ABDUL LATIF JAMEEL Poverty Action Lab
TRANSLATING RESEARCH INTO ACTION

YEF – ITCILO - JPAL
Evaluating Youth Employment Programmes: An Executive Course
22 – 26 June 2015 | ITCILO Turin, Italy

How to Randomize?

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Course Overview

1. Introduction to Impact Evaluation
2. Measurements
3. **How to Randomize**
4. Sampling and Sample Size
5. Threats and Analysis
6. Cost-Effectiveness Analysis and Scaling Up

Lecture Overview

- Unit of randomization
  - Concepts
  - Considerations
- Randomization designs
- Some extensions
  - Multiple treatments
  - Stratification
  - Mechanisms of randomization

Lecture Overview

- **Unit of randomization**
  - **Concepts**
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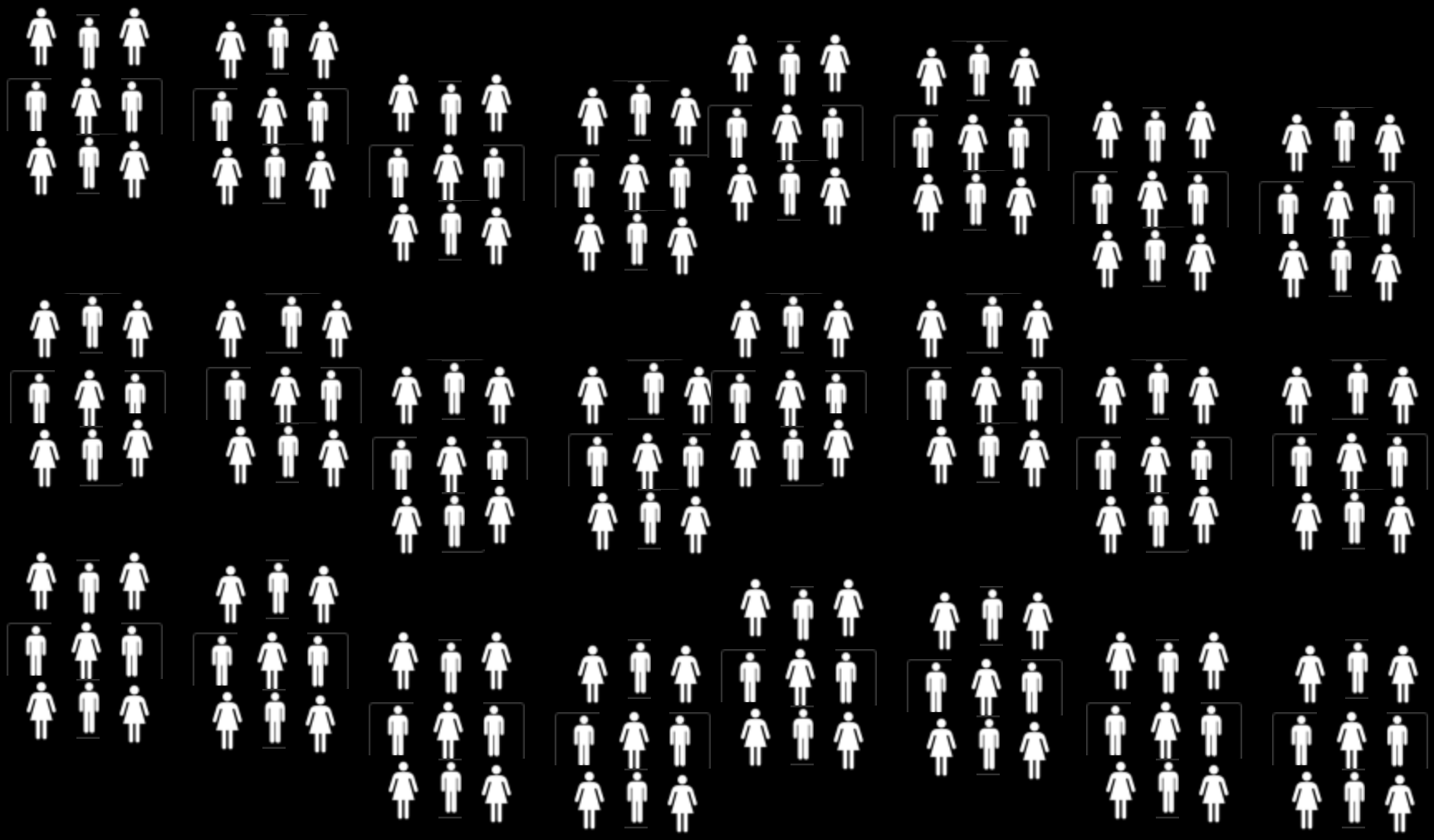
Unit of Randomization: Options

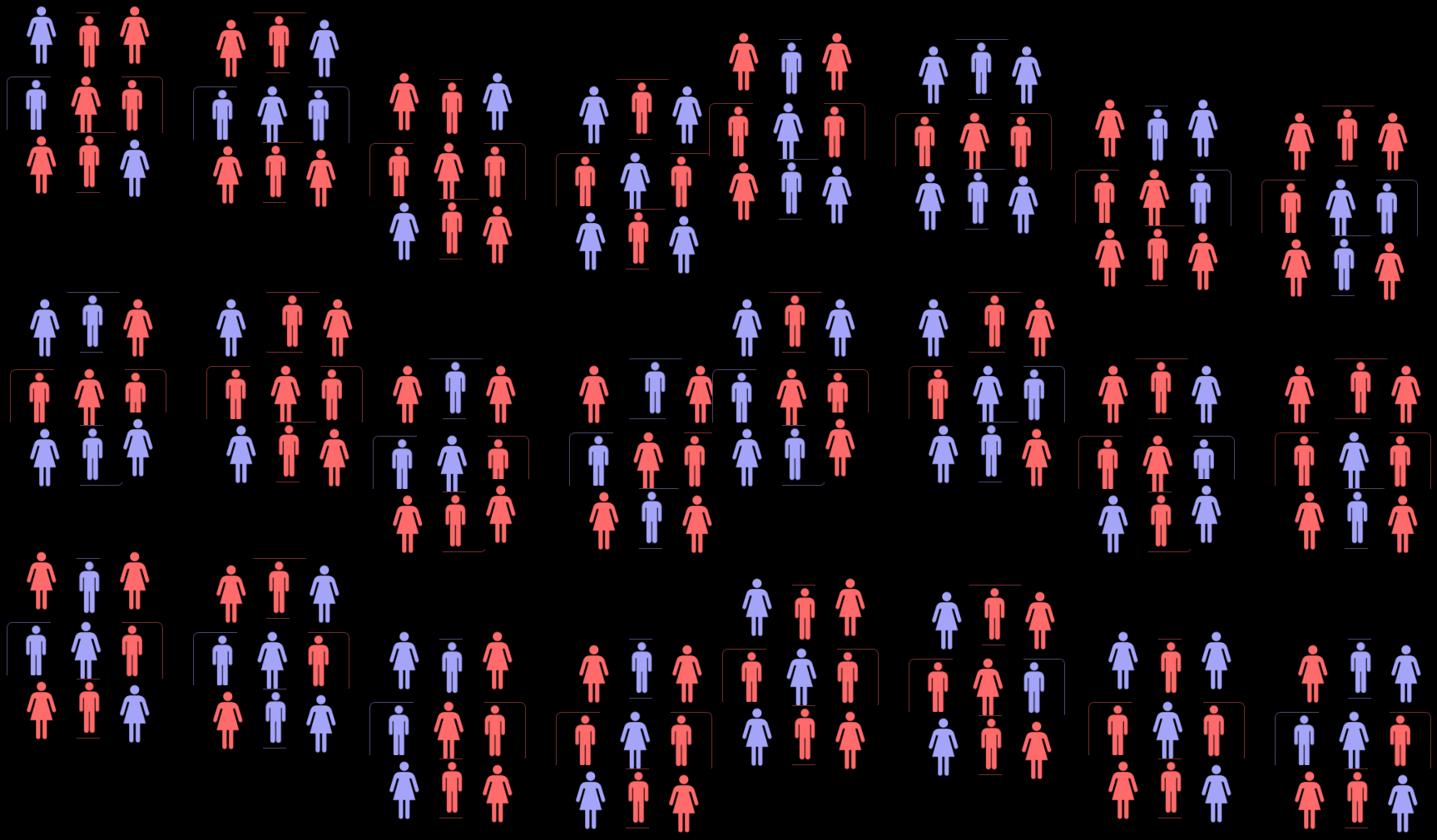
- Concepts:
  1. Randomizing at the individual level
  2. Randomizing at the group level
     "Cluster Randomized Trial"

- Question: At what level should we randomize?

