EGAP LEARNING DAYS 6:
EXPERIMENTAL DESIGN SESSIONS

MALAWI
13-17 FEBRUARY 2017

This five-day meeting will consist of a combination of design clinics and teach-ins on topics critical for designing impact evaluations and field experiments intended to measure the effects of policies, interventions, and programs on policy outcomes. Teach-in topics will include randomization, statistical power, and threats to the estimation of treatment effects. Throughout the week participants will work to develop their own research designs together with peers and more senior researchers.

Venue: Blue Waters, Mafco Street, Senga Bay, Salima, Malawi.

Timing: The workshop starts on Monday 13 February at 10AM and closes Friday 17 February at 5PM

Organization
The learning days are being organized by Macartan Humphreys (Columbia University, MH), Nahomi Ichino (University of Michigan, NI), James Mkandawire (Invest in Knowledge, JM), Gareth Nellis (EGAP, GN), Tara Slough (Columbia University, TS) and Maarten Voors (Wageningen University, MV).

Study material

- Please bring a laptop. Make sure you have R and Rstudio[1] installed. See notes below.
- We will use material developed by EGAP (http://egap.org/list-methods-guides)
- Additional material is drawn from
  - Dunning, Thad. 2012. *Natural experiments in the social sciences: a design-based approach*. New York: Cambridge University Press.
  - Gerber, Alan S, y Donald P Green. 2012. *Field experiments: Design, analysis, and interpretation*: New York: W.W. Norton. Chapters 1 to 5 [2]
  - Gertler et al: Gertler, Paul J.; Martinez, Sebastian; Premand, Patrick; Rawlings, Laura B.; Vermeersch, Christel M. J. 2011. *Impact Evaluation in Practice*. World Bank.[3]
  - Glennerster et al: Glennerster, Rachel; Takavarasha, Kudzai. 2013. *Running Randomized Evaluations: A Practical Guide.* Princeton.[4]

Preparation before the workshop.

- Please prepare a brief (5 minutes) statement to introduce yourself (who you are, where you work, what are your expectations for the Learning Days) and to present your research question and general idea of your project that you will work on during the workshop. Every participant must have a research project to work on throughout the week. If you would like to discuss potential research project options with us in advance of the training, please send us an email. We are happy to discuss!

[1] Download from http://www.rstudio.com/products/rstudio/download/ . If you already prefer using R with an editor other than RStudio, you do not need to install RStudio.
[2] We will distribute some pdfs of chapters from this book. The book itself is very much worth owning as a reference, as is Dunning's book.
[3] Download from https://openknowledge.worldbank.org/handle/10986/2550 License: CC BY 3.0 Unported.
[4] Open Access ancillary materials: http://runningres.com

- The file, “Introduction to R and RStudio” provides information on how to download R and RStudio. We ask that you download both programs prior to the workshop and familiarize yourself with the material provided in the guide. In particular, we provide three lines of code in section 3.1 (page 4) that you should execute to download several auxiliary files (“packages”) that we will use during Learning Days. If you have difficulty downloading R, RStudio, or the packages, please email Tara at tls2145@columbia.edu for assistance.
- Please familiarize yourself with R, the statistical program we will be using. Have a look at a free introduction to R from the Code School, which runs entirely through your browser https://www.codeschool.com/courses/try-r. In addition, please complete the first lecture from the online R Programming course organized by Johns Hopkins University: (i) go to coursera.org, (ii) create an account (this is free!), (iii) sign up for R Programming at Johns Hopkins University (instructor: Roger Peng) under the "Courses" tab (iv) read the materials and watch the videos. The videos from the first week are about 2.5 hours long total.
- Complete the following pre-Learning Days assignment in R: https://goo.gl/forms/vuw9LzQjMVErwFnH2. All R code is included so it should not take long to complete.

Learning Days Agenda

Monday, 13 February 2017: Getting Started

Morning: Introduction and causal inference

10-12PM: Welcome (MV, all)

- Introduction of group
- Introduction of EGAP (what is + types of projects)
- Objectives of Learning Days
- Expectations for collaboration: Ask questions (when you ask questions you are helping everyone, including the professors)! It is ok to sit or stand during lectures and discussions (just not in front of other people).
- Logistics
- **Brief** statement of research projects by participants (no formal presentation). A 3–min introduction to your research project, stressing motivation and research question, and main evaluation design plan.

12–1PM: Lecture 1: Causal inference (MH)

- Research questions: what are *X* and *Y*? What might it mean to say *X caused Y*?
- The potential outcomes framework and the fundamental problem of causal inference
- What do experiments have to do with causality?

1PM–2PM: LUNCH

Afternoon: Research Design and Design Clinic

2–3:30PM: Lecture 1, cont. (MH)

3:30–4:15PM: Lecture 2 Stages of research design and implementation (MV, MH, TS)

- Introducing the *research design form.*
- Stages to DeclareDesign

4:15–4:45PM: Design clinic: housekeeping (TS, all)

- Make sure you are set up with R
- Hands-on session on simple statistics in R
- Setting up DeclareDesign

4:45–5:30PM: Design clinic: your project

- Break in small groups
- Work on *research design form*
- Small Group discussions on research ideas: What are causal drivers and what are outcomes? By what "theory of change" or "causal mechanism" should the drivers influence the outcomes?

