J-PAL
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Why Randomize?

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Session Overview

I. Basic vocabulary for impact evaluation

II. Randomized evaluation

III. Other methods of impact evaluation

IV. Conclusions

Components of Programme Evaluation

• Needs Assessment	• What is the problem?
• Programme Theory Assessment	• How, in theory, does the Programme fix the problem?
• Process Evaluation	• Does the Programme work as planned?
• **Impact Evaluation**	• **Were its goals achieved? The magnitude?**
• Cost Effectiveness	• Given magnitude and cost, how does it compare to alternatives?

BASIC VOCABULARY FOR IMPACT EVALUATION

Example: Immunization Incentives

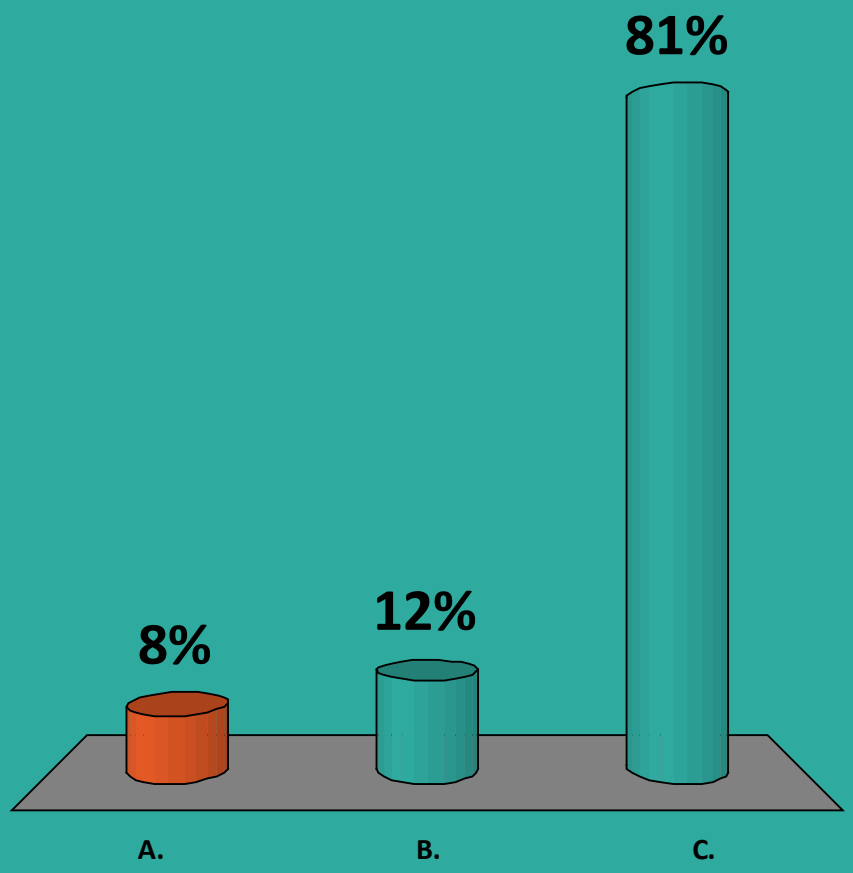
- **The Problem:**
  - Despite availability of free immunization, full coverage rates among children remains extremely low in many developing countries
- **Intervention**
  - Reliable, monthly immunization camps set up in villages in Udaipur
  - Small incentives offered to mothers conditional on having child immunized; larger incentive when immunization course completed

Which one of these would make a good question for impact evaluation?

A. What percentage of 3 year old children in Rajasthan were not fully immunized?

B. What is the correlation between regular immunization camps and immunization rates?

C. Does holding regular immunization camps and providing incentives to parents improve immunization rates of children?



Causal Inference

Cause and effect language is used everyday in a lot of contexts, but it means something very specific in impact evaluation.

- We can think of causality as:
  - The singular effect of a program on an outcome of interest
  - Independent of any other intervening factors,

- Our goal is to estimate the size of this effect accurately and with confidence

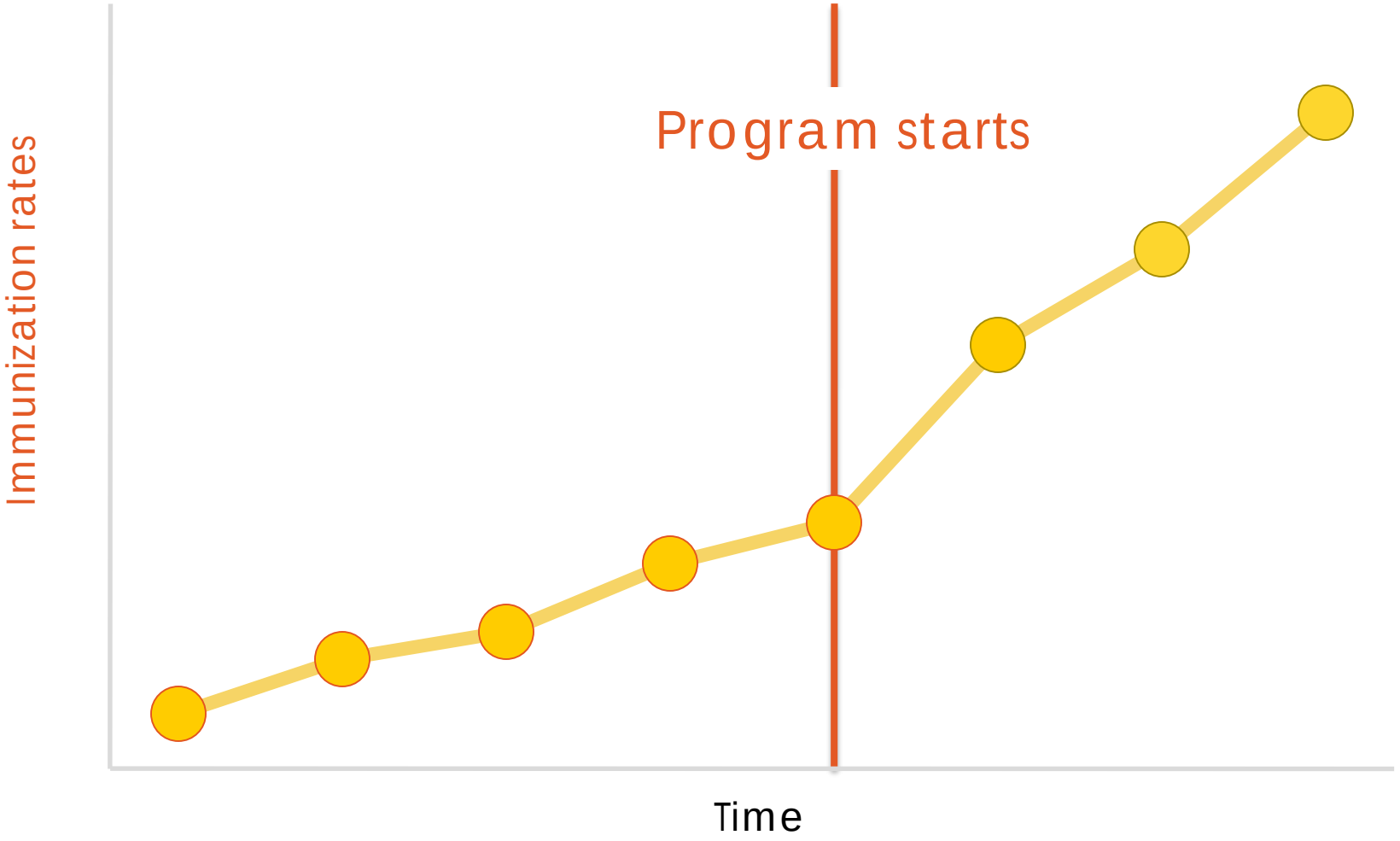
How to measure impact?