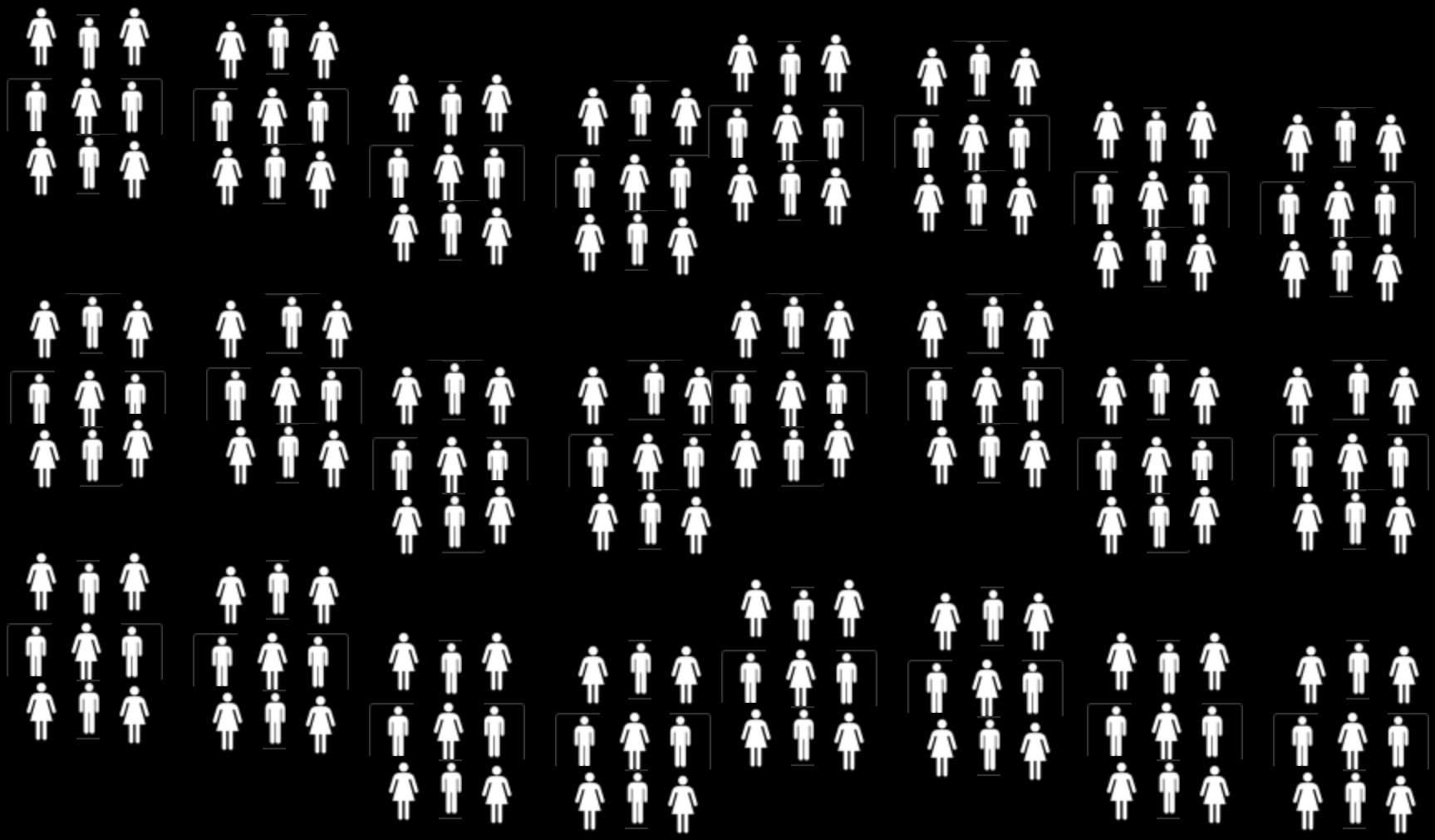
Unit of Randomization: Individual?



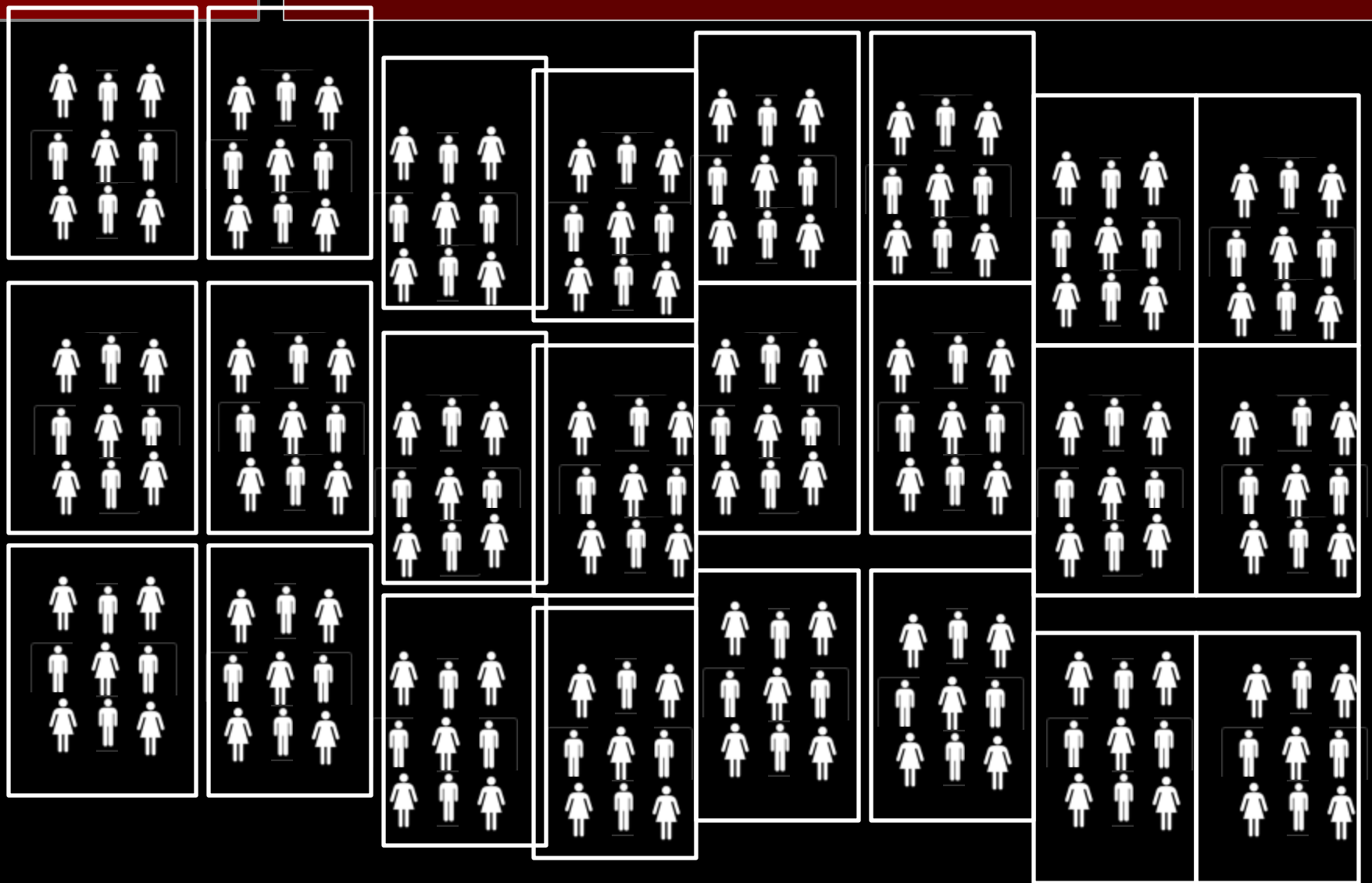
Unit of Randomization: Individual?



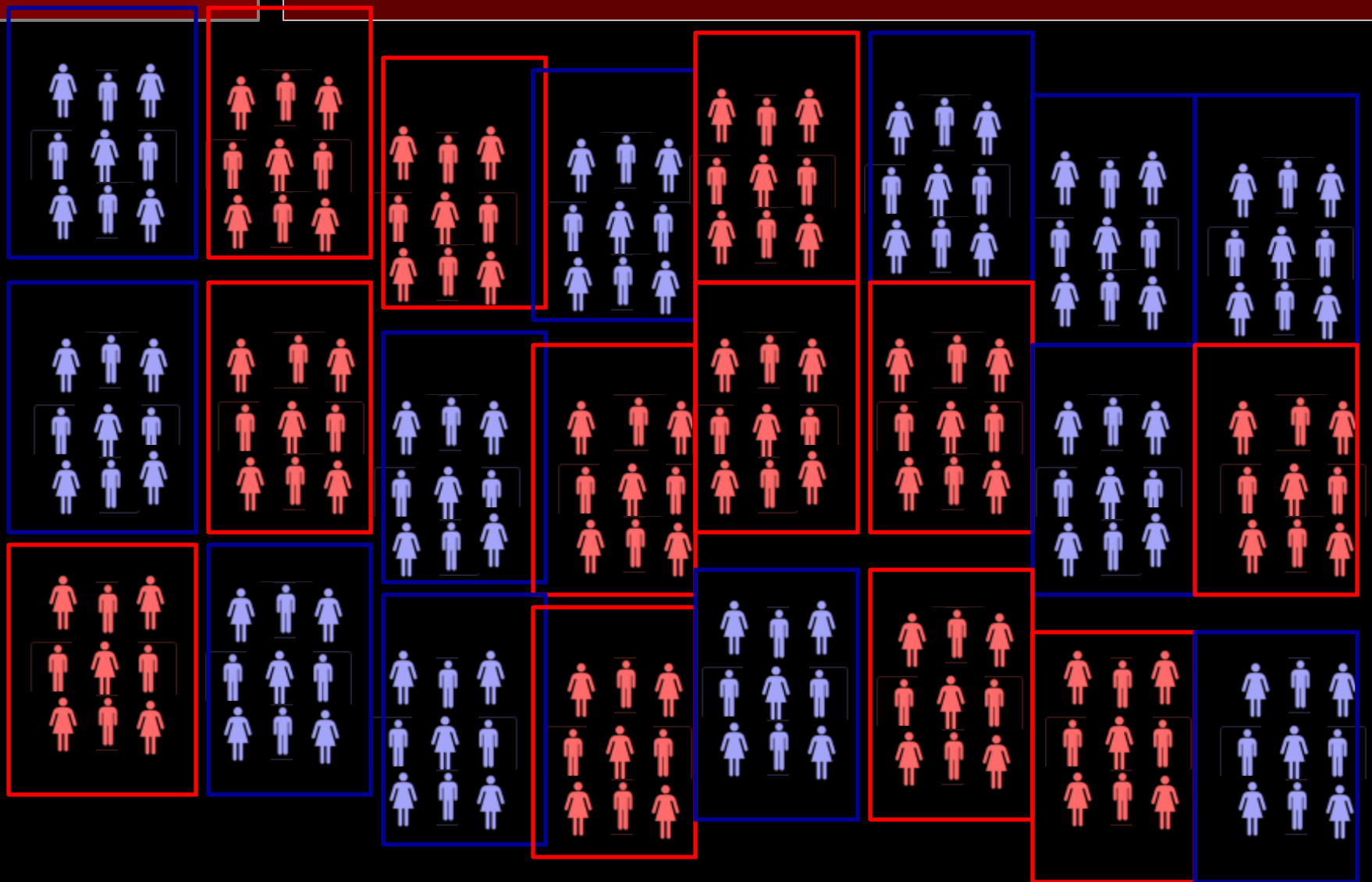
Unit of Randomization: Clusters?



