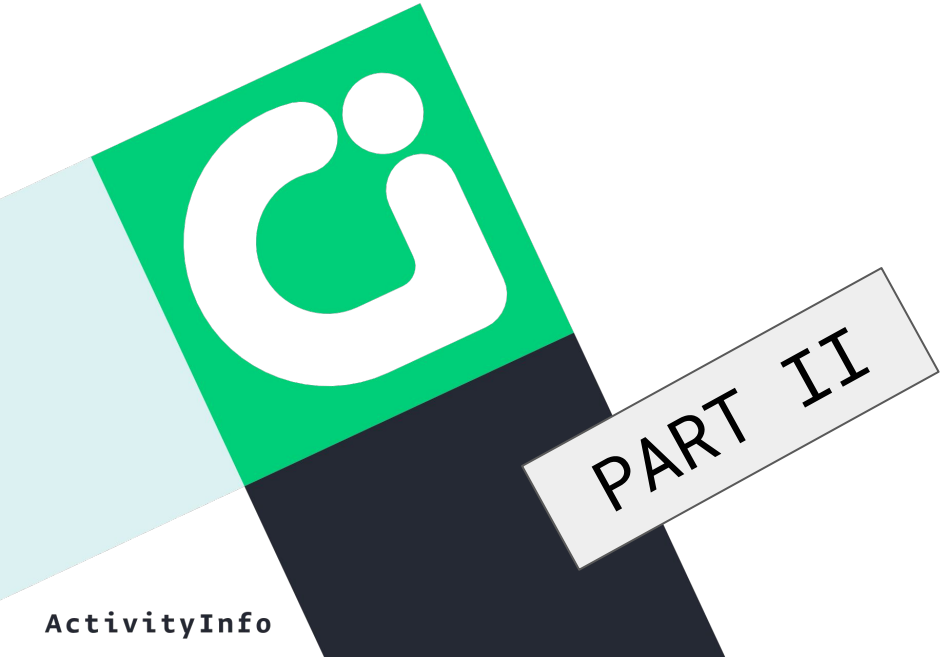
Measuring Impact Quantitatively

March 17th, 2022

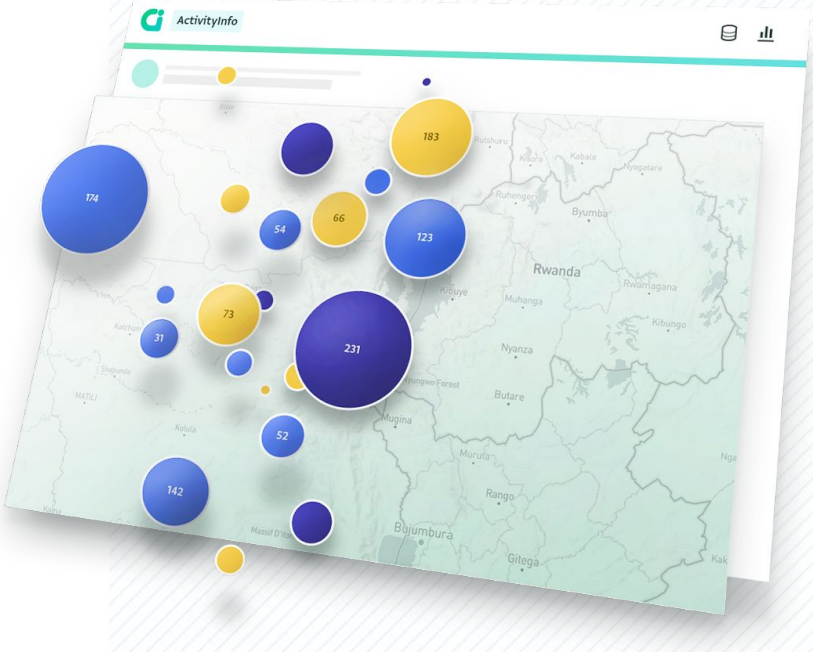


ActivityInfo

Presented by the ActivityInfo Team

Monitoring & Evaluation Software

- Track activities, outcomes
- Beneficiary management
- Surveys
- Work offline / online