- *Impact* (also called "causal effect") is defined as a comparison between:

1. The outcome some time after the program has been introduced

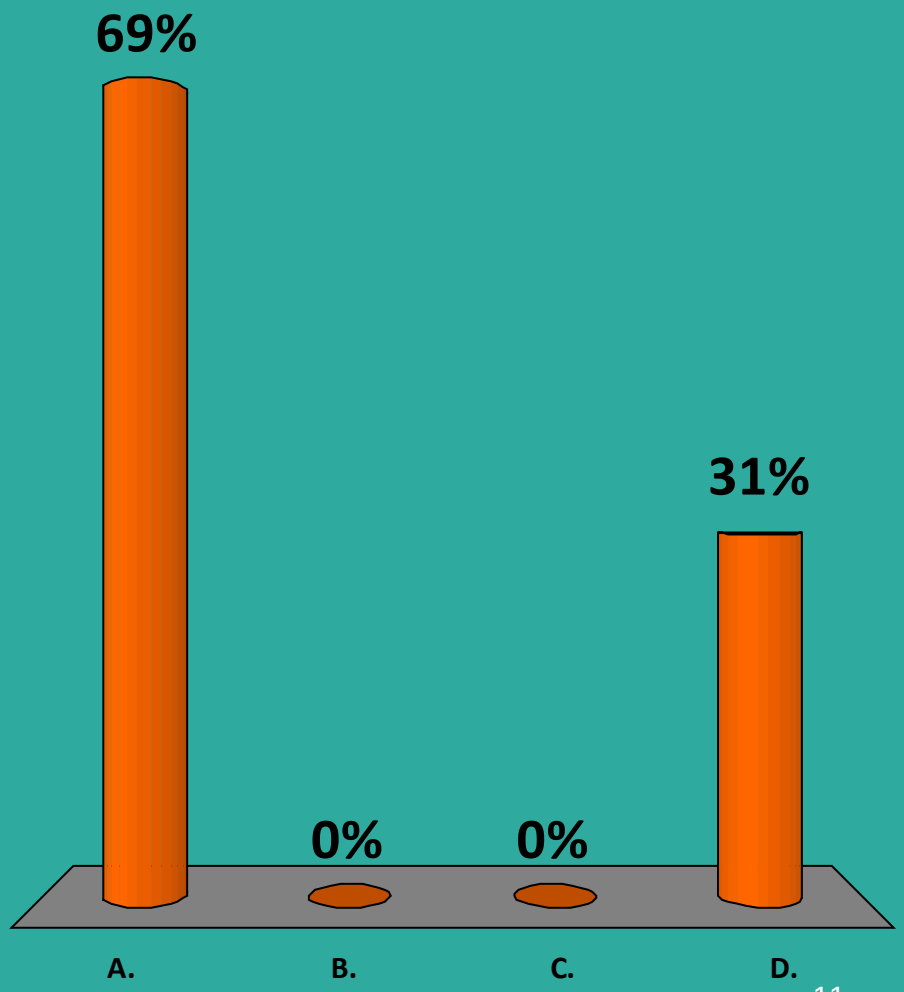
2. The outcome at that same point in time had the program not been introduced (the *"counterfactual"*)

What is the impact of this program?

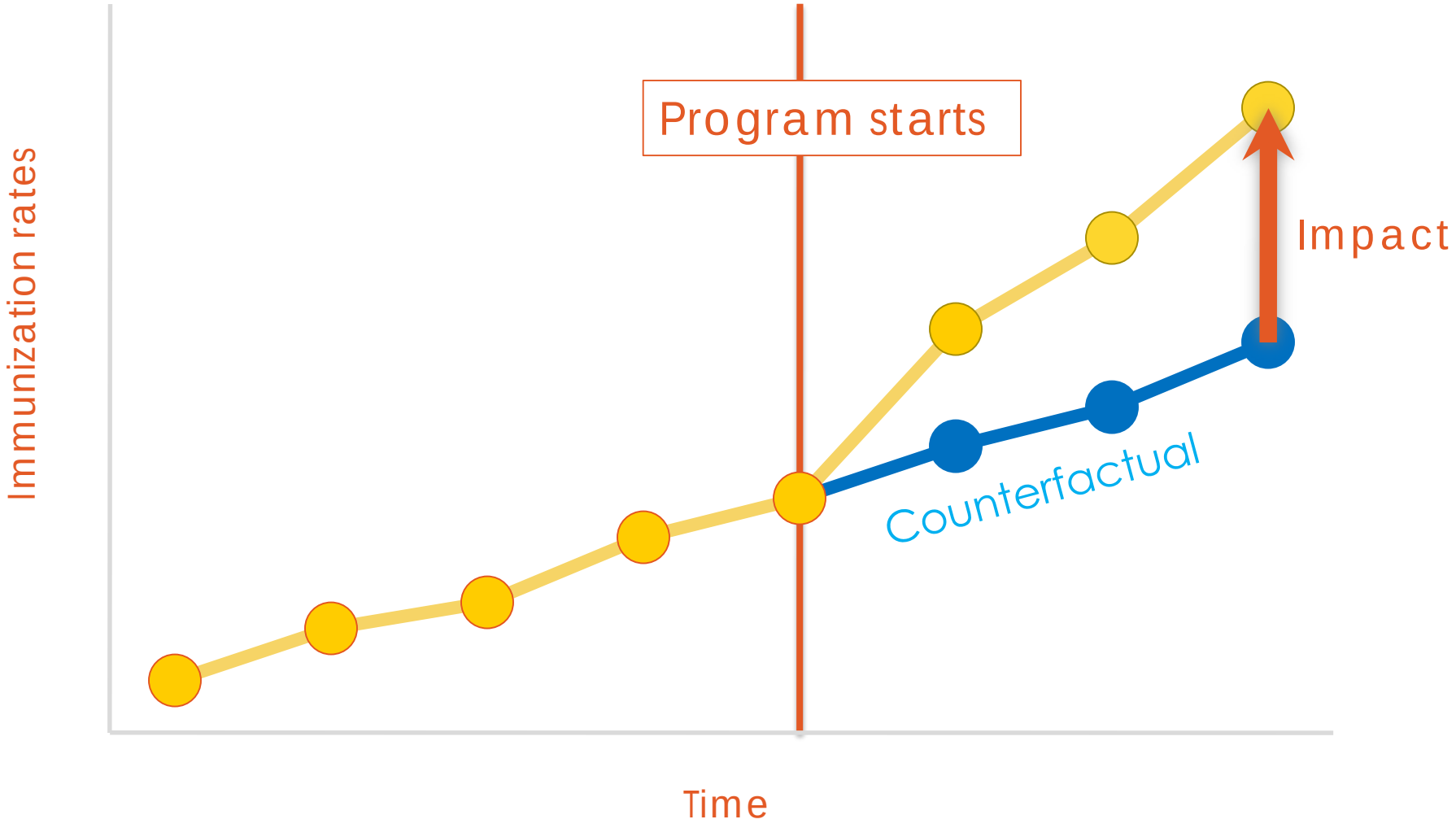


What is the impact of this program?