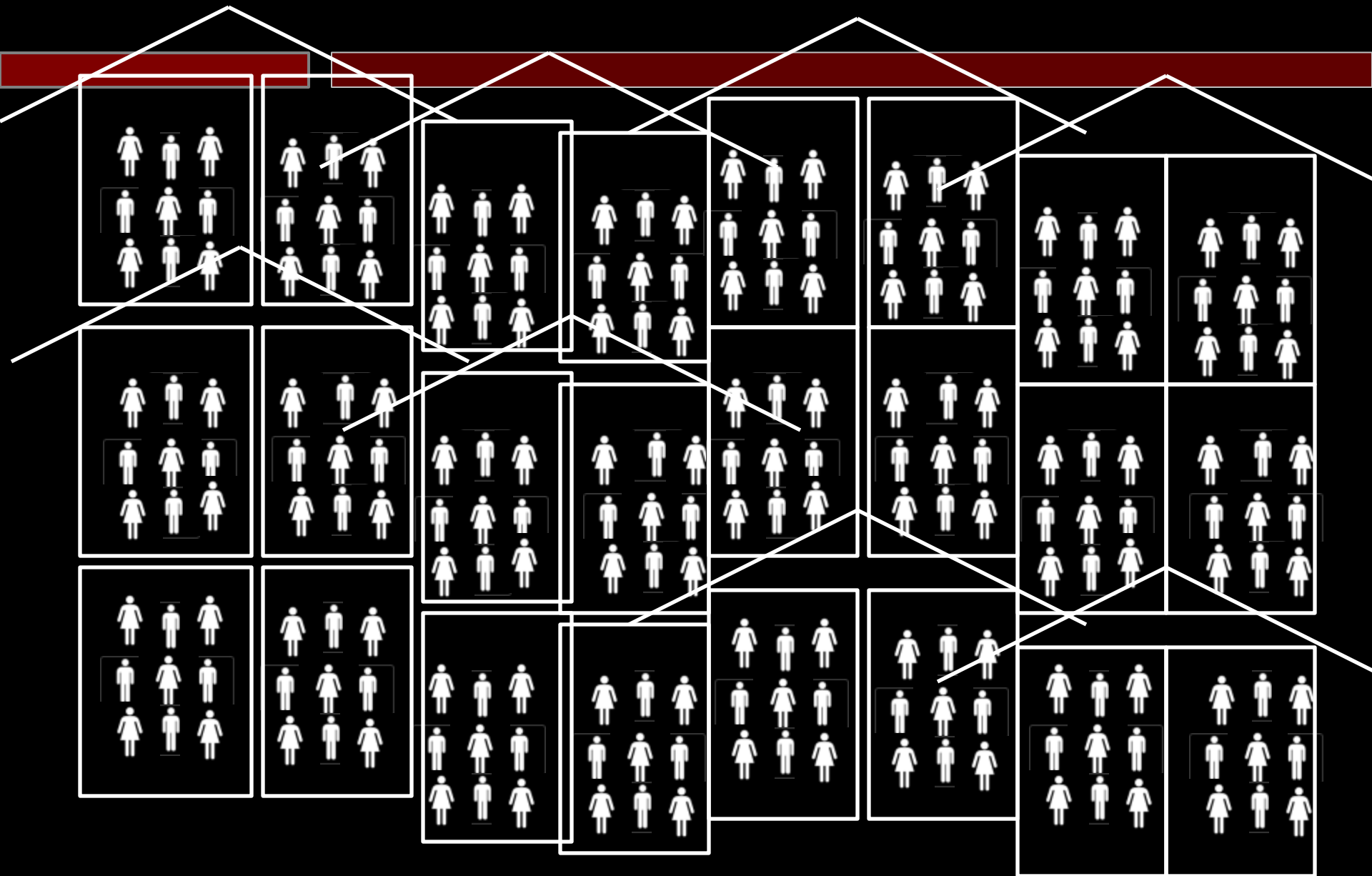
Unit of Randomization: Class?



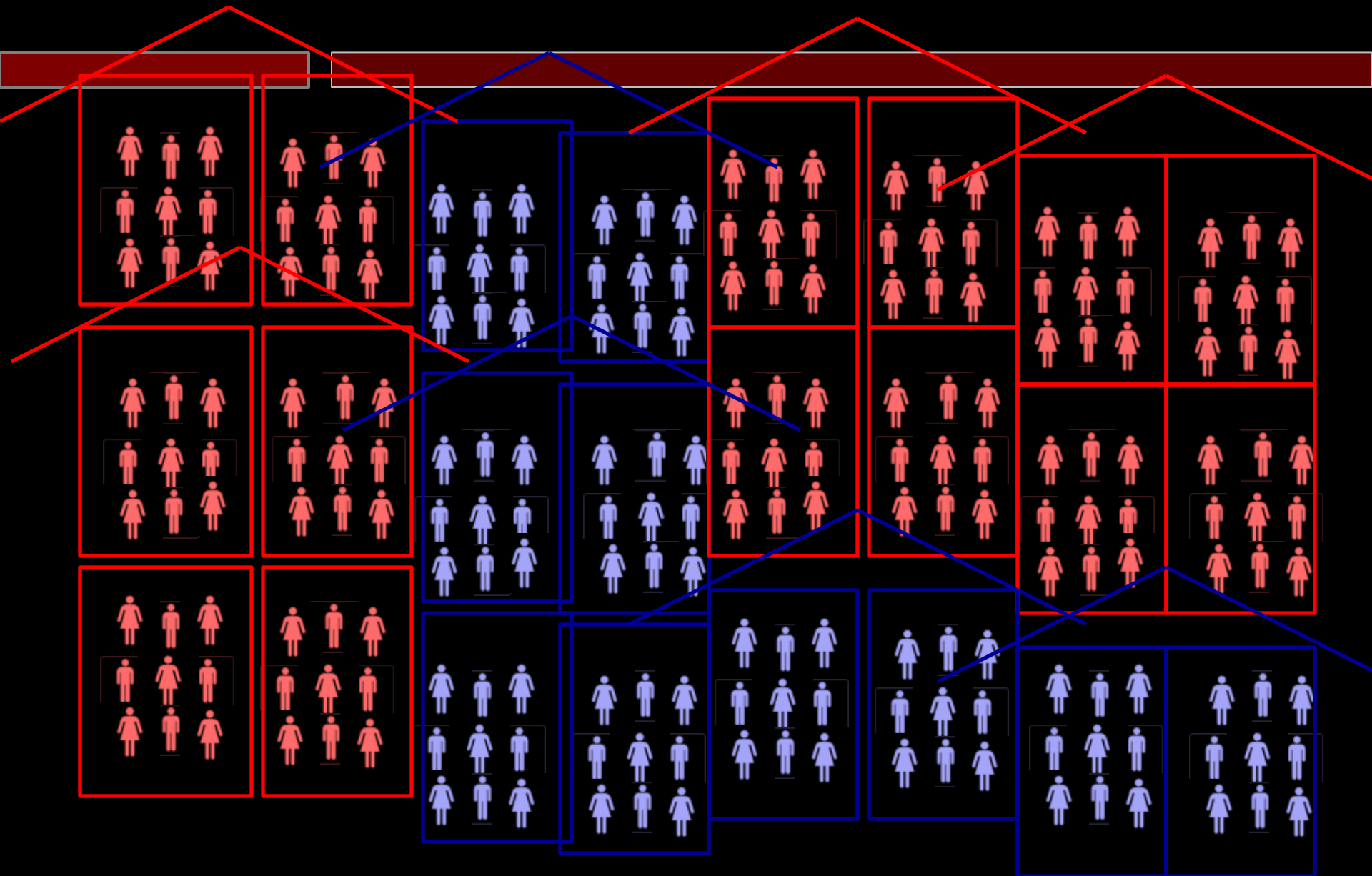
Unit of Randomization: Class?



Unit of Randomization: School?



Unit of Randomization: School?



How to Choose the Level?

- Generally, best to randomize at the level at which the treatment is administered.

- BUT, in practice, there are a few other things you may need/have to take into consideration…

Constraints: Research

- Contamination
  - Ask yourself:
    - How is the intervention administered?
    - What is the catchment area of each "unit of intervention"
    - How wide is the potential impact?
    - AND: For each level of randomization, how likely is contamination to occur – e.g. control units being treated or influenced by treated units?
  - For each level of randomization, does the control group remain a good counterfactual? If not, results can be biased
  - More on this on Thurs. - lect.6

Constraints: Research

- Funding and authorizations

- Balancing
- Statistical power
  - More on this on Wed. with Rohit (lect.5)

- Data: Level of aggregation of the data

Constraints: Implementation

- Resources: Randomization at the individual or a cluster level may not have the same cost for the implementation partner.

- Logistics: How are treatments implemented? Any possible problems there?

  Ex.: job placement officers helping both T & C individuals?

Constraints: Implementation

- Resistance on the ground:
  - Randomizing at the child-level within classes?
  - Randomizing at the class-level within schools?
  - Randomizing at the community-level?

Suppose an intervention targets health outcomes of children through info on hand-washing. What is the appropriate level of randomization?