Activity Info

Mini-course outline

Part 1 (Last week)

- What is a quantitative impact evaluation?
- Measurement challenges
- Statistics for reliability
- Using cognitive interviewing to improve survey instruments
- Designing experiments

Part 2 (Today)

- Causal inference

Part 3 (April)

- Understanding Statistical significance vs effect size

Activity Info

Key points from last week

- Why conduct a quantitative impact evaluation?
- When would you not conduct a quantitative impact evaluation?
- Types of measurements
- Sources of measurement error
- Reliability: Cronbach’s alpha
- Cognitive interviewing, a tool for improving questionnaires

Activity Info

Learning objectives

- Describe the “fundamental problem of causal inference”
- Identify four strategies for “counterfeit counterfactuals”
- Identify risks of before-and-after comparisons

Activity Info

Introduction to causal inference

Quantitative Impact Evaluation

Causal impact

Outcome Y *without* the program

$$\Delta = (Y \mid P = 1) - (Y \mid P = 0)$$

Outcome Y *with* the program

Activity Info

The counterfactual problem

What would have happened for a participant if we hadn’t conducted our intervention?

FYI: This is the framework introduced by the **Rubin causal model**

The lack of a multiverse is inconvenient

Peter parker in Universe 1 with **vocational training**

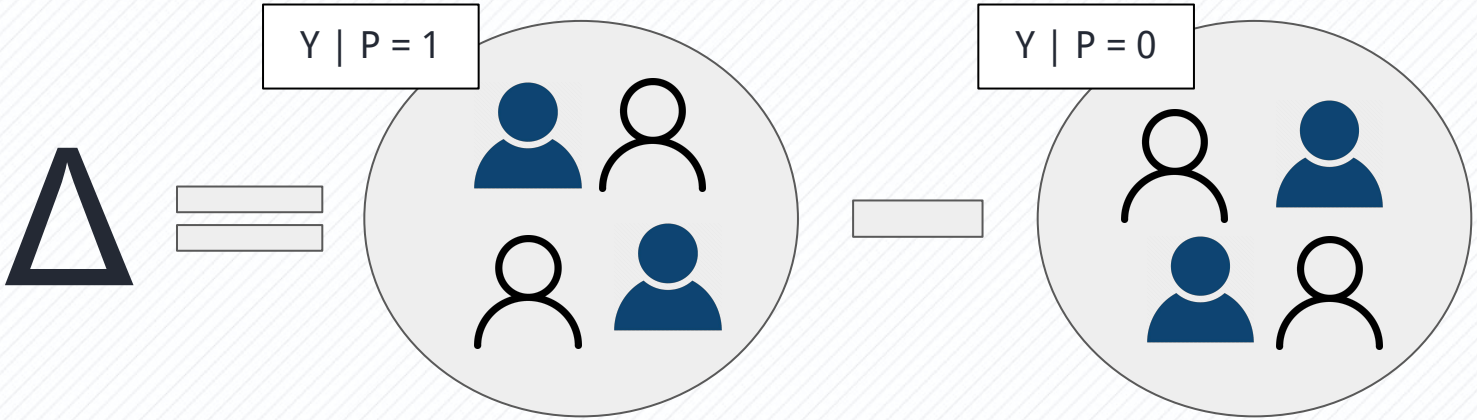
Peter parker in Universe 2 with **cash transfer**

Peter parker in Universe 3 with **no intervention**

Activity Info

Counterfeit counterfactuals

If we can't experiment on multiverses, then we must find **comparable groups**.



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Valid comparison groups…

1. Two groups must be same on average:
   participation should be the only difference.
2. Program should only affect the treatment group.
3. Program should (potentially) affect both groups in the same way.

