the average effect of the Takaful and Karama programs on nutrition?
 2. **Selection bias:** How much of the observed differences between program participants is due to differences between them that would've existed regardless if they were on the program
- Causal inference goal is to find a reason where we can believe there is no selection bias, and to do that we need to understand why people got into the program in the first place

Understanding why they enrolled

- People naturally avoid pain and move towards pleasure, and ironically, this is usually what causes correlations to not represent causal effects
 - If people with severe COVID symptoms are placed on ventilators, then you will likely see much higher mortality rates among them
 - But it's unlikely that the ventilators are killing them – they got on the vents *because* they were dying
- Discerning causal effects requires, not statistics, but deciphering the *behavioral reason* that individuals were exposed to some intervention like a poverty program
- Large spectrum of relevant reasons why people got into a program, starting with self-selection

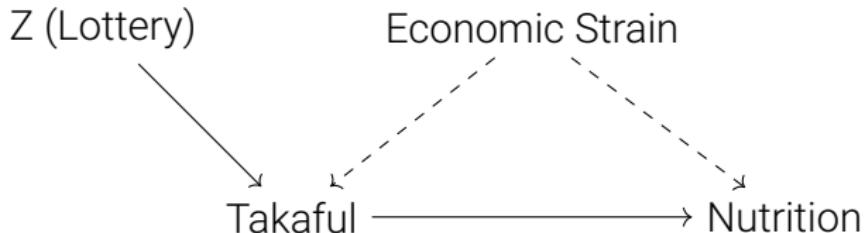
Spectrum of Treatment Assignment

- **Self-selection:** Individuals voluntarily choose based on rationality, desperation, or a desire for improvement.
 - Humans naturally gravitate towards decisions that minimize pain and maximize pleasure.
 - Challenging for causal inference due to selection bias and different responses to programs (i.e., some are helped, some nothing happens, some may even be hurt).
- Under the most extreme versions of self selection, it's practically impossible to know how much is selection bias and how much is causal
- We typically need something that robbed the person of their agency and instead of self selection, that other thing put them in the program

Randomization

- Easiest and most straightforward method, balances determinants of the outcome across groups, eliminates selection bias to isolates the average treatment effect.
- Randomization is not a *statistical model* – it's a *mechanism* that assigns people to a program
- Randomized experiments are where the scientist controls the physical randomization (e.g., vaccine trials), but sometimes that may not be feasible or ethical, and stakeholders may be opposed to doing it, despite being important
- Example: We want to understand the long-term effects of high-quality primary education on career success and overall well-being, but randomizing children into receiving a subpar education versus a high-quality one, even though understanding this is crucial for future educational policies, may be infeasible most of the time

Randomized Takful Graphic



Randomized controlled trials (RCT) use randomization, but so does a non-experimental method called instrumental variables which takes advantage of some naturally occurring randomization that assigned people to Takaful; if an instrument can be found, it is powerful

Running Variables

- People take a test, and if their score on the test exceeds some number, administrators put them into the social program
- It isn't random, but depending on the nature of the effort put into the test, can still be used to estimate the effect of the social program on life outcomes
- Example: Being assigned to a welfare program based on fixed income

Takaful and Karama Program

- Initiated in 2015 as part of Egypt's economic reforms from 2014.
- Targeted cash transfers to poor households.
- Two main assignment mechanisms used: IV and Running Variables.

Focus of our Discussion

- We will delve deeper into Instrumental Variables (IV) and Running Variables.
- These mechanisms, combining randomized experiments and non-randomized scoring, are pivotal in the evaluation of Takaful and Karama.

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Takaful and Karama Programs

- **Takaful (Solidarity):** A *conditional* cash transfer program targeting poor families with children under 18 years of age. Conditions for school attendance and health care utilization were planned but not yet implemented.
- **Karama (Dignity):** An *unconditional* cash transfer program targeting the elderly (aged 65 and above) and persons with severe disabilities.
- Initiated in 2015, part of Egypt's economic reforms since 2014, co-financed by the Egyptian government and the World Bank.

Poverty Rate Comparison: Europe (2015)

Egypt poverty in context

- **Egypt:** Poverty rate in 2015: 27.8%.
- **United Kingdom:** Approx. 15% (below 60)
- **Germany:** 16.7%
- **France:** 14%

Note: Comparisons can vary due to different poverty measurement methods.