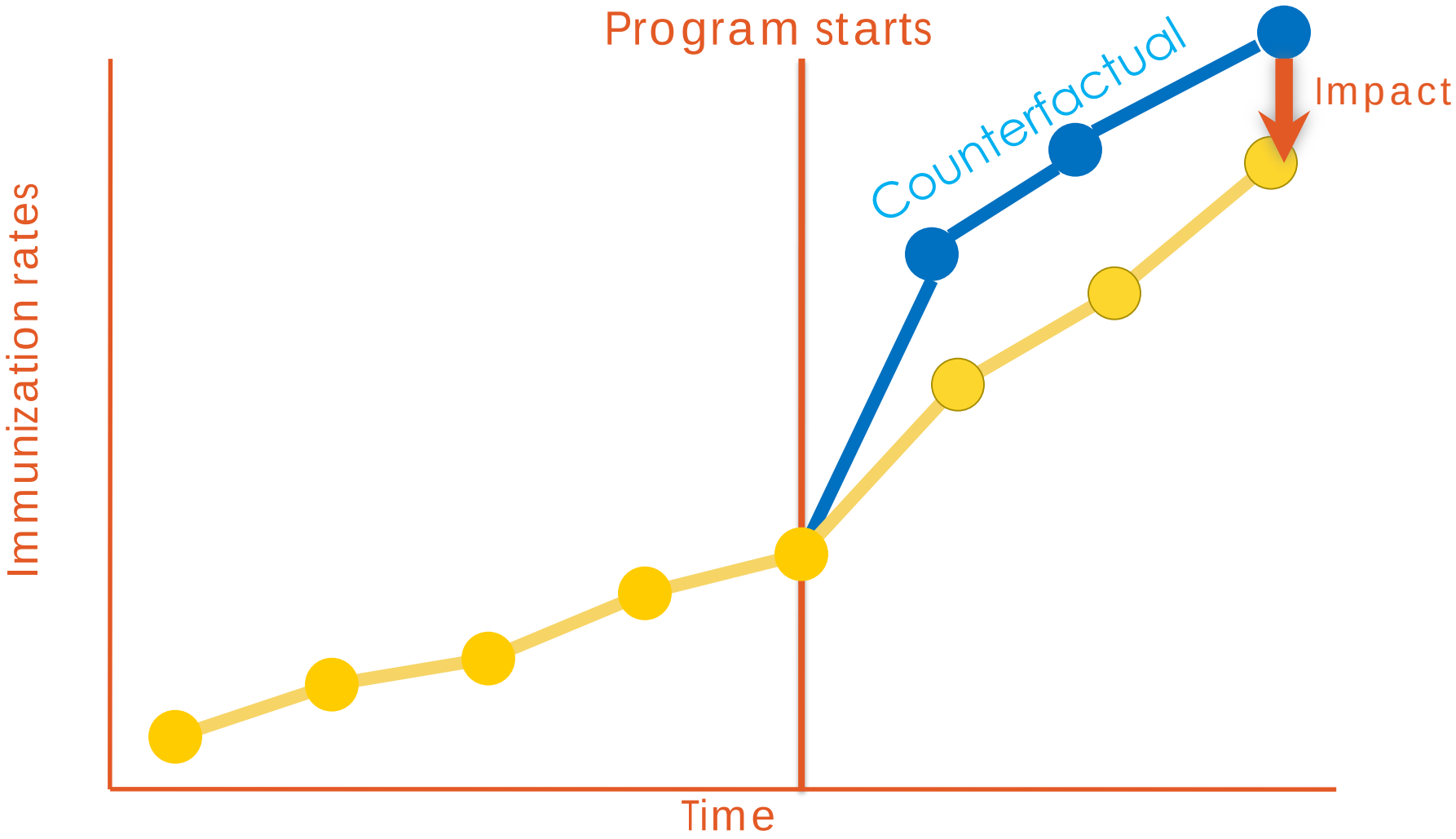
A. Positive
B. Negative
C. Zero
D. Not enough info



What is the impact of this program?



Impact: What is it?



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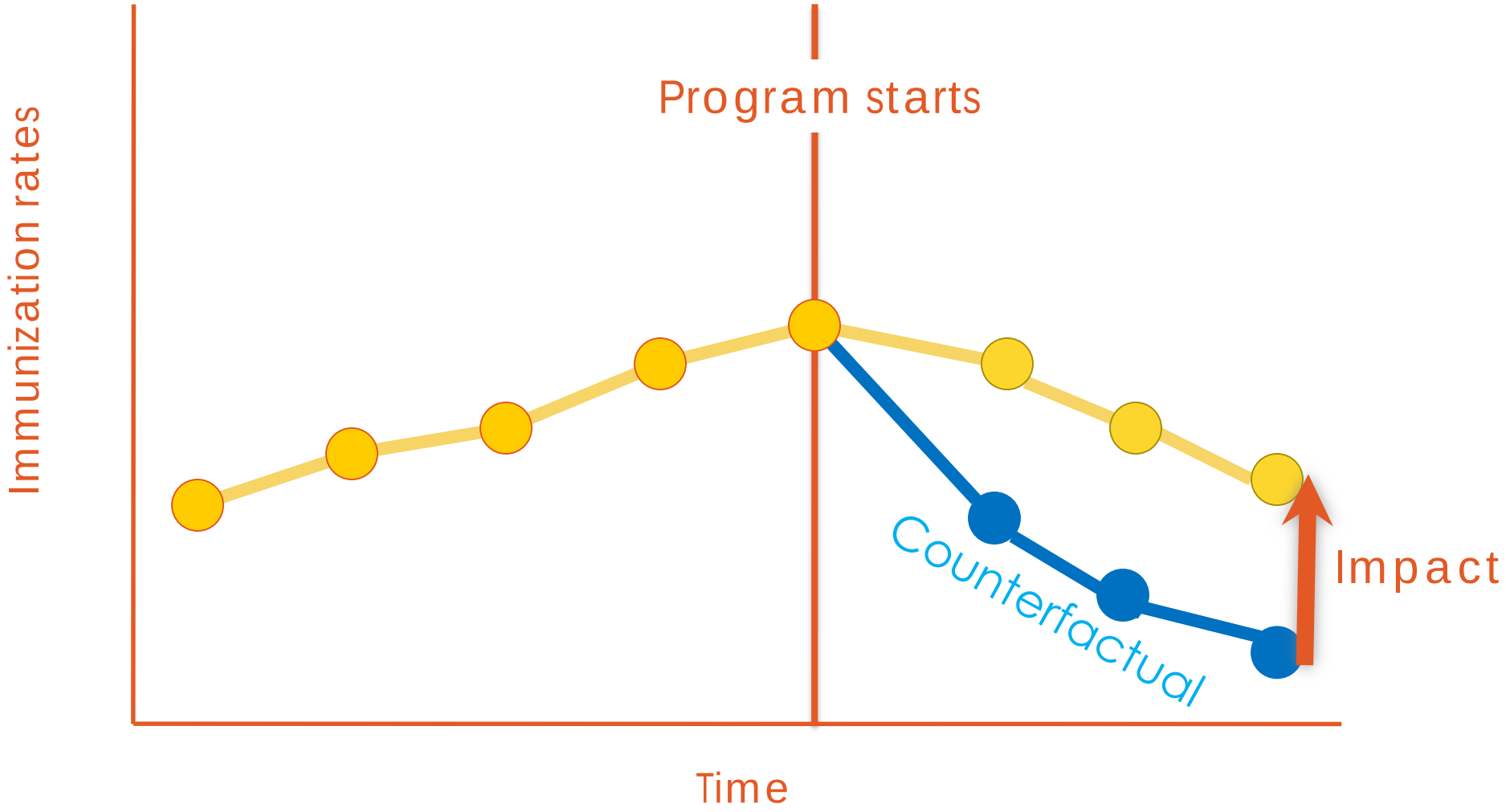