A. Child level

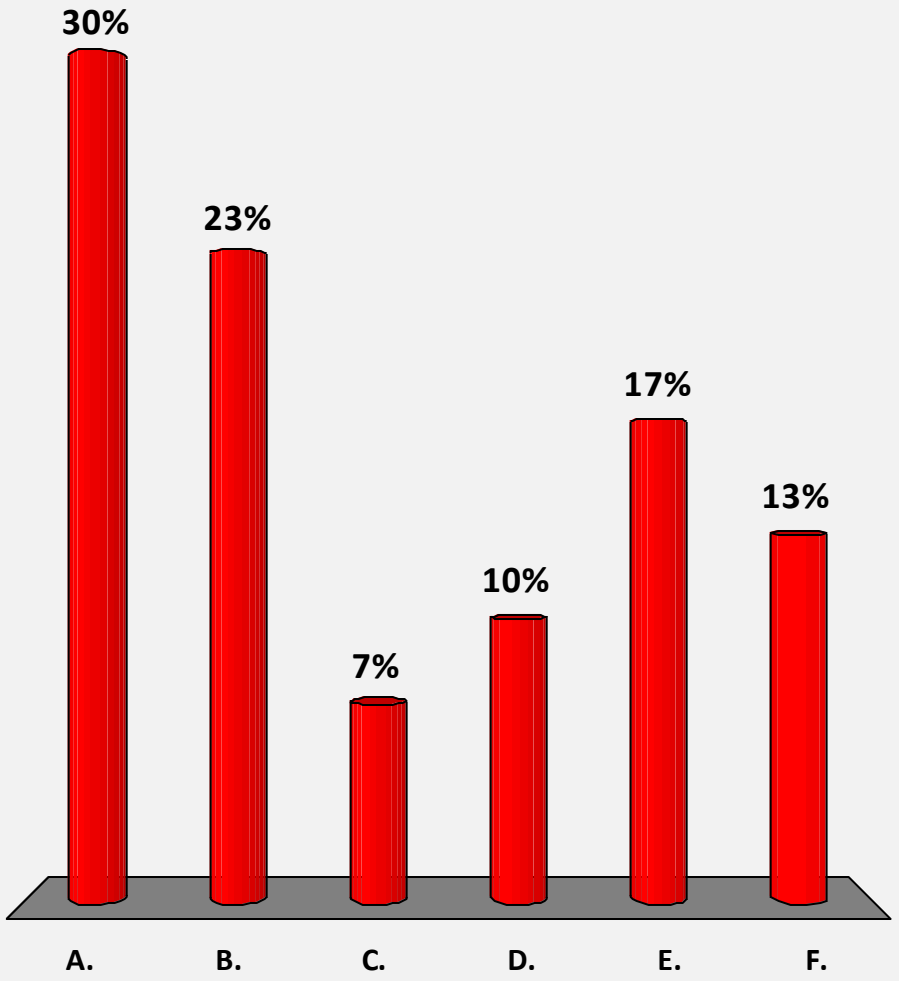
B. Household level

C. Classroom level

D. School level

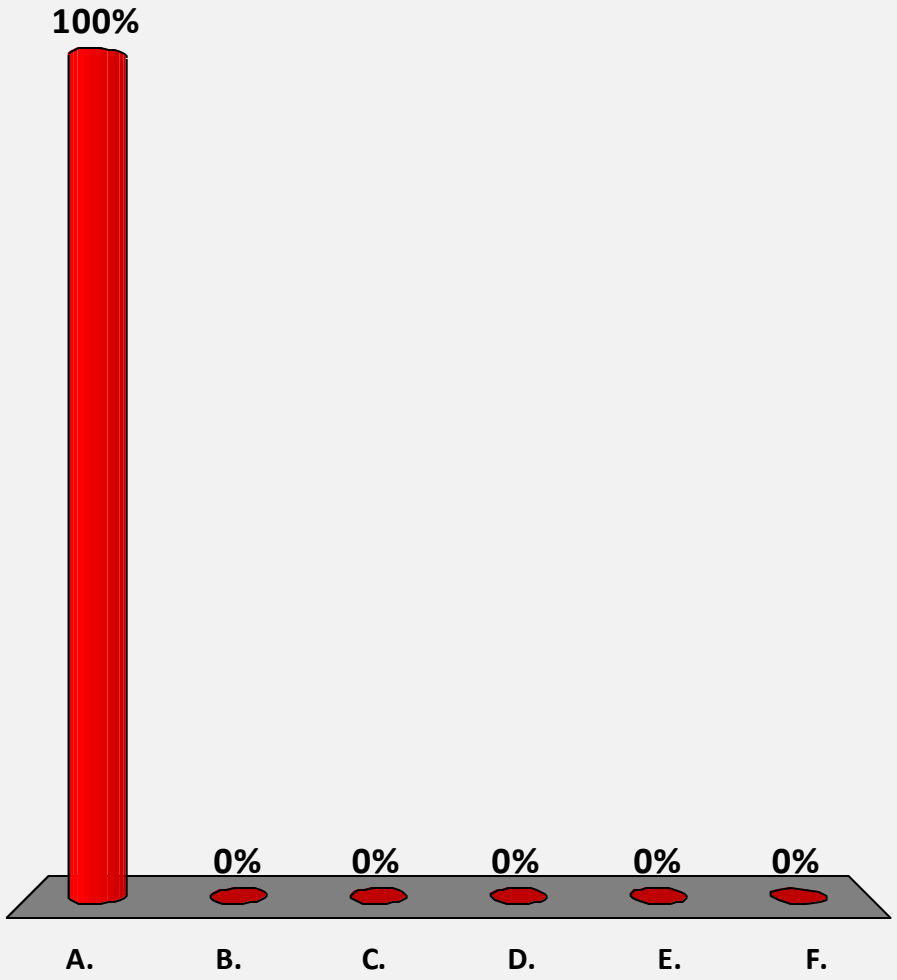
E. Village level

F. Don't know



What real world complaints against randomization have you encountered, if any? (up to 2 responses possible)

A. Control group would complain
B. It is not fair to poor
C. Not enough resources
D. You are treating people like lab rats
E. Too complicated
F. None of the above



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Starting point: Standard lottery

- Individuals or clusters picked randomly
- Standard RCT framework:
  - One control group
  - One treatment group
  - Researchers & partners (can) ensure that individuals/clusters receives or not the treatment during the length of the evaluation depending on their group
  - Upon completion of the evaluation, decision to scale up or not the intervention
- Very useful when there is oversubscription
- Sometimes, this basic design cannot be implemented…

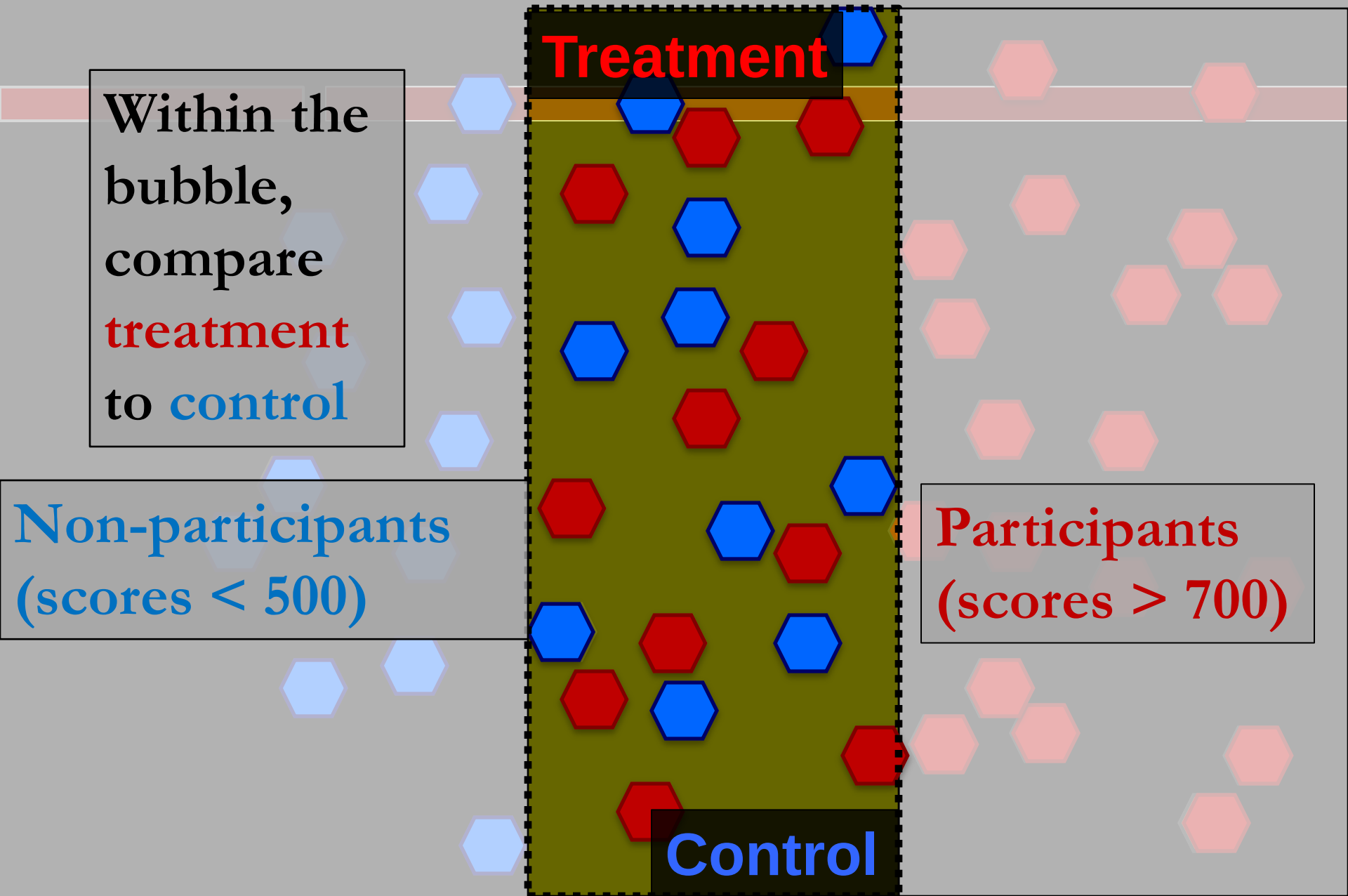
Starting point: Standard lottery

- Why not?
  - Sometimes, partners won't let researchers decide entirely who can get treated or not - should be randomized
  - Sometimes, it is only possible to do the evaluation if there is a promise that the control group will get treated later on
  - Sometimes, researchers can't prevent individuals to benefit from the intervention (for practical or ethical reasons)
  - …

Randomization in "the bubble"

- Sometimes a partner may not be willing to randomize among eligible people.
- Partner might be willing to randomize in "the bubble."
- People "in the bubble" are people who are borderline in terms of eligibility
  - Just above the threshold → not eligible, but almost
- What treatment effect do we measure? What does it mean for external validity?