Activity Info

Counterfeit estimates of the counterfactual

Problematic

- Before-and-after comparisons
- Enrolled and non-enrolled

Better…

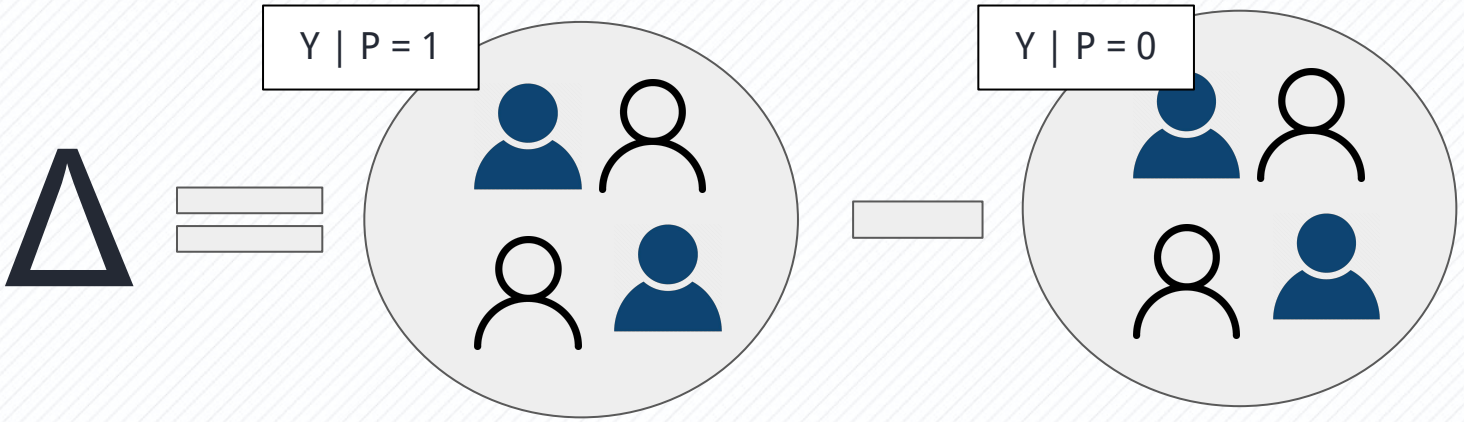
- Randomized assignment
- Differences-in-Differences

Activity Info

Before and after comparisons

Before and after comparisons

Is participation the only difference??