Counterfactual

The **counterfactual** represents the state of the world that program participants would have experienced in the absence of the program (i.e. had they not participated in the program)

Problem: Counterfactual cannot be observed

Solution: We need to "mimic" or construct the counterfactual

Constructing the counterfactual

- Usually done by selecting a group of individuals that ***did not*** participate in the program
- This group is usually referred to as the ***control group*** or ***comparison group***
- How this group is selected is a **key decision** in the design of any impact evaluation

Selecting the comparison group

- Idea: Select a group that is exactly like the group of participants in all ways except one: their exposure to the program being evaluated

- Goal: To be able to attribute differences in outcomes between the group of participants and the comparison group to the program (and not to other factors)

- An impact evaluation is only as good as the comparison group it uses to mimic the counterfactual

Impact evaluation methods

1. Randomized Experiments

Use random assignment of the program to create a comparison group which mimics the counterfactual.

Also known as:

- Random Assignment Studies
- Randomized Field Trials
- Social Experiments
- Randomized Controlled Trials (RCTs)
- Randomized Controlled Experiments

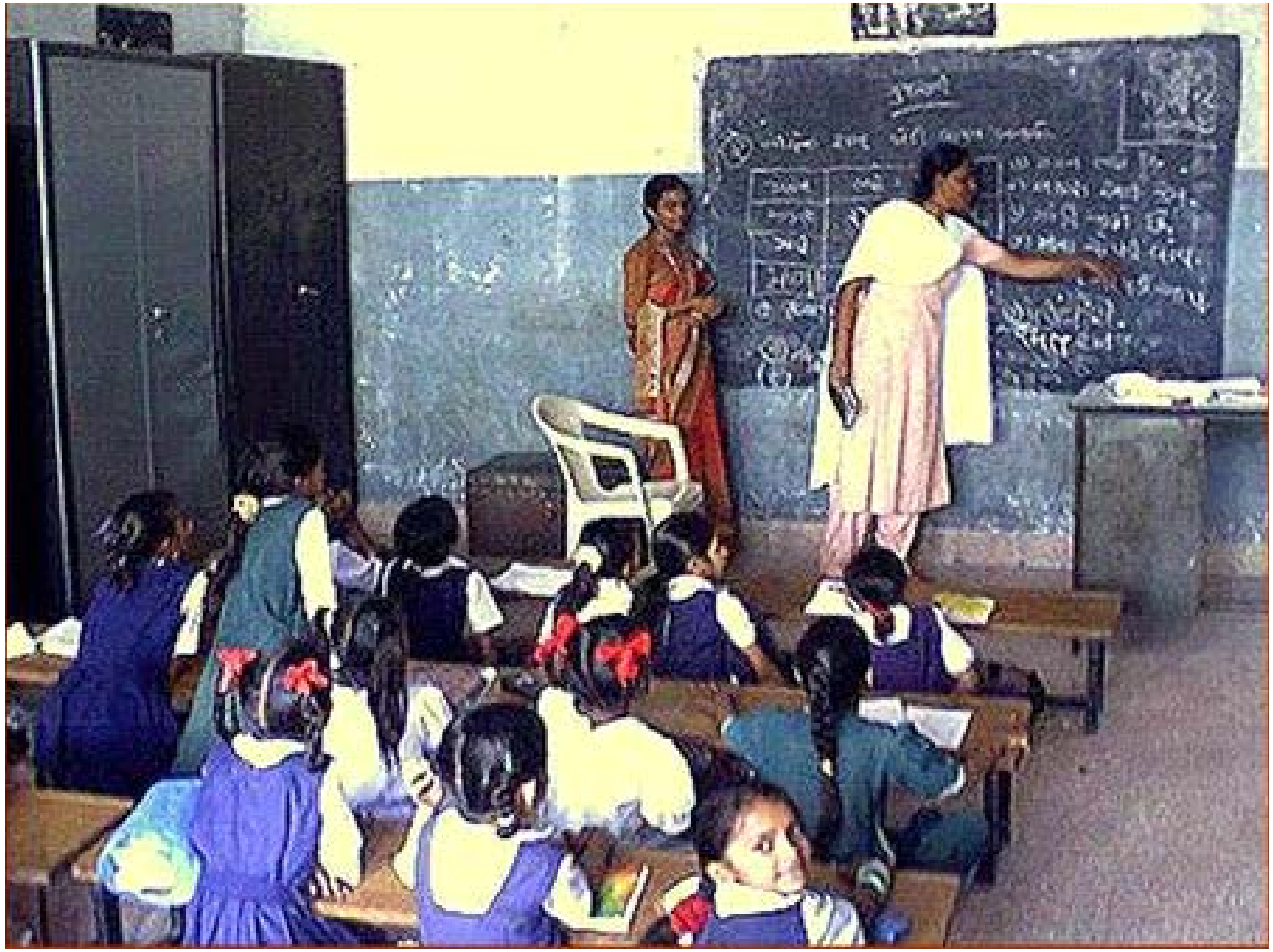
Impact evaluation methods

2. Non- or Quasi-Experimental Methods

Argue that a certain excluded group mimics the counterfactual

a. Pre-Post
b. Simple Difference
c. Differences-in-Differences
d. Multivariate Regression
e. Statistical Matching
f. Interrupted Time Series
g. Instrumental Variables
h. Regression Discontinuity

Example: Balsakhi Program



Balsakhi Program: Background

- Problem:
  - Many children in 3rd and 4th standard were not even at the 1st standard level of competency
  - Class sizes were large
  - Social distance between teacher and many of the students was large

- Proposed solution:
  - Hire local women (balsakhis) from the community and train them to teach basic competencies (reading, numeracy) to lowest performing students
  - Implemented by Pratham, an NGO from India
  - In Vadodara, the balsakhi program was run in government primary schools in 2002-2003
  - Teachers decided which children would get the balsakhi

Balsakhi: Outcomes

- Children were tested at the beginning of the school year (Pretest) and at the end of the year (Post-test)

- QUESTION: How can we estimate the impact of the balsakhi program on test scores?