Randomization in “the bubble”



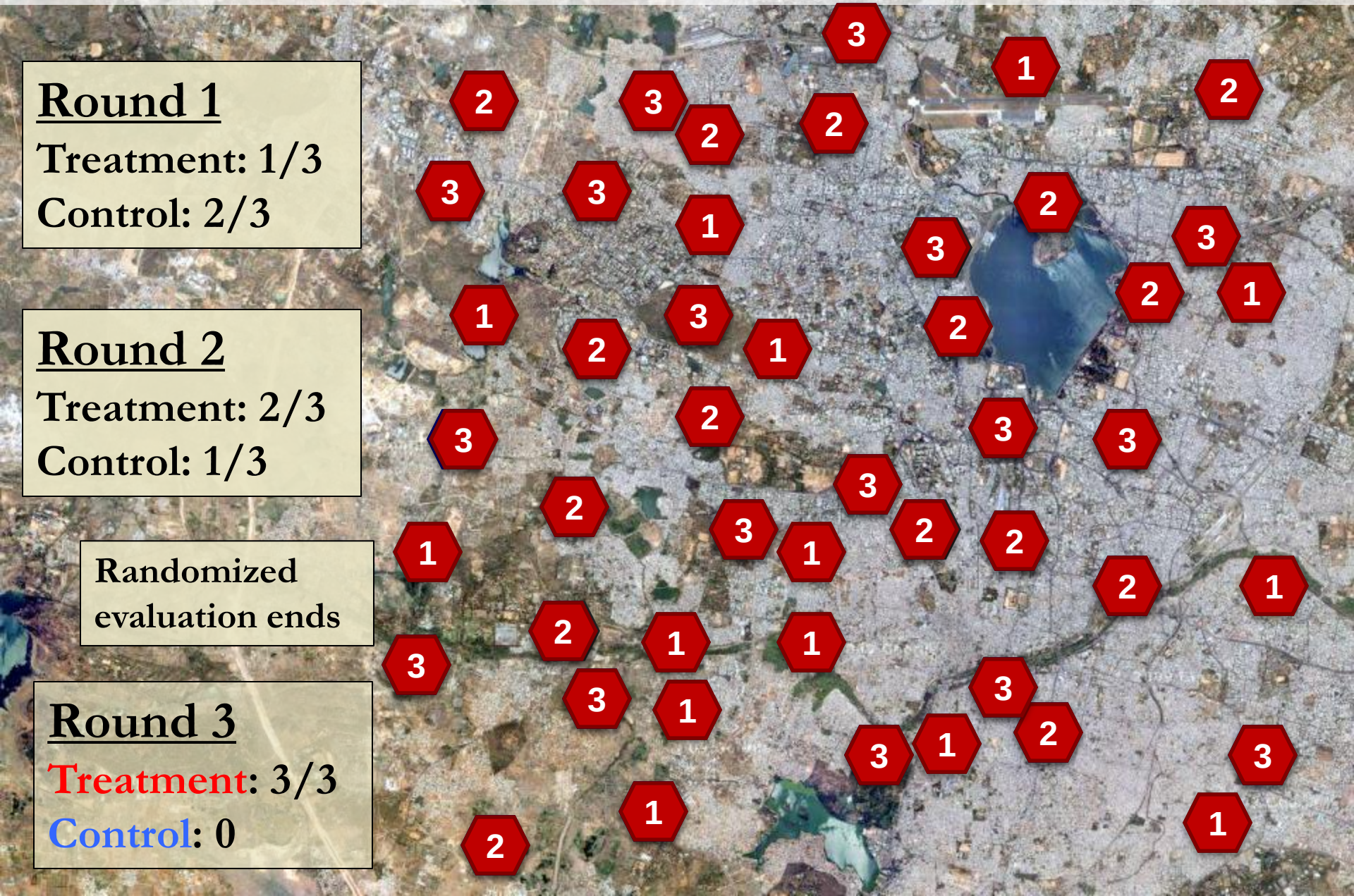
Randomization in “the bubble”

- Program officers can maintain discretion
- Example: Training program
- Example: Expansion of consumer credit in South Africa

Phase-in: takes advantage of expansion

- Everyone gets program eventually
- Natural approach when expanding program faces resource constraints
- What determines which schools, branches, etc. will be covered in which year?

Phase-in design



Phase-in designs

Advantages

- Everyone gets something eventually
- Provides incentives to maintain contact

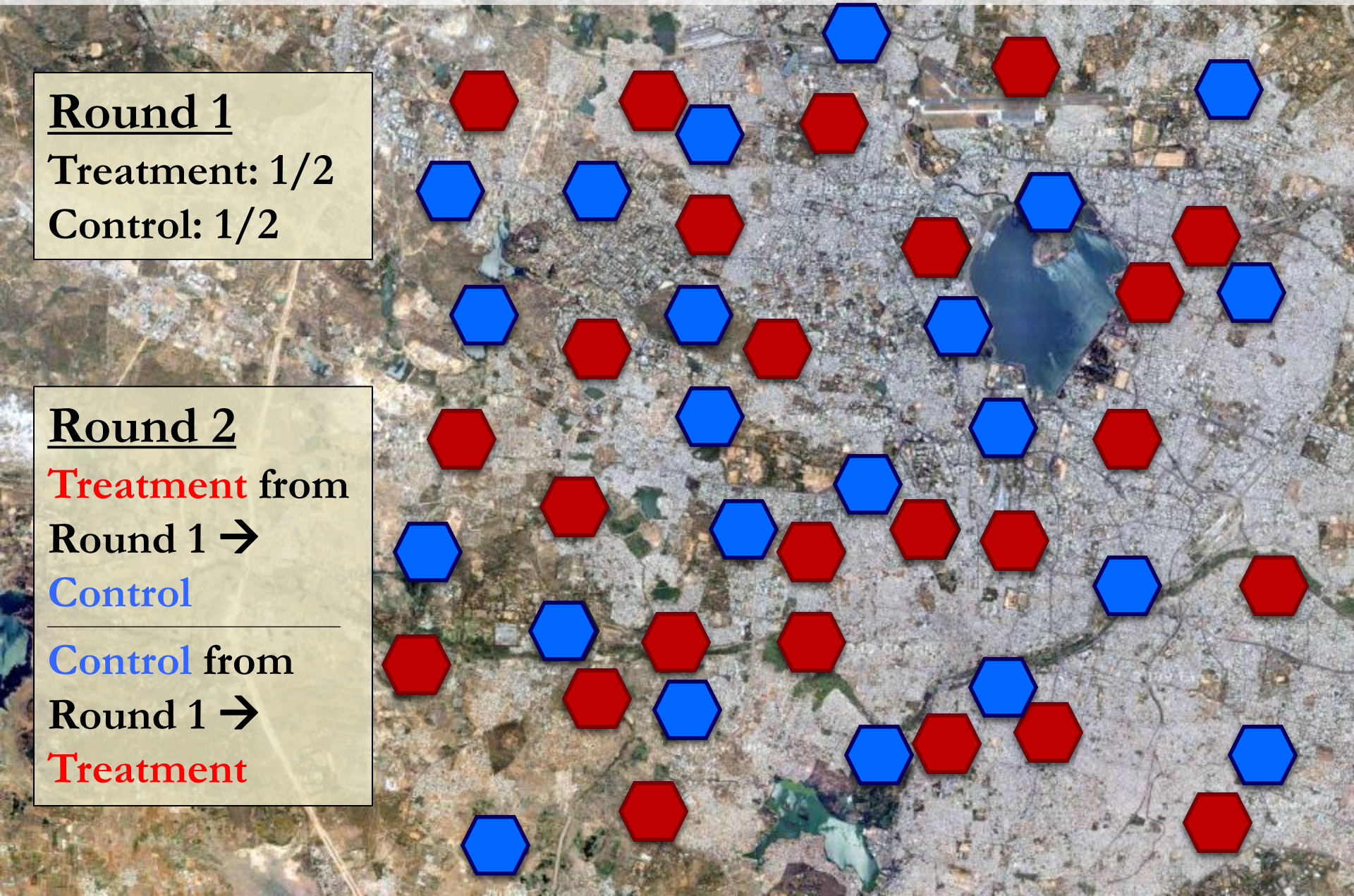
Concerns

- Can complicate estimating long-run effects
- Care required with phase-in windows
- Do expectations change actions today?

Rotation design

- Groups get treatment in turns
- Advantages?
- Concerns?