5:30–6PM: Recap

- Recap
- Quick go around: what did you find useful? What would you like to hear more about?

Resources

- 10 strategies for figuring out if X causes Y

- 10 things you need to know about causal inference
- R: http://www.r-project.org/
- DeclareDesign
- Day 1. Key Tools for Experimental Research Design and Analysis in R

Tuesday, 14 February 2017: Identification and Randomization

Morning: Randomization strategies

9:00–9:30 AM: Day 1 Recap

9:30–11:45AM: Lecture 3: Randomization (NI)
- Mechanics of replicable randomization
- Strategies for randomization: simple, clustered, factorial, intertemporal, block randomized (the idea of the power of a statistical test)

11:45–1:00PM: Research presentation 1
    - Maarten Voors: [title]

1PM–2PM LUNCH

Afternoon: Hypothesis testing and Design Workshop

2PM–3PM: Lecture 4: What is a hypothesis test for a randomized experiment? (MH)
- Fisher's test of the sharp null hypothesis of no effects and relationship with large sample tests.

3:00 – 3:30PM DeclareDesign clinic on your design (TS, MH)

3:30–5PM: Design clinic: assignments and design form
- Hands-on session on statistics, randomization and hypothesis testing in R
- Work on research design form
    - Focus on strategy for hypothesis testing for each design
    - Focus on randomization strategies for each design

5–5:30PM: Recap
- Recap
- Quick go around: what did you find useful? What would you like to hear more about?

After dinner
8-9:30PM: One-on-one office hours with individual instructors (sign up as desired)

Resources
- 10 things you need to know about randomization
- Day 2. Key Tools for Experimental Research Design and Analysis in R

Wednesday, 15 February 2017: Estimation of Causal Effects and Statistical Power

Morning: Estimation and Testing of Causal Effects

9:00 AM–9:45 AM: Day 1 & 2 Recap

9:45 AM–12PM: The Average Treatment Effect and Statistical Inference; Power analysis (GN)

- ATE: Variance, standard errors, confidence intervals, sampling distributions
- Power: What it is, relation to sample size, dispersion, standard methods, simulations

12M – 12:10PM: Break

12:10–1:15PM: Research Presentations 2 & 3 (TS, NI)

1:15PM – 2PM LUNCH

Afternoon: Research presentation and Design Workshop

2–3:30PM: DeclareDesign install session (TS, MH, NI) & Research Design Form workshop (GN, MV)

3:30–4PM: DeclareDesign example (MH, TS)

4-4:45PM: Group work

- Hands-on session on power in R
- Feedback and questions
- Figuring out the power for each study
- Work on research design

4:45–5PM: Recap

- Recap
- Quick go around: what did you find useful? What would you like to hear more about?

5-6PM: Boat ride in Lake Malawi

Resources

- 10 things you should know about the local average treatment effect
- 10 things you need to know about spillovers in experimental analysis
- https://egap.shinyapps.io/spillover-app/
- Day 3. Key Tools for Experimental Research Design and Analysis in R

Thursday, 16 February 2017: Threats to Causal Inference

Morning Threats to Inference

9:00–9:20AM: Reflections & Discussion of topics for Friday afternoon

9:20–10:15AM: Day 4 recap quiz

10:15-10:35AM: Introduction to in-class experiment (MH)

10:35-11AM: Break

11-11:30AM: DeclareDesign: blocks & clusters (MH)

11:30AM–1PM: Group work
- Feedback and questions
- Work on research design

1PM–2PM LUNCH

Afternoon: Research presentation and Design Workshop

1:45-3:15PM: In-class experiment

3:15-6:00PM: Design clinic
- Feedback and questions
- Work on your project with DeclareDesign
- Revise research designs
- Prepare Presentations

6:30PM: Depart for dinner at Livingstonia Beach

After dinner: Prepare presentations for Friday morning

Resources
- 10 things you need to know about statistical power
- 10 things you need to know about covariate adjustment
- 10 things you need to know about multiple comparisons
- https://egap.shinyapps.io/Power_Calculator/
- DeclareDesign Guide

Friday, 17 February 2017: Design presentations and Remaining Topics

Morning: Design Presentations

8:30-10AM: Individual run-through of presentations

10AM–1PM: Design presentations
- Each participant's does a 10-min presentation with 5-minutes discussion
- Addressing sampling, randomization approach, power, cluster randomized trials, potential threats

1–2PM: LUNCH

Afternoon: Design Presentation and Topics

2–3PM: Lecture – Threats to Inference (MV, MH)
- Partial compliance: LATE and ITT
- Spillovers & Attrition & Mediation

3-4PM: Other topics
Based on demand we will discuss on one or more of the following themes.
1. IRB/Ethics
2. Partnerships
3. Measurement strategies
4. Workflow
5. Transparency in research

4–5 PM: Feedback and Next Steps
- How will we all continue to communicate and support each other after today?

List of Participants

- Rexford Kweku Asiama
- Bright Chimatiro
- James Ciera
- Fidelia Dake
- Nadege Djossou
- Uchenna Efobi
- Therese Elomo Zogo
- Augustine Harawa
- Hastings Honde
- Mary Karumba
- Sydney Lungu
- Robert Mpiira
- Threza Louis Mtenga
- Nancy Mulauzi
- Adams Tommy