Randomized Evaluation

- Suppose we evaluated the balsakhi program using a randomized evaluation

- QUESTION #1: What would this entail? How would we do it?

- QUESTION #2: What would be the advantage of using this method to evaluate the impact of the balsakhi program?

The basics

- Take a sample of program applicants
- Randomly assign them to either:
  - Treatment Group – is offered the program
  - Control Group – not allowed to receive the program (during the evaluation period)
- The two groups will, on average, have the same observable and unobservable characteristics
  - since assignment is purely by chance
  - provided we have a large enough number of units
- Impact = Difference in outcomes between the treatment and control groups after the program

Key advantage of experiments

Because members of the groups (treatment and control) do not differ systematically at the outset of the experiment,

any difference that subsequently arises between them can be attributed to the program rather than to other factors.

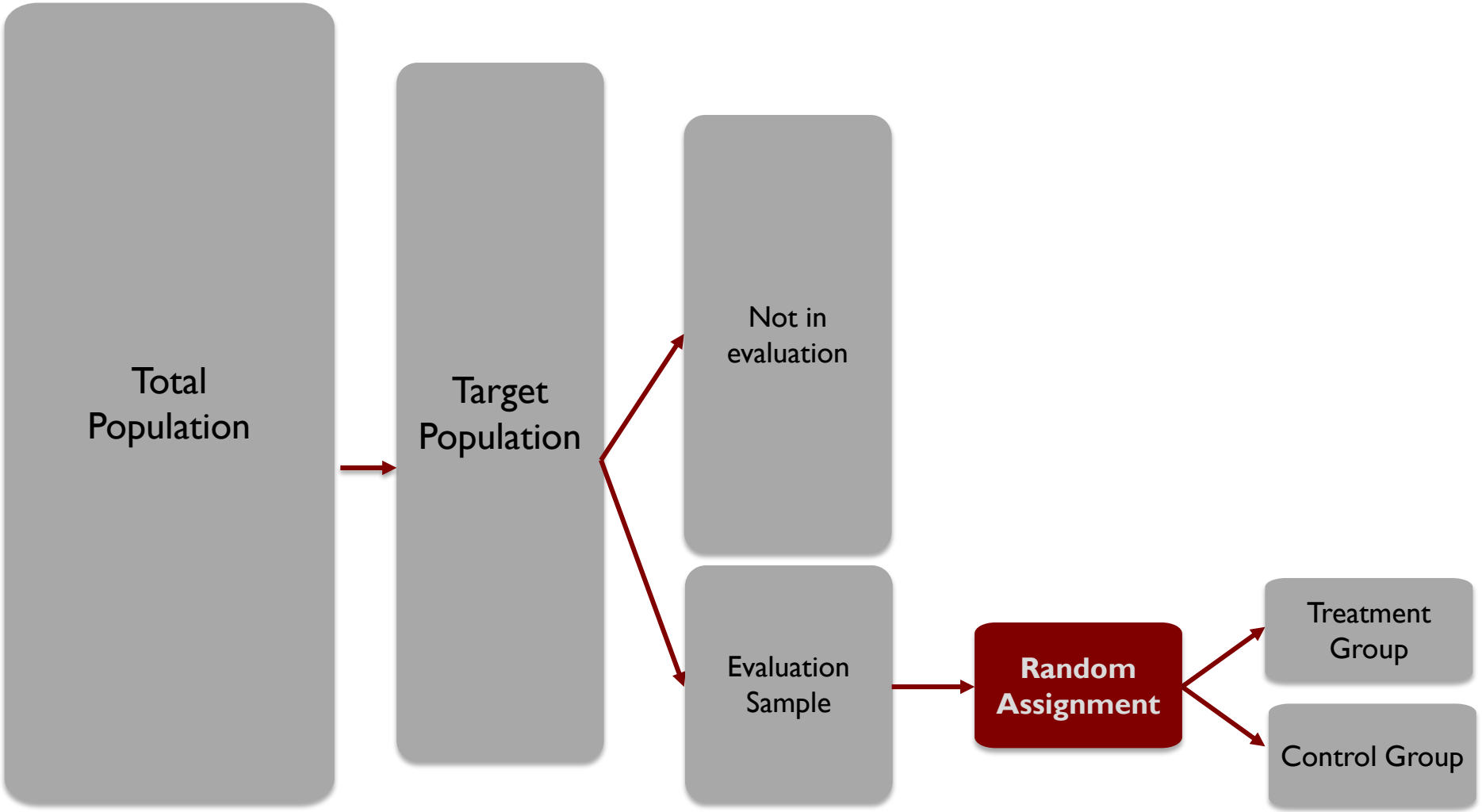
If properly designed and conducted, randomized experiments provide the most credible method to estimate the impact of a program

Testing Assumptions: Randomized Evaluations

- What is the main assumption of randomized evaluation that must hold for it to give the true impact of the program?
  - No randomization failure: that randomization generates two statistically identical groups

- How can you test whether this assumption is true?
  - Balance test – compare their characteristics at baseline (beginning of the program)

Basic set-up of a Randomized Evaluation



When to do a Randomized Evaluation?

- When there is an important question you want/need to know the answer to
- Timing--not too early and not too late
- Program is representative not gold plated
  - Or tests an basic concept you need tested
- Time, expertise, and money to do it right
- Develop an evaluation plan to prioritize

When NOT to do a Randomized Evaluation?

- When the program is premature and still requires considerable "tinkering" to work well
- When the project is on too small a scale to randomize into two "representative groups"
- If a positive impact has been proven using rigorous methodology and resources are sufficient to cover everyone
- After the program has already begun and you are not expanding elsewhere

NON AND QUASI-EXPERIMENTAL METHODS

Non or Quasi-Experimental Methods

- Let us look at other methods of estimating impact using the data from the schools that got a balsakhi
    1. Pre – Post (Before vs. After)
    2. Simple difference
    3. Difference-in-difference

- Other methods can be effective if the specific conditions needed for that method's assumption to hold exist

- Limitation: Conditions needed for them to be valid do not always apply

1 - Pre-post (Before vs. After)

- Look at average change in test scores over the school year for the balsakhi children

1 - Pre-post (Before vs. After)

Average post-test score for children with a balsakhi	51.22
Average pretest score for children with a balsakhi	24.80
Difference	26.42

QUESTION: Under what conditions can this difference (26.42) be interpreted as the impact of the balsakhi program?