Rotation design



Round 1

Treatment: 1/2

Control: 1/2

Round 2

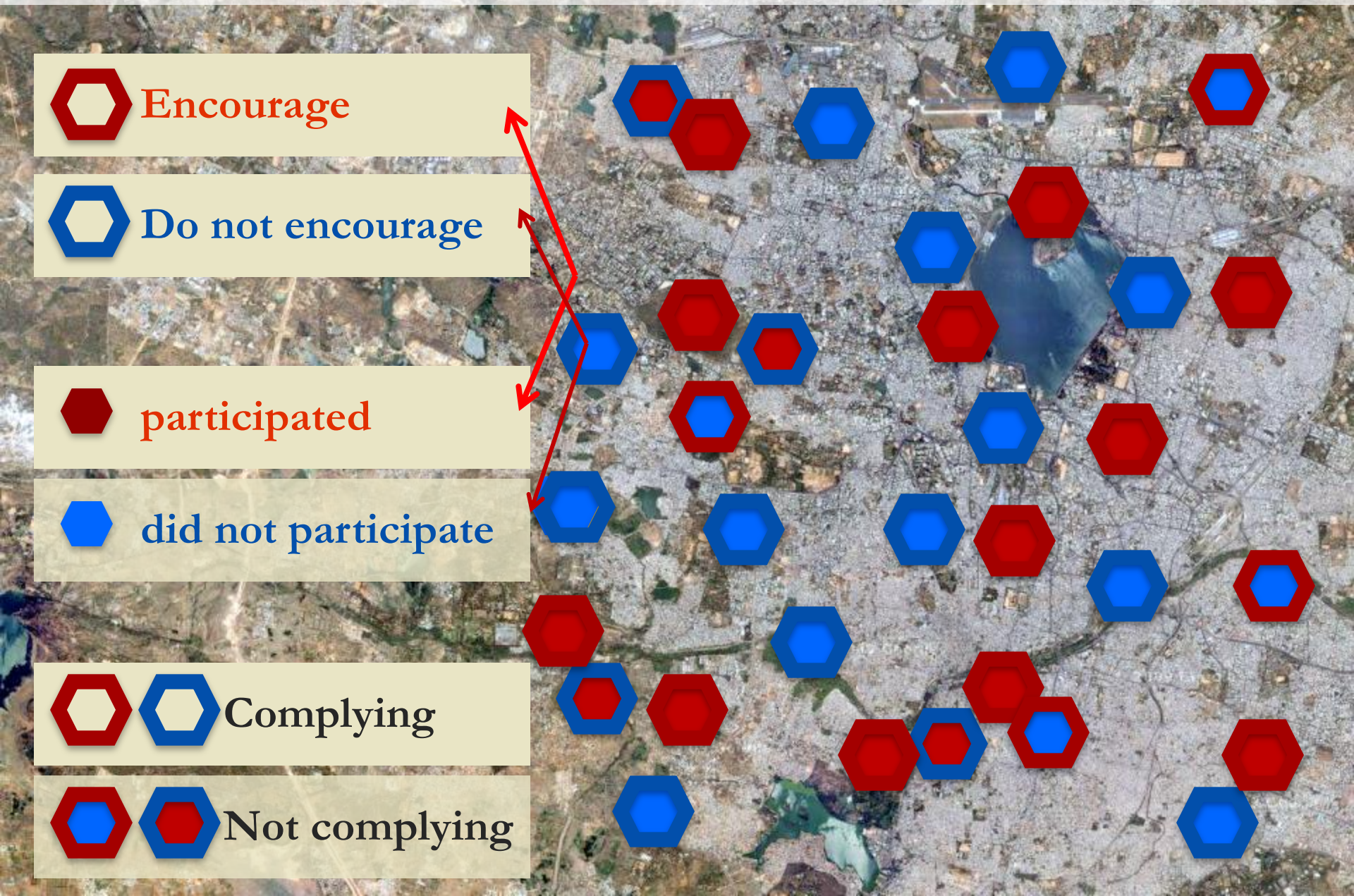
Treatment from Round 1 → Control

Control from Round 1 → Treatment

Encouragement design: What to do when you can't randomize access

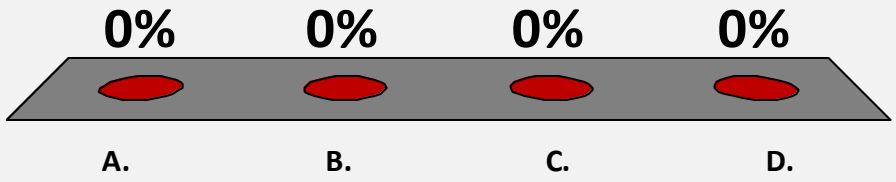
- Sometimes it's practically or ethically impossible to randomize program access
- But most programs have less than 100% take-up
- Randomize encouragement to receive treatment

Encouragement design

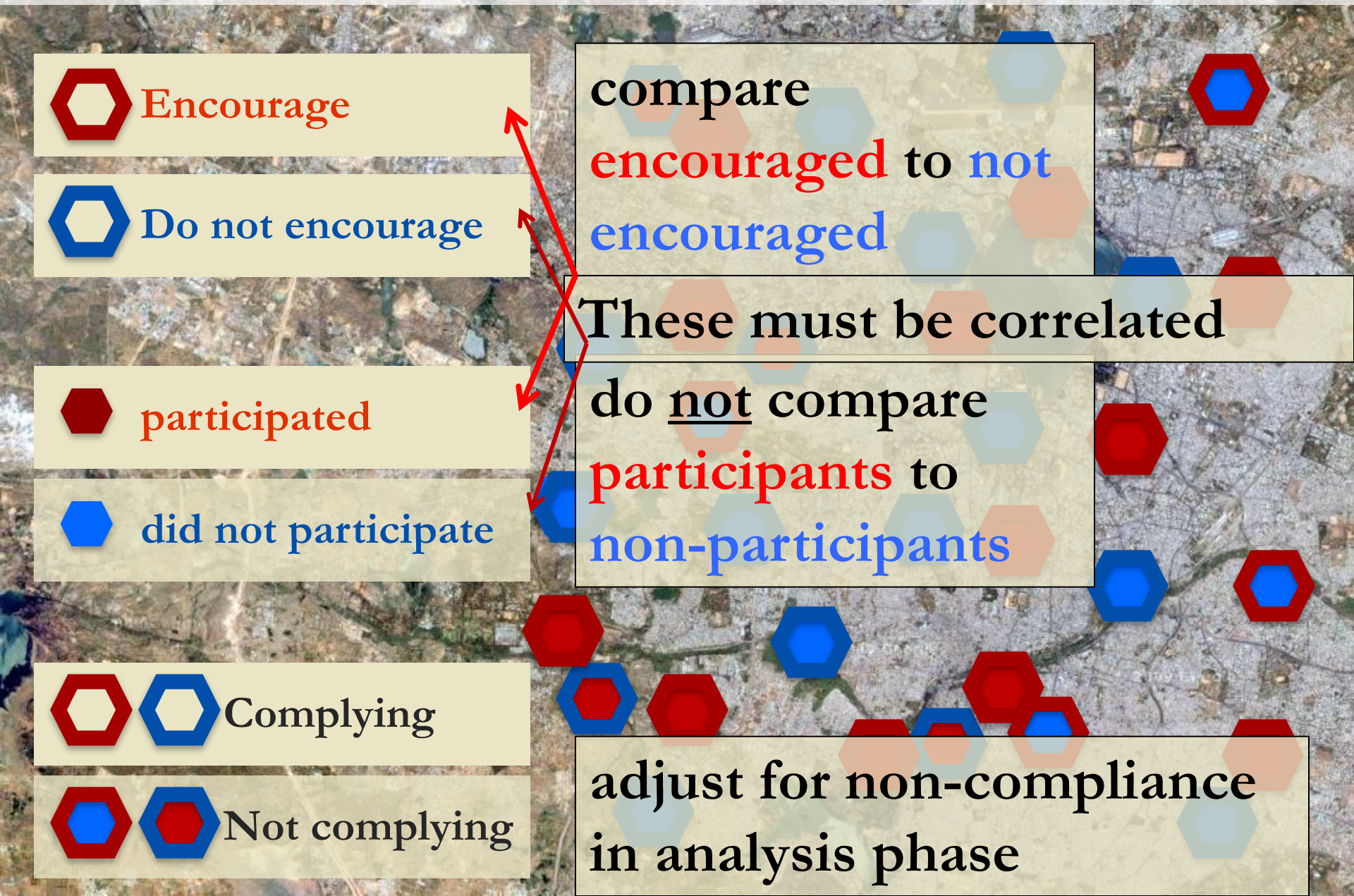


Which two groups would you compare in an encouragement design?

A. Encouraged vs. Not encouraged
B. Participants vs. Non-participants
C. Compliers vs. Non-compliers
D. Don't know



Encouragement design



What is “encouragement”?

- Something that makes some folks more likely to use program than others
- Not itself a “treatment”
- For whom are we estimating the treatment effect?
- Think about who responds to encouragement

To summarize: Possible designs

- Simple lottery
- Randomization in the "bubble"
- Randomized phase-in
- Rotation
- Encouragement design

  – Note: These are not mutually exclusive.

Methods of randomization - recap

Design	Most useful when…	Advantages	Disadvantages
Basic Lottery	•Program oversubscribed	•Familiar •Easy to understand •Easy to implement •Can be implemented in public	•Control group may not cooperate •Differential attrition

Methods of randomization - recap

Design	Most useful when…	Advantages	Disadvantages
Phase-In	•Expanding over time •Everyone must receive treatment eventually	•Easy to understand •Constraint is easy to explain •Control group complies because they expect to benefit later	•Anticipation of treatment may impact short-run behavior •Difficult to measure long-term impact