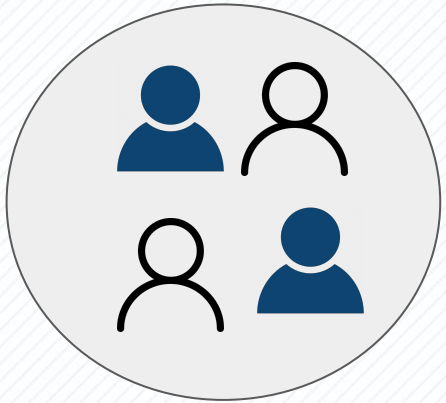


Activity Info

Example: agricultural intervention

(Y | P = 1) = 12800 kg/ha maize

(Y | P = 0) = 10300 kg/ha grain maize



+2500kg/ha

2021

3-year programme to introduce better soil management practices

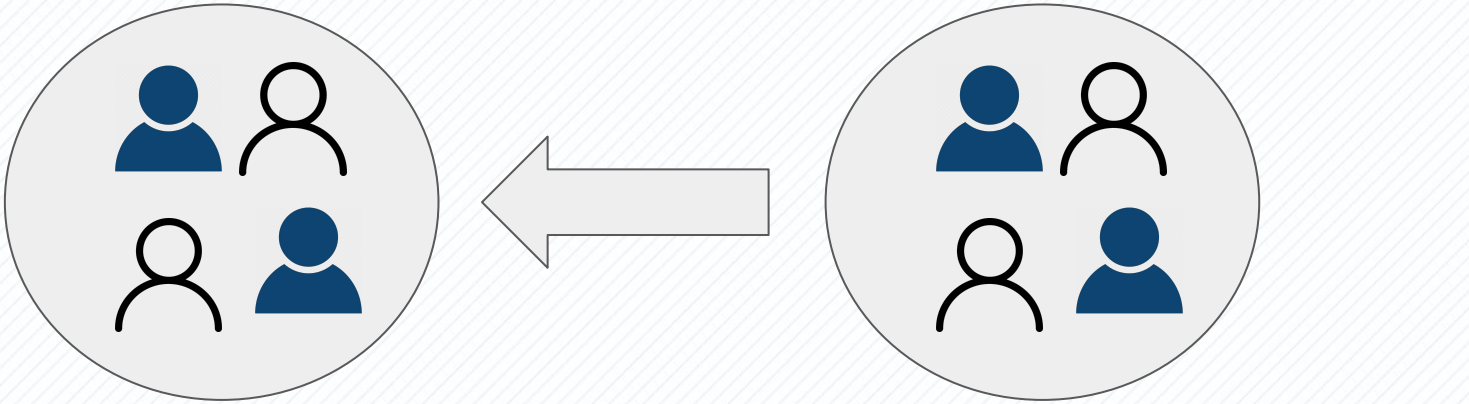
2019

Activity Info

Example: agricultural intervention

(Y | P = 1) = 12800 kg/ha maize

(Y | P = 0) = 10300 kg/ha grain maize



+2500kg/ha

2021

Rainfall: 975mm

3-year programme to introduce better soil management practices

2019

Rainfall: 582mm

Activity Info

Example: agricultural intervention

(Y | P = 1) = 12800 kg/ha maize

(Y | P = 0) = 10300 kg/ha grain maize

+2500kg/ha

- 3-year programme to introduce better soil management practices
- Price of pesticides fell
- New strains of maize introduced

2021

Rainfall: 975mm

2019

Rainfall: 582mm

Activity Info

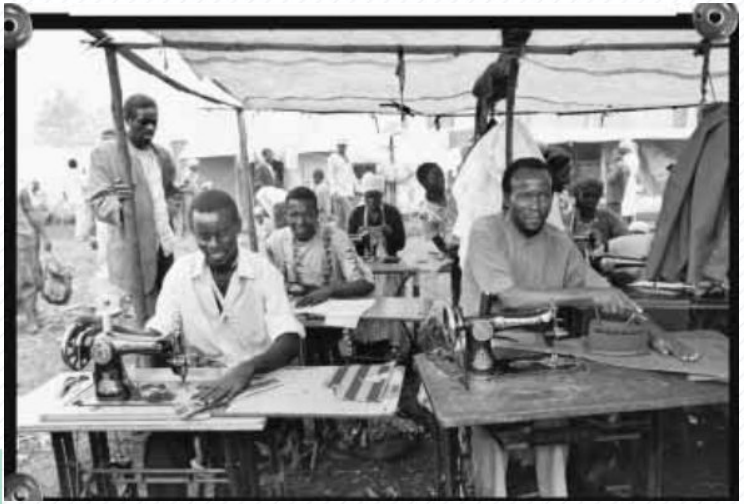
Enrolled vs Non-Enrolled

Enrolled vs Non-enrolled

- Allow eligible beneficiaries to enroll for a programme
- After the program, compare those who enrolled vs those who did not.

Activity Info

Example: vocational training in refugee camp



Rwandese refugees in Inera Camp, Bukavu Region, South Kivu. UNHCR/12.1994/A. Hollmann

Activity Info

Example: vocational training in refugee camp

Is participation the only difference??

(Y | P = 1) = 60$/month

(Y | P = 0) = 10$/month

+50$

Choose to Enroll

Received training

Choose not to Enroll

No training

Activity Info

Example: vocational training in refugee camp

Nope!