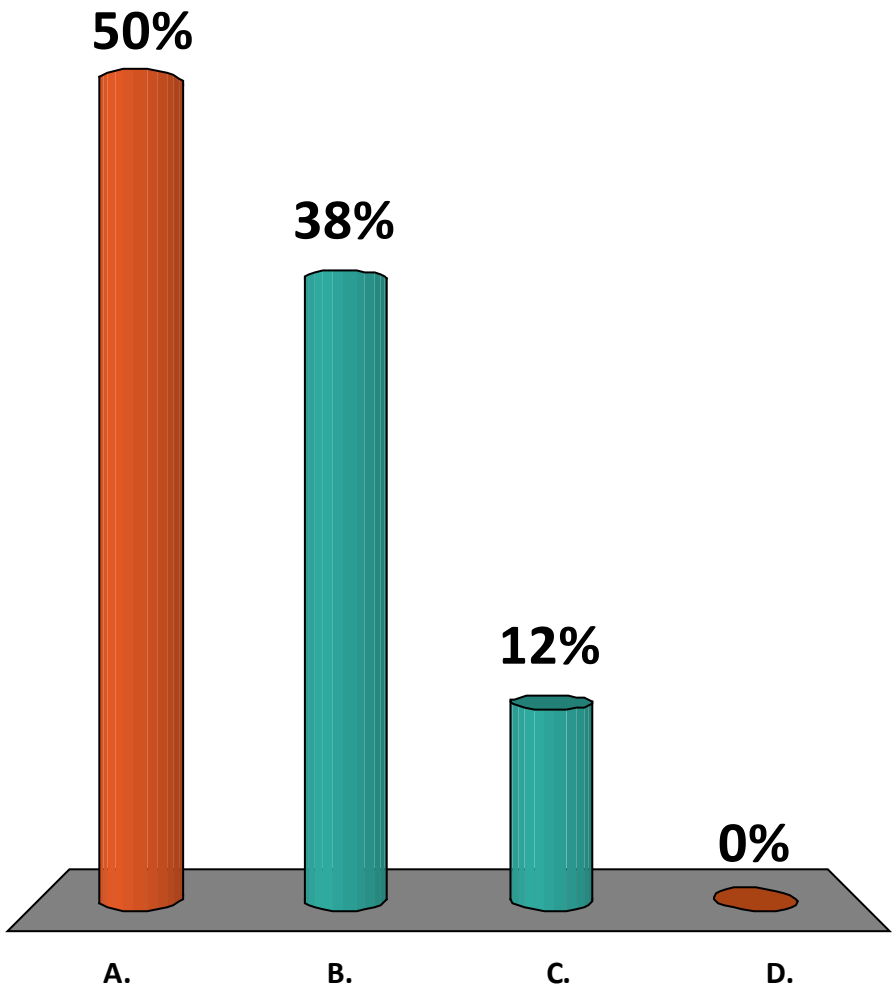
Which of the following represents the counterfactual in this case:

A. Balsakhi students before participating in the programme

B. The non-Balsakhi students in the same schools

C. Students from other schools in Vadodara where the Balsakhi progamme is not being implemented

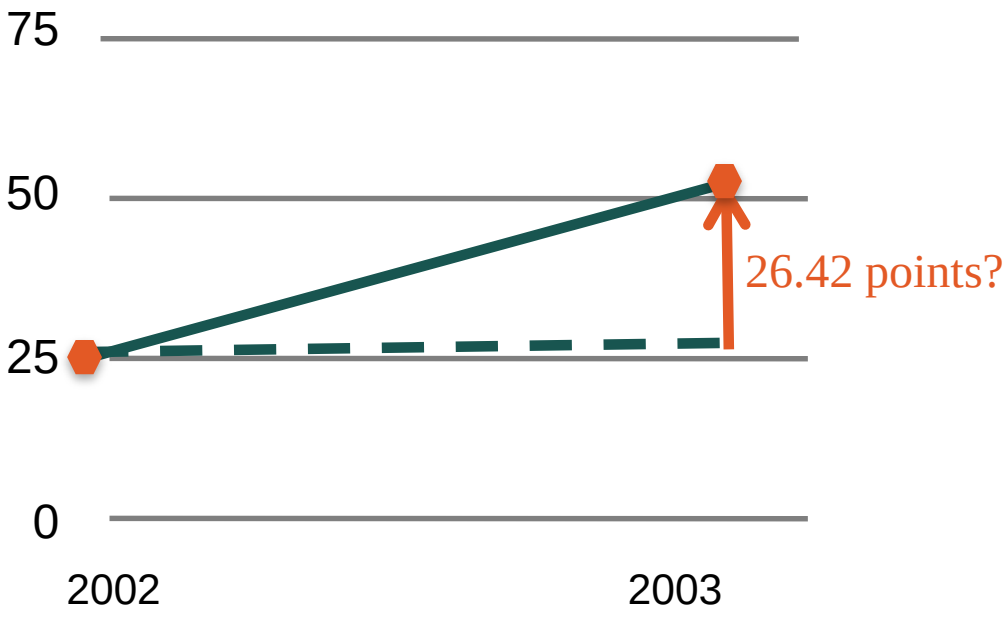
D. None of the above



What would have happened without Balsakhi?

Method 1: Before vs. After

Impact = 26.42 points?



2 - Simple difference

Compare test scores of...

Children who got balsakhi

With test scores of...

Children who did not get balsakhi

2 - Simple difference

Average score for children with a balsakhi	**51.22**
Average score for children without a balsakhi	56.27
Difference	-5.05

QUESTION: Under what conditions can this difference (-5.05) be interpreted as the impact of the balsakhi program?

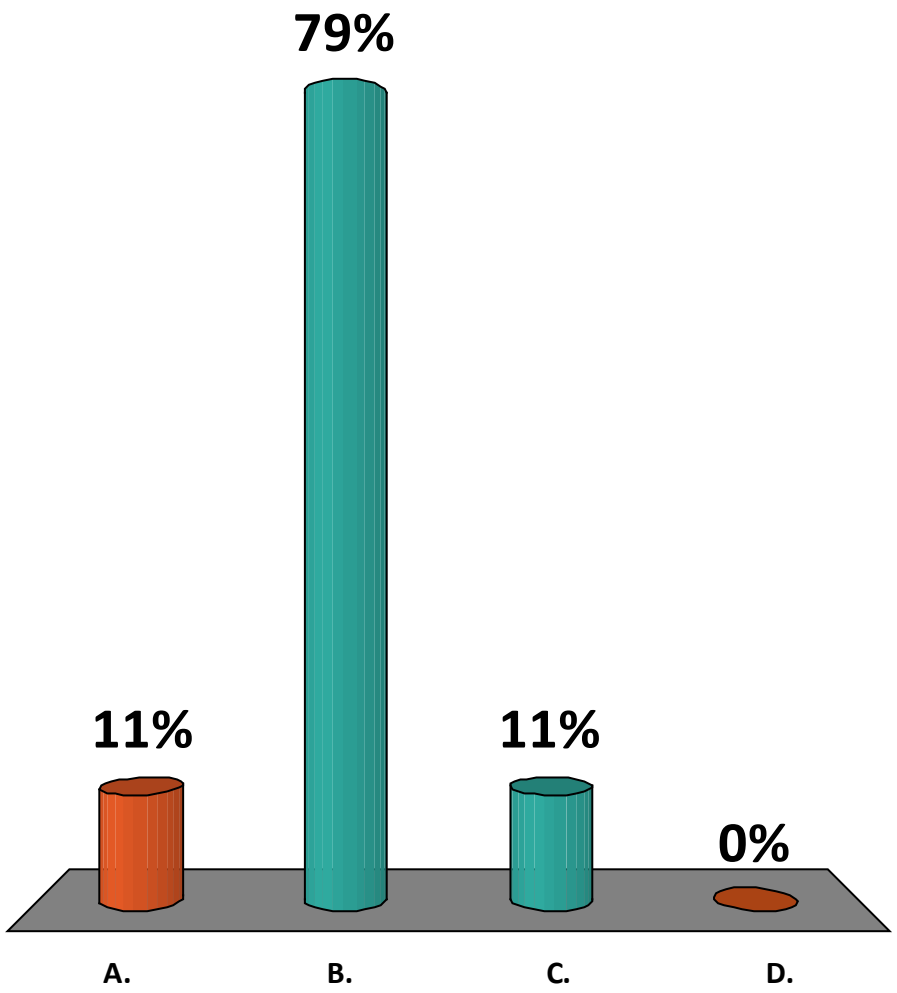
Which of the following represents the counterfactual in this case:

A. Balsakhi students before participating in the programme

B. The non-Balsakhi students in the same schools

C. Students from other schools in Vadodara where the Balsakhi progamme is not being implemented

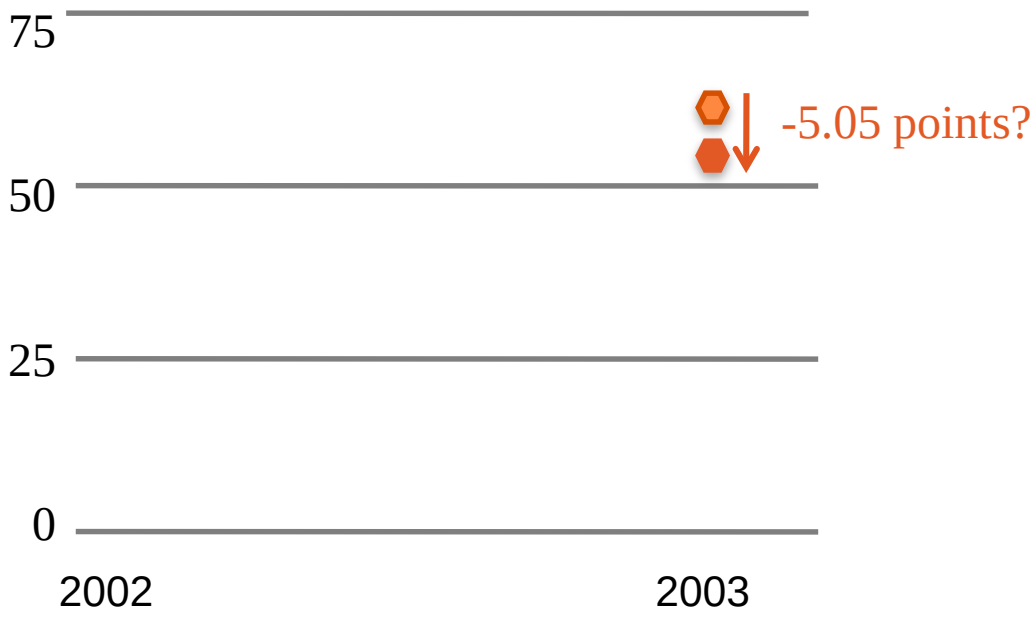
D. None of the above



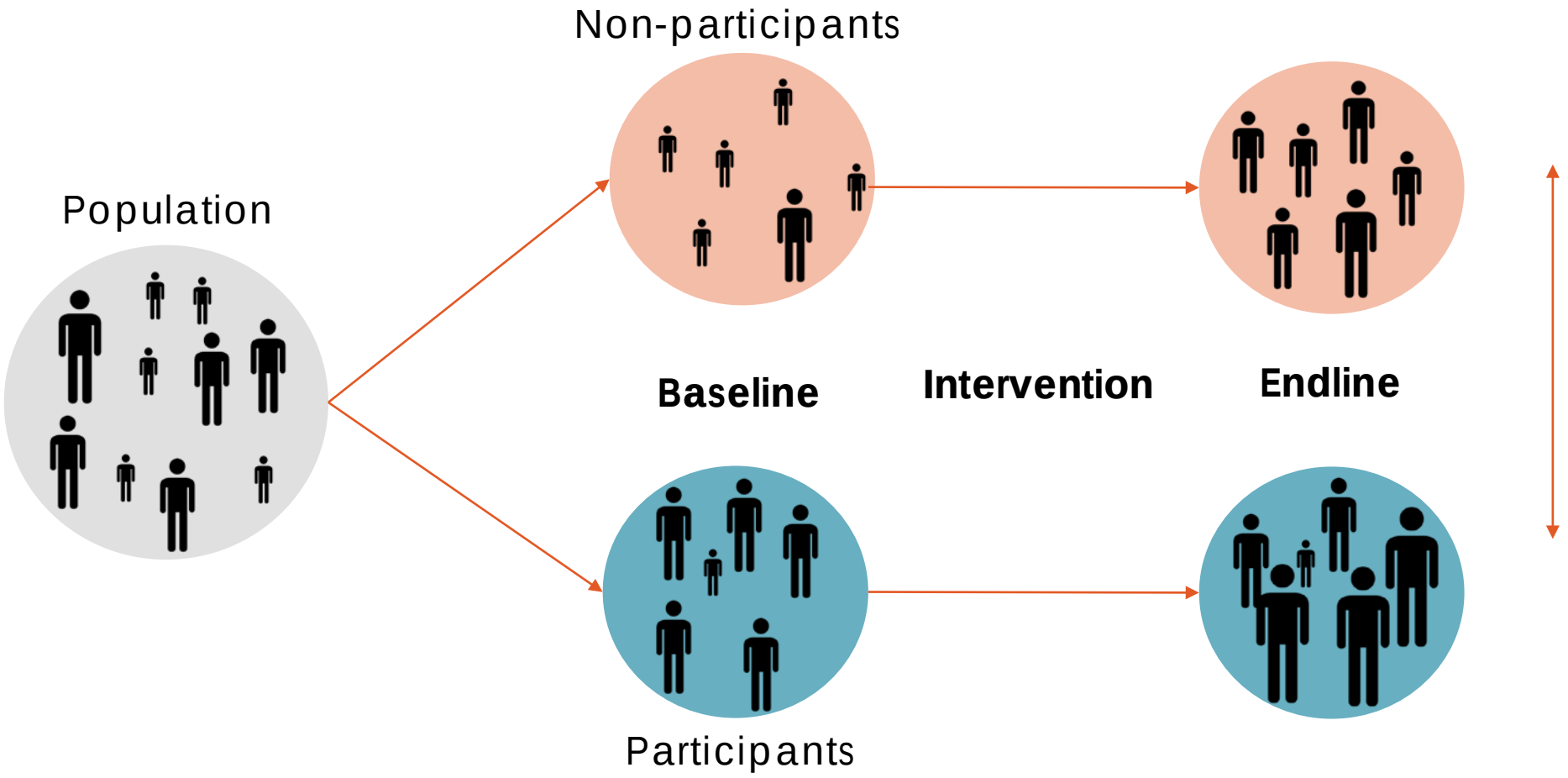
What would have happened without balsakhi?

Method 2: Simple Comparison

Impact = -5.05 points?



Selection Bias



Is this difference due to the program?

Or pre-existing differences?