Methods of randomization - recap

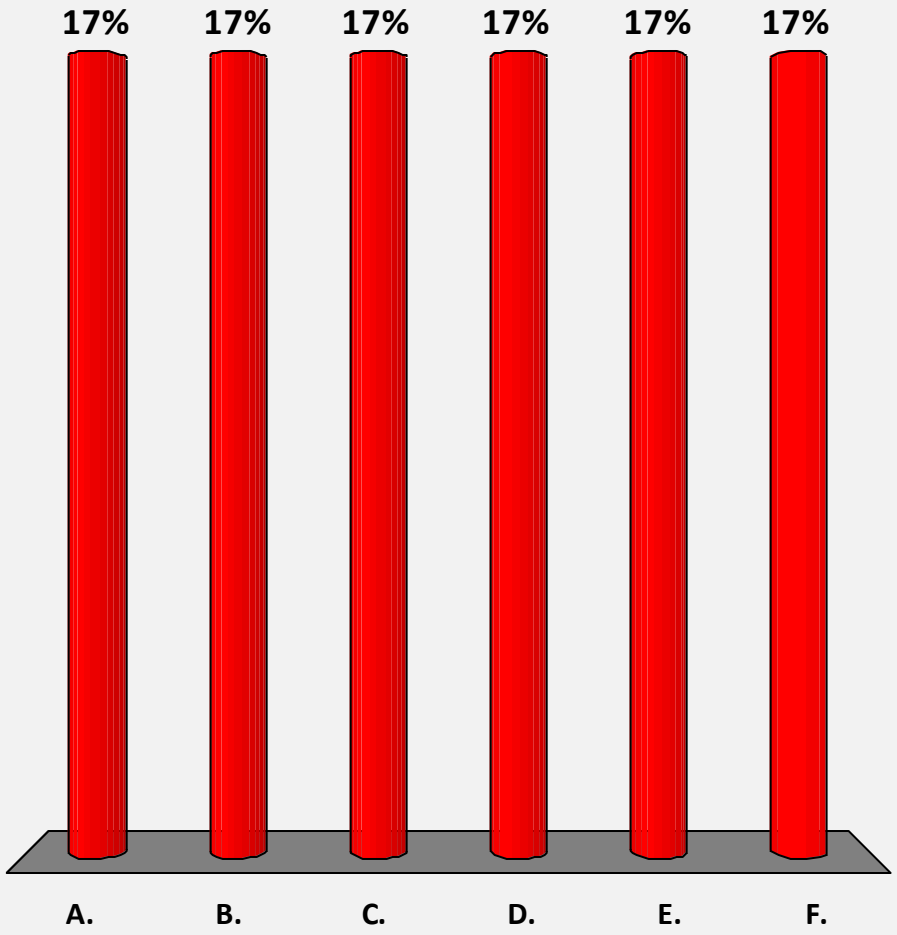
Design	Most useful when…	Advantages	Disadvantages
Rotation	•Everyone must receive something at some point •Not enough resources per given time period for all	•More data points than phase-in	•Difficult to measure long-term impact

Methods of randomization - recap

Design	Most useful when…	Advantages	Disadvantages
Encouragement	•Program has to be open to all comers •When take-up is low, but can be easily improved with an incentive	•Can randomize at individual level even when the program is not administered at that level	•Measures impact of those who respond to the incentive •Need large enough inducement to improve take-up •Encouragement itself may have direct effect

What randomization method would you choose if your partner requires that everyone receives treatment at some point in time? (Up to 2 responses allowed)

A. Phase-in design
B. Rotation design
C. Basic lottery
D. Randomization in the bubble
E. Encouragement
F. Don't know



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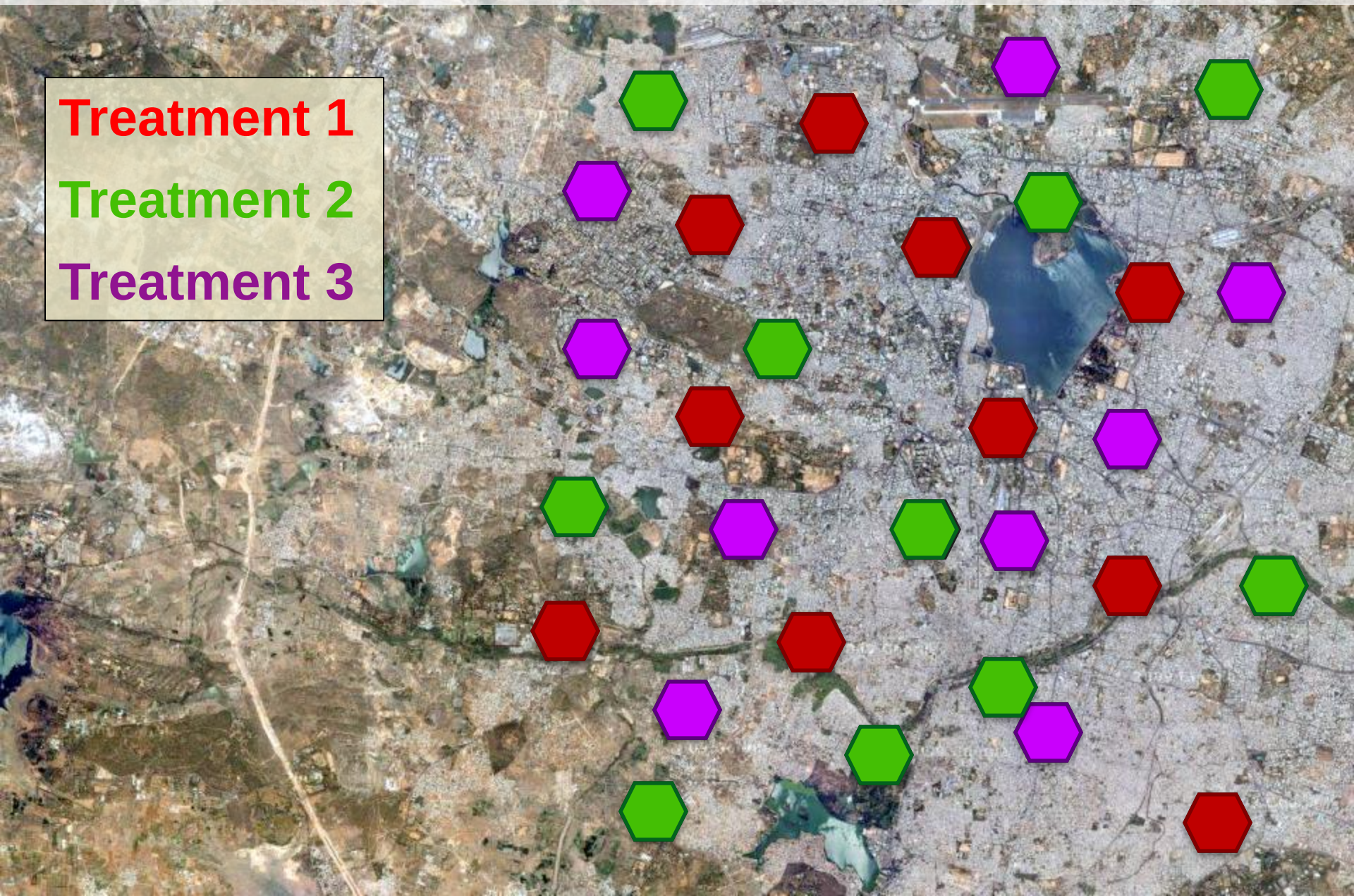
  - **Stratification**
  - **Mechanisms of randomization**

Multiple treatments

- Sometimes core question is deciding among different possible interventions
- You can randomize these programs
- Does this teach us about the benefit of any one intervention?
- Do you have a control group?

Multiple treatments



Cross-cutting treatments

- Test different components of treatment in different combinations
- Test whether components serve as substitutes or complements
- What is most cost-effective combination?
- Advantage: win-win for operations, can help answer questions for them, beyond simple "impact"!

Varying levels of treatment

- Some schools are assigned full treatment
  - All kids get pills
- Some schools are assigned partial treatment
  - 50% are designated to get pills
- Testing subsidies and prices

Stratification

- Objective: balancing your sample when you have a small sample
- What is it:
  - dividing the sample into different subgroups
  - selecting treatment and control from each subgroup
- What happens if you don't stratify?

When to stratify

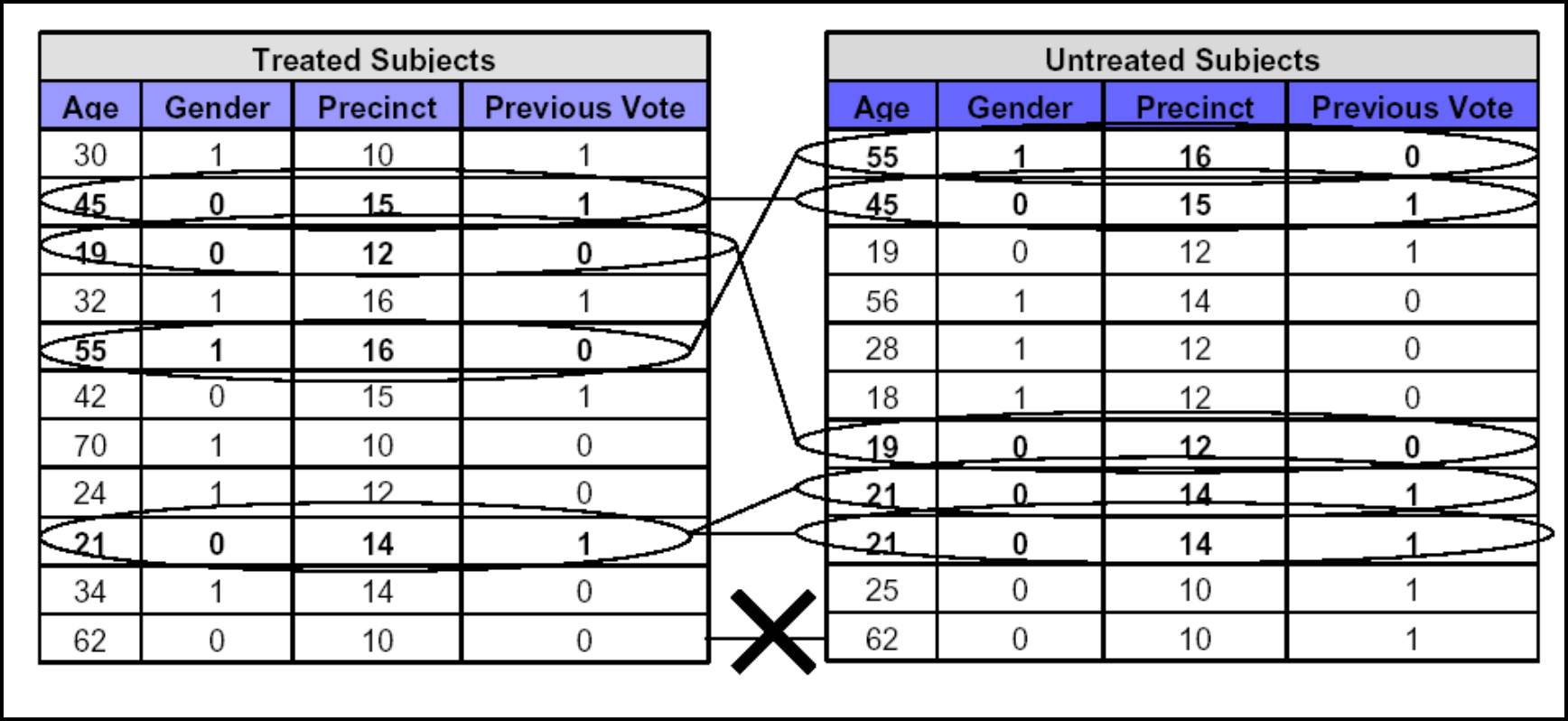
- Stratify on variables that could have important impact on outcome variable
- Stratify on subgroups that you are particularly interested in (where may think impact of program may be different)
- Stratification more important with small sample frame
- You can also stratify on index variables you create
- Can stratify closely on one continuous variable or coarsely on multiple
  - Baseline value of Primary Outcome Variable