(Y | P = 1) = 60$/month

Choose to Enroll

Received training
Secondary education: 60%
Previous business owner: 80%

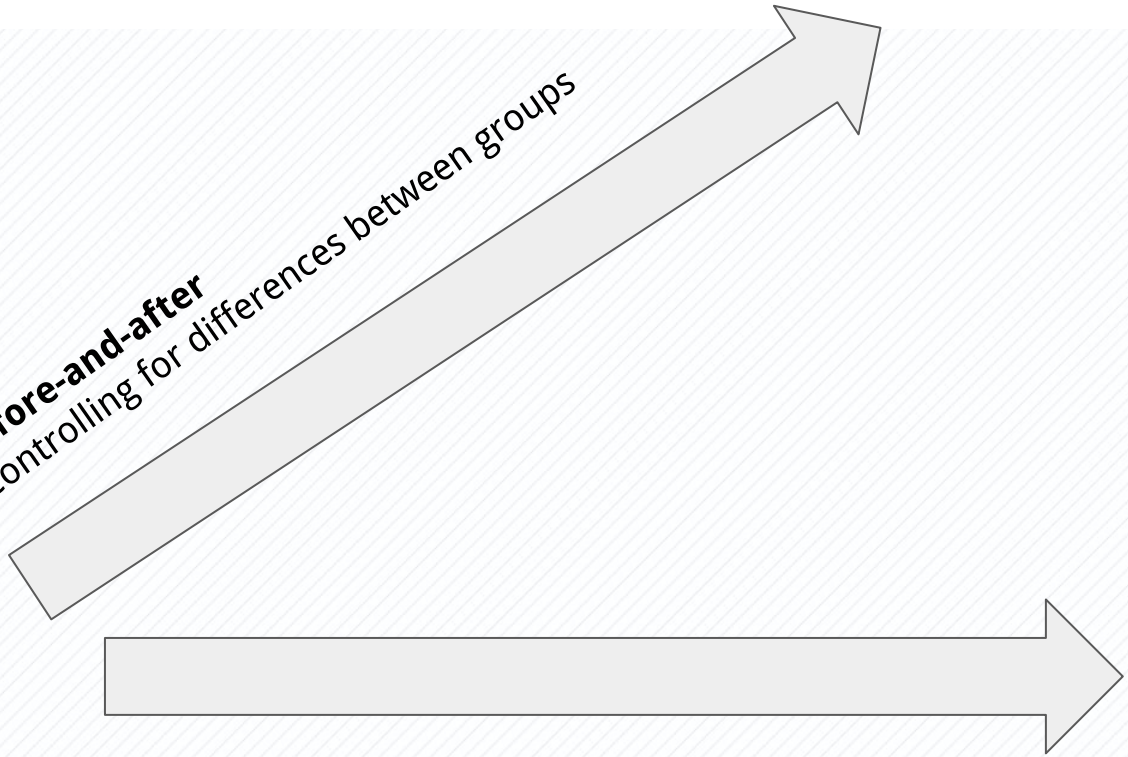
(Y | P = 0) = 10$/month

Choose not to Enroll

No training
Secondary education: 10%
Previous business owner: 30%

+50$

Activity Info



Enrolled vs Non-Enrolled
Controls for external changes over time

Activity Info

Multiple regression

Multiple regression

Statistical technique that allows you to examine the impact of multiple independent variables **at the same time.**

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Demo

Enroll vs Non-enrolled with ActivityInfo + R

Activity Info

Requirements

- Must be able to identify and measure ALL external factors ahead of time.
- Must have sufficient variation to conduct analysis.

Randomized assignment

Randomized assignment

- Identify eligible people
- Randomly select beneficiaries for participation
- Compare selected beneficiaries with sample of non-selected, eligible people