3 – Difference-in-Differences

Compare gains in test scores of…

With gains in test scores of…

Children who got balsakhi

Children who did not get balsakhi

3 – Difference-in-difference

	Pretest	Post-test	Difference
Average score for children with a balsakhi	24.80	51.22	26.42

3 – Difference-in-difference

	Pretest	Post-test	Difference
Average score for children with a balsakhi	24.80	51.22	26.42
Average score for children without a balsakhi	36.67	56.27	19.60

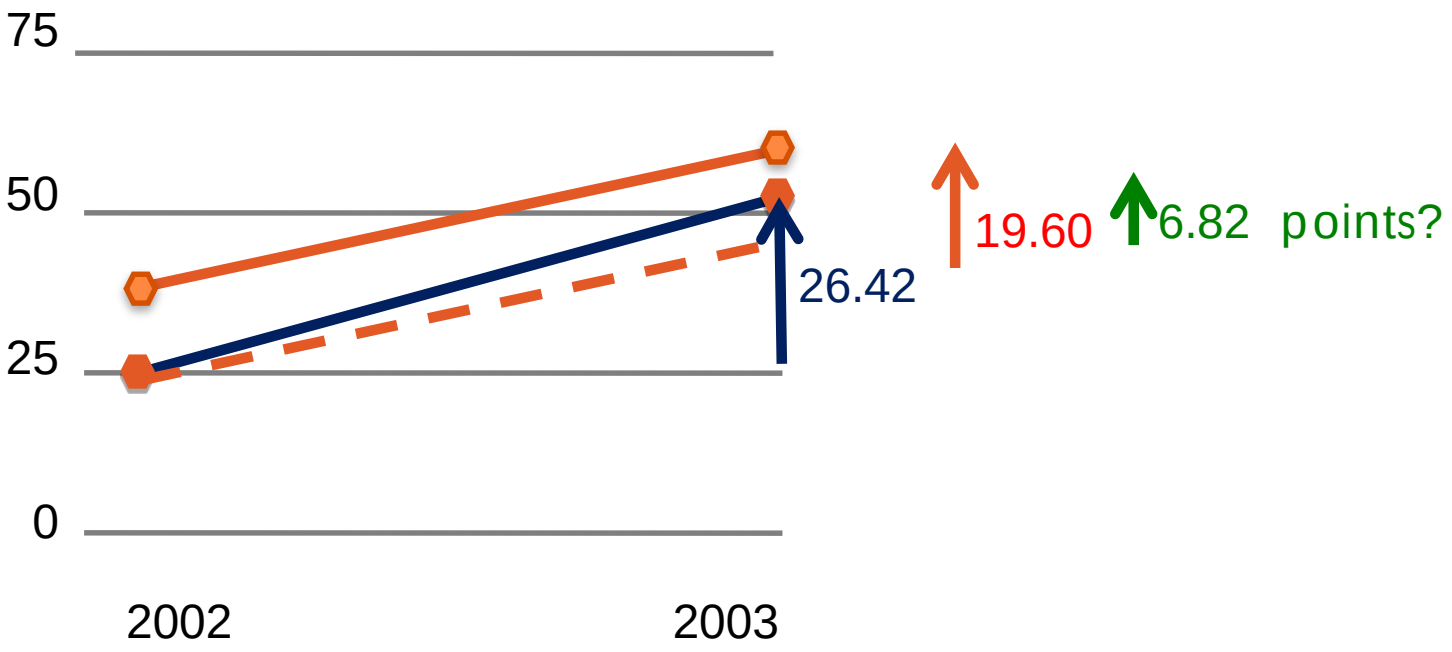
3 – Difference-in-difference

	Pretest	Post-test	Difference
Average score for children with a balsakhi	24.80	51.22	26.42
Average score for children without a balsakhi	36.67	56.27	19.60
Difference			6.82

QUESTION: Under what conditions can this difference (6.82) be interpreted as the impact of the balsakhi program?

What would have happened without balsakhi?

- Method 3: Difference-in-differences



4 – Other Methods

- There are more sophisticated non-experimental methods to estimate program impacts:
  - Regression
  - Matching
  - Instrumental Variables
  - Regression Discontinuity

- These methods rely on being able to "mimic" the counterfactual under certain assumptions

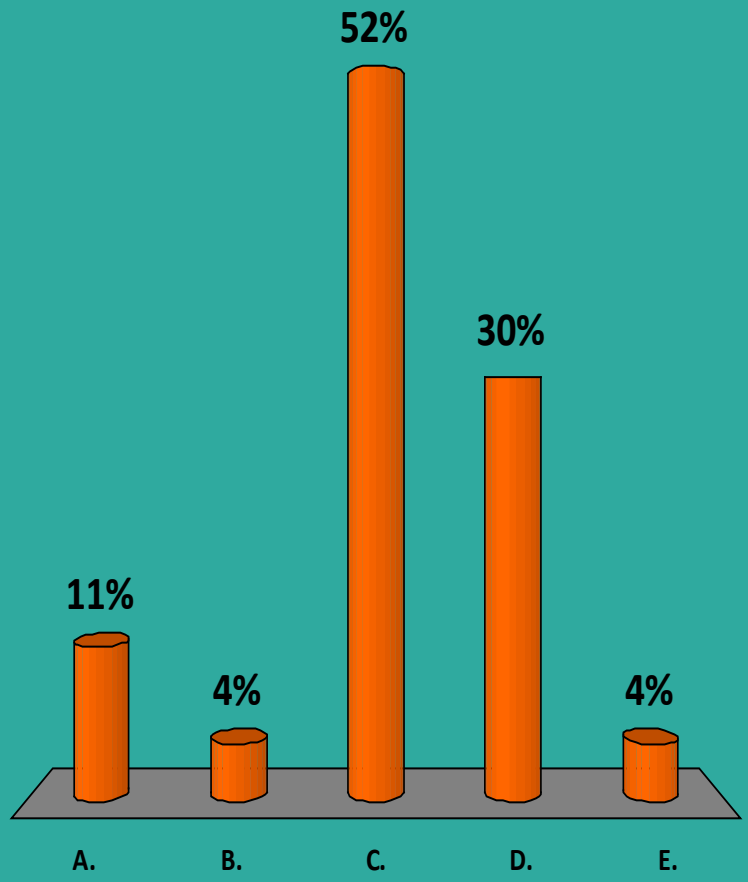
- Problem: Assumptions are not testable

Which of these methods do you think is closest to the truth?

Method	Impact Estimate
(1) Pre-post	26.42*
(2) Simple Difference	-5.05*
(3) Difference-in-Difference	6.82*
(4) Regression	1.92

*: Statistically significant at the 5% level

A. Pre-Post
B. Simple Difference
C. Difference-in-Differences
D. Regression
E. Don't know



Impact of Balsakhi - Summary

Method	Impact Estimate
(1) Pre-Post	26.42*
(2) Simple Difference	-5.05*
(3) Difference-in-Differences	6.82*
(4)Regression	1.92
(5) Randomized Experiment	**5.87***

*: Statistically significant at the 5% level

Bottom Line: Which method we use matters!

IV – CONCLUSIONS

Conclusions - Why Randomize?

- There are many ways to estimate a program's impact
- This course argues in favor of one: randomized experiments
  - Conceptual argument: If properly designed and conducted, randomized experiments provide the most credible method to estimate the impact of a program
  - Empirical argument: Different methods can generate different impact estimates

THANK YOU!