- Can get complex to stratify on too many variables
- Makes the draw less transparent the more you stratify

Matching

- An extreme form of stratification
- How to account in analysis
- What happens with attrition?
  - Can you drop corresponding matched pair?
- What happens with compliance?
  - Can you drop corresponding matched pair?
- More on this on Thursday

An illustration of matching



Treated Subjects			
Age	Gender	Precinct	Previous Vote
30	1	10	1
45	**0**	**15**	**1**
19	**0**	**12**	**0**
32	1	16	1
55	**1**	**16**	**0**
42	0	15	1
70	1	10	0
24	1	12	0
21	**0**	**14**	**1**
34	1	14	0
62	0	10	0

Untreated Subjects			
Age	Gender	Precinct	Previous Vote
55	**1**	**16**	**0**
45	**0**	**15**	**1**
19	0	12	1
56	1	14	0
28	1	12	0
18	1	12	0
19	**0**	**12**	**0**
21	**0**	**14**	**1**
21	**0**	**14**	**1**
25	0	10	1
62	0	10	1

Source: Arceneaux, Gerber, and Green (2004)

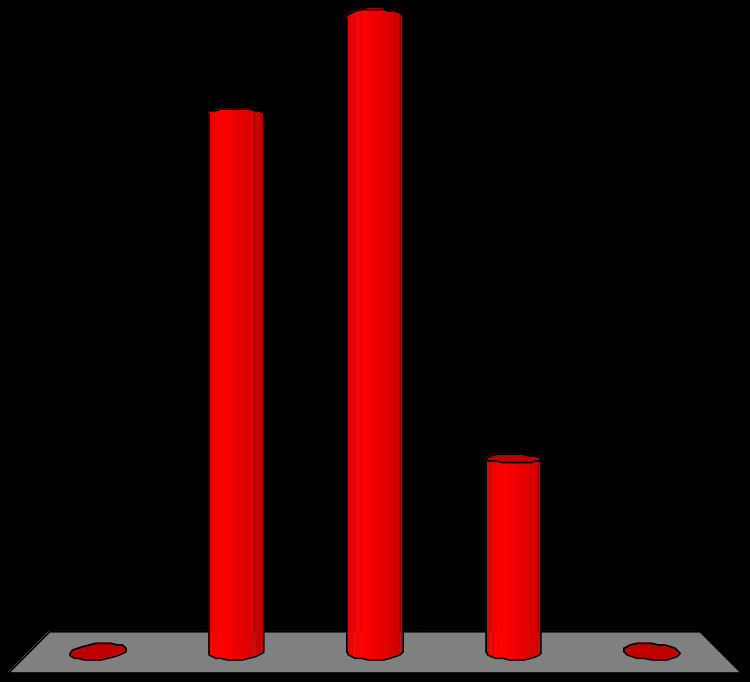
Mechanics of randomization

- Need sample frame
- Pull out of a hat/bucket
- Use random number generator in spreadsheet program to order observations randomly
- Stata program code
- What if no existing list?

Source: Chris Blattman

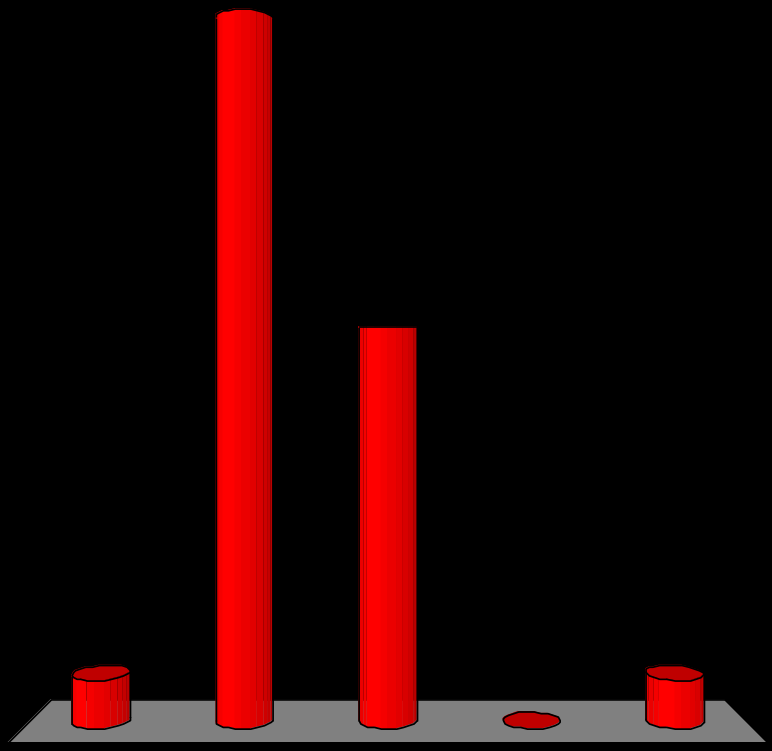
How was the length of this presentation?

- Unbearably long
- Too long
- Just right
- Not long enough
- Too short – more time, please!



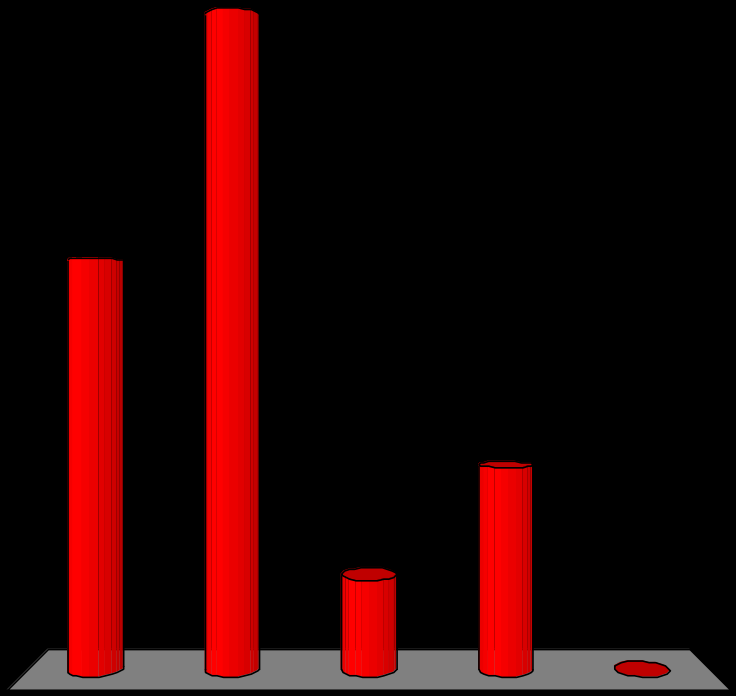
How was the pace of this presentation?

- Too fast! I couldn't keep up.
- Rushed
- Just right
- Slow
- Too slow, I fell asleep.



Was the content relevant to your work?

- Very relevant
- Quite useful
- Perhaps
- Not really
- No – not useful at all.



Before today, how much of this material did you already feel comfortable/ proficient in?

A. 100%

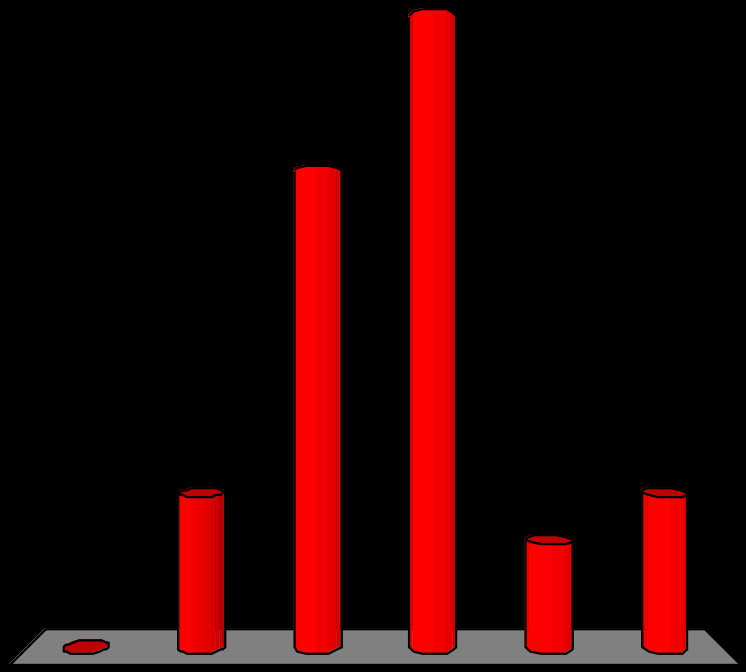
B. 80%

C. 60%

D. 40%

E. 20%

F. < 20%



After this presentation, how much of this material do you feel proficient in?

A. 100%

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C. 60%

D. 40%

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F. < 20%