Activity Info

Example: vocational training in refugee camp

(Y | P = 1) = 60$/month

Choose to Enroll

Received training
University educated: 60%
Previous business owner: 80%

(Y | P = 0) = 10$/month

Choose not to Enroll

No training
University educated: 10%
Previous business owner: 30%

+50$

Activity Info

Example: vocational training in refugee camp

(Y | P = 1) = 17$/month

Randomly selected

Received training
University educated: 20%
Previous business owner: 35%

(Y | P = 0) = 15$/month

Randomly not selected

No training
University educated: 21%
Previous business owner: 34%

+2$

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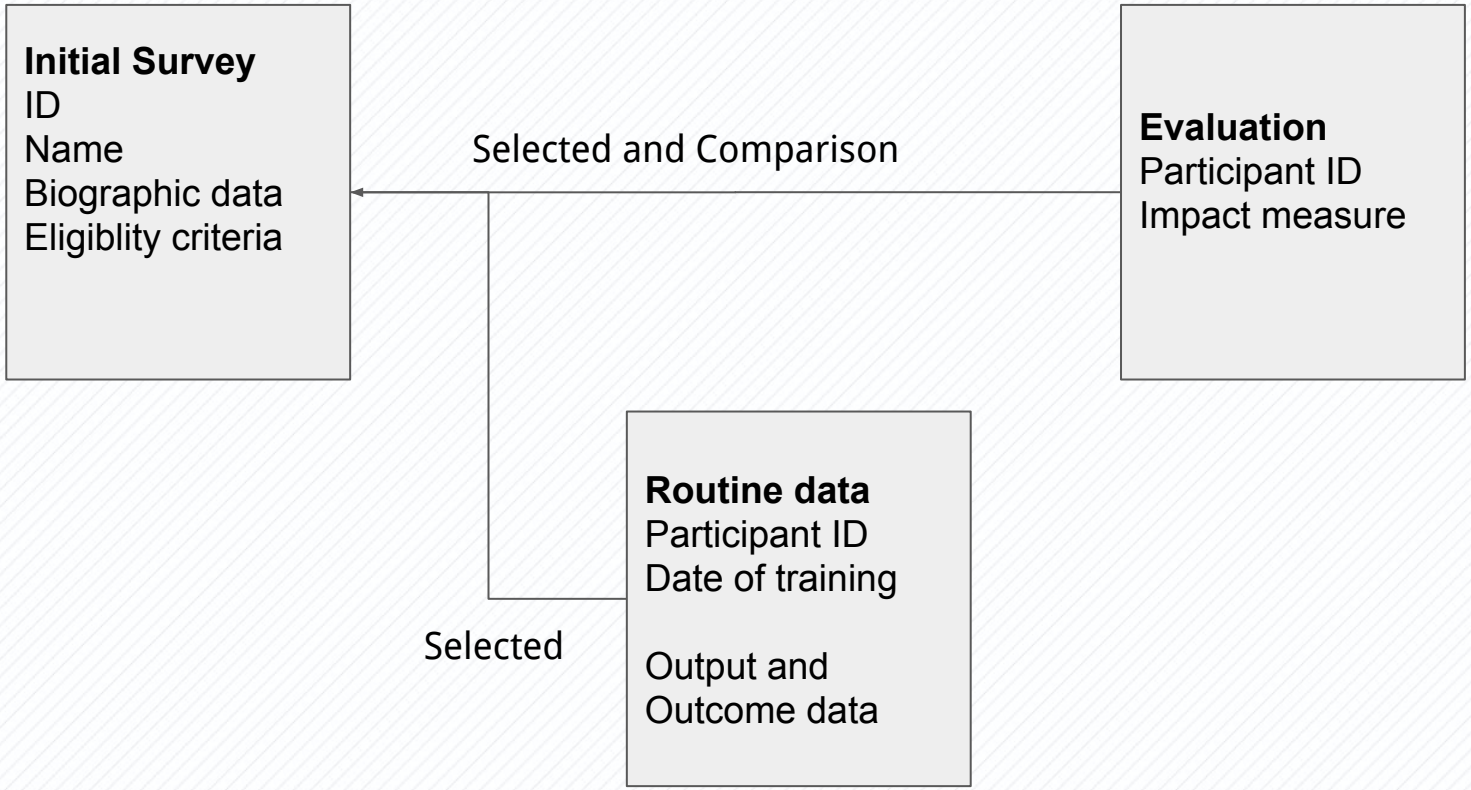
Practical: How to?