Poverty Rate Comparison: North America (2015)

Egypt poverty in context

- **Egypt:** Poverty rate in 2015: 27.8%.
- **United States:** 13.5%
- **Canada:** 9.5% (Low Income Measure, After Tax)

Note: Comparisons can vary due to different poverty measurement methods.

Poverty Rate Comparison: Middle East (Around 2015)

Egypt poverty in context

- **Egypt:** Poverty rate in 2015: 27.8%.
- **Yemen** (Upper bound): 50% (before conflict intensification)
- **Jordan** (Lower bound): 14.4% (2010 estimate, might have changed after Syrian refugee crisis)

Note: Comparisons can vary due to different poverty measurement methods.

Egyptian Context, Survey and Data Collection

- Post-economic reforms: Likely increase in poverty due to rising price levels.
- Study's consumption survey: 40% below the 2015 poverty line (EGP 482 per capita/month).
- Survey conducted from July 15 – August 30, 2017.
- Data on expenditure, well-being, schooling, health, nutrition, decision-making, shocks.
- Total sample: 6,541 households for evaluation + 1,692 for targeting analysis.

RDD and IV

- People are assigned into cash transfer programs, not so much because they volunteered, but because their “score” on some “test” passed some “cutoff” of eligibility
- Insofar as people are voluntarily sorting into the program, and thus bypassing the threshold eligibility rule, then selection bias gets reintroduced
- Authors will augment the RD approach with the instrument approach

PMT Score and Eligibility Rule

- Households selected based on Proxy Means Test (PMT) score across three waves.
- Compares outcomes for beneficiaries below vs. non-beneficiaries above the threshold.
- Large number of households with PMT score near eligibility thresholds.

PMT Score and Eligibility

- Three thresholds of PMT score determine eligibility.
- Covariate based methods (e.g., propensity scores) ruled out due to lack of pre-program baseline data.
- Used two methods for impact estimation: IV and Fuzzy RD.

Proxy Means Test (PMT) and Program Enrollment

- **Proxy Means Test (PMT):** A tool used to estimate household's economic well-being based on observable household attributes.
- **PMT Score Generation:** Derived from data collected during three waves of registration. Households are given scores based on various socio-economic indicators.
- **Eligibility Rule:** Households with PMT scores below a set threshold become eligible for the programs.

Takaful Impact Results: Introduction

- Takaful aimed to assist poor households by increasing household consumption.
- Impact comparable to successful cash transfer programs in other countries.
- Significant reduction in the prevalence of poverty among beneficiaries.

Takaful Impact Results: Food Consumption & Diet Quality

- Beneficiaries increased food consumption by 8.3 - 8.9% per AEU.
- Notable increase in value of fruit and meat consumption.
- No significant impact on dietary diversity, possibly due to already diverse diets.

Takaful Impact Results: Child Nutrition

- Positive impact on weight-for-height z-scores for children under 2.
- Reduction in children under 5 treated for malnourishment.
- No significant change in rates of child stunting.

Takaful Impact Results: Women's Decision Making

- 90% of Takaful beneficiaries were female as of June 2017.
- Negative impact on women's control over decision making.
- Contrary to patterns found in other countries and intended program impact.

Exploring Takaful's Impact on Women's Decision Making

- **Unexpected Finding:** Takaful's negative impact on women's decision-making is counterintuitive.
- **Potential Selection Bias:** Women with already limited decision-making power may have been more likely to enroll.
- **Absence of Baseline Data:** Without initial data, hard to determine if the program caused the observed outcome.
- **Cultural Dynamics:** External financial support might alter household power dynamics, potentially leading to conflicts.
- **Next Steps:** Qualitative studies can offer deeper insights into household dynamics and perceptions.

Takaful Impact Results: Schooling and Healthcare

- No significant impacts on school enrollment or health care utilization.
- Increased spending on school supplies and transportation.
- Likely due to absence of conditionalities at evaluation time.

Karama Impact Results: Introduction

- The RD approach faced challenges due to a shifting inclusion threshold.
- More than half of the intended Karama comparison group was lost.

Karama Impact Results: Challenges

- Smaller sample size due to the program's smaller scale.
- Efficiency in enrolling newly eligible households led to a loss of comparison group.

Karama Impact Results: Measured Impact

- No measurable impacts on outcome variables examined.
- Karama transfers represented 28% of household expenditure per person.
- Lack of impact likely due to challenges faced in the study.