Activity Info

Differences-in-Differences

Example: provide wifi in refugee camps

Selected group

Comparison group

+2$

After

Vs

Before

After

Vs

Before

Activity Info

Example: media campaign against domestic violence

	District with campaign	District without campaign
Reports of domestic violence **before** campaign (last 12 months)	4%	3%
Reports of domestic violence **after** campaign	5%	6.5%
Difference	+1%	+3.5%

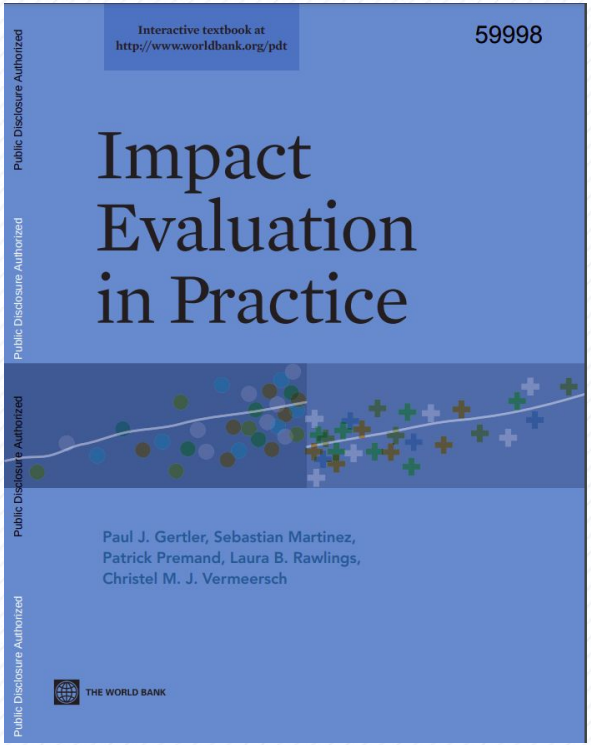
Activity Info

Learning check!

Do you use before-and-after comparisons in your work? Identify a few potential biases?

How could you integrate randomized assignment into your work? Or not?

Sources & Further Reading



Paul J. Gertler, Sebastian Martinez, Patrick Premand, Laura B. Rawlings, Christel M. J. Vermeersch

Download from
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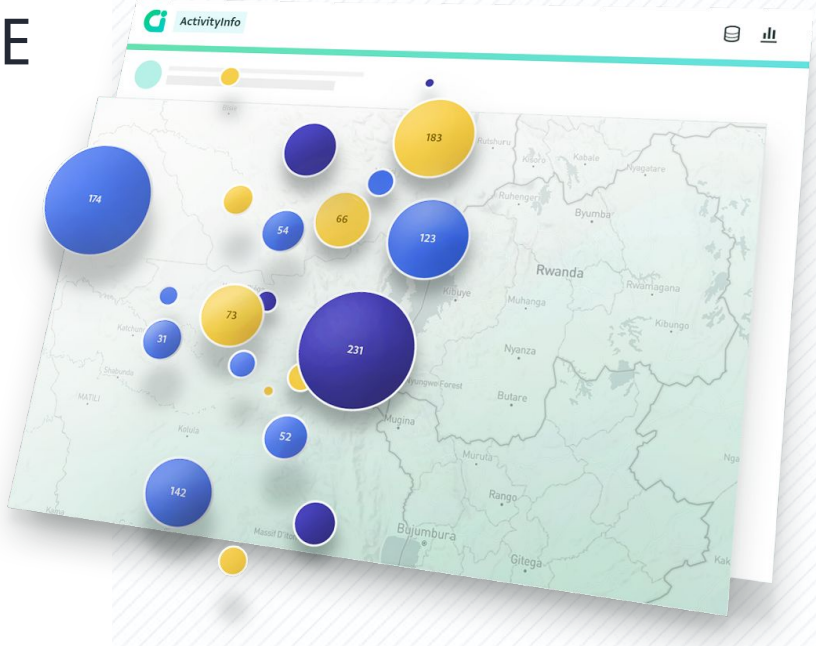
[Try a template]



Activity Info