# Randomization

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RCT workshop I

# Outline

- Opportunities for randomization
- Level of randomization
- Simple randomization
- Stratified randomization

# What can be randomized?

- Idea: The randomly selected treatment group must have more exposure to the program than the comparison/control group.
- Three aspects of the program to create different exposure:
  - Access: which people will be offered the program ← most common
  - Timing: when to provide access to the program
  - Encouragement (to take part): which people will be given encouragement

# Randomly assign the offer to access the treatment

Example: Free textbooks enough for 100 schools

1. Make a list of 200 eligible schools.
2. Randomly select 100 schools to receive textbooks during the evaluation period.
3. The remaining 100 schools form a conparison group.

# Randomly assign a time when people can access the treatment

Randomly assign who gets access first and who gets it later.

Example: a school-based free tablet program is planning to phase in their program to 75 schools over three years.

- Randomly divide them into 3 groups of 25 schools each.

| Year | Group A | Group B | Group C |
|---|---|---|---|
| 1 |  | Comparison group | Comparision group |
| 2 |  |  | Comparison group |
| 3 |  |  |  |

Evaluation ends.

No comparison group exists anymore.

# Randomly assigned encouragement to take up the program

- Program that is already open to all of the eligible participants but only some are currently using it (undersubscribed).
- Idea: Only some (the treatment group) will receive extra encouragement to take up the program.
- Example: Crop insurance
  - The program was offered to 250 households in a community.
  - 50 households took up the program.
  - The half of the remaining households (N=100) were randomly selected and sent a letter about the benefits of a crop insurance and offering help to fill out paperwork.
- Other examples: COVID-19 vaccination / health check-ups / cancer screening
- Encouragement could be easier take-up process.

# When is it possible to randomize?

| Obvious opportunities | Description |
|---|---|
| New program design | When you want to design a new approach to addressing a problem |
| New programs | New program is being pilot-tested |
| New people | Existing program is being offered to new target population |
| Oversubscription | When there are more interested people than an existing program can serve |
| **Possible opportunities** | |
| New services | Existing program offers a new service |
| New location | Existing program is being expanded to new area |
| Admission in phases | Not all potential beneficiaries can be enrolled at once |

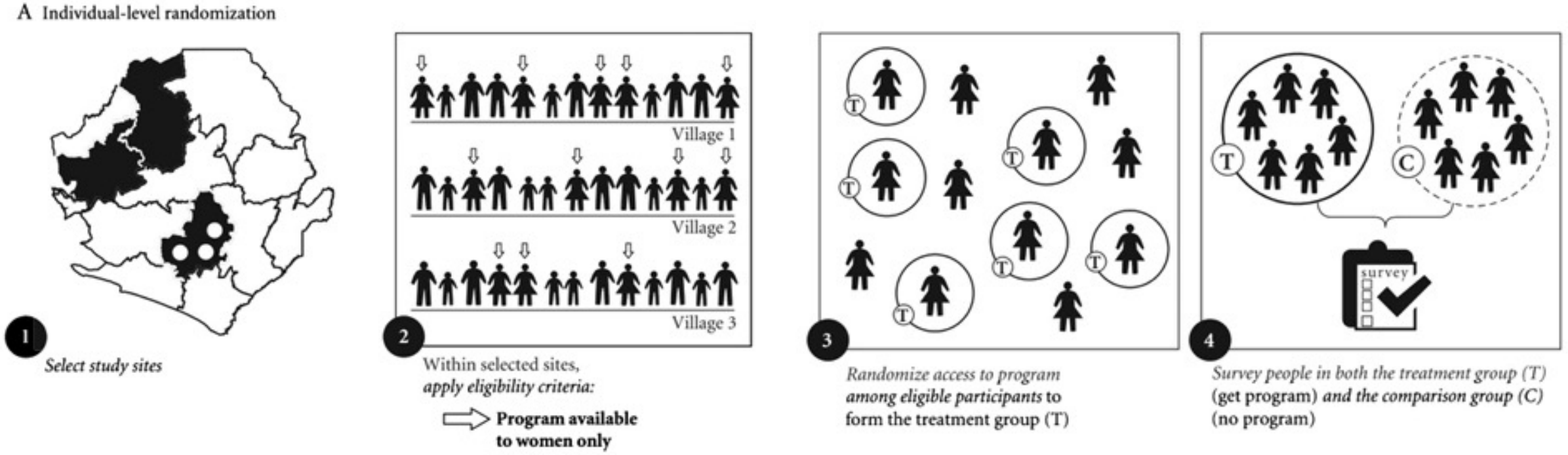
# Outline

- Opportunities for randomization
- **Level of randomization**
- Simple randomization
- Stratified randomization

# Choosing the level of randomization

- Goals are of a program/policy mostly are to change lives of individuals
- But often offered through groups, e.g., schools, saving groups, households, clinics, or communities.
- Decide on which level of randomization?
  - Some programs operate at several levels, e.g., microcredit loans to individual through saving groups that are part of communities.
  - These communities are taken care of by credit officers who are responsibility for multiple communities
  - This program can be evaluated by randomization on individual, saving group, community, or credit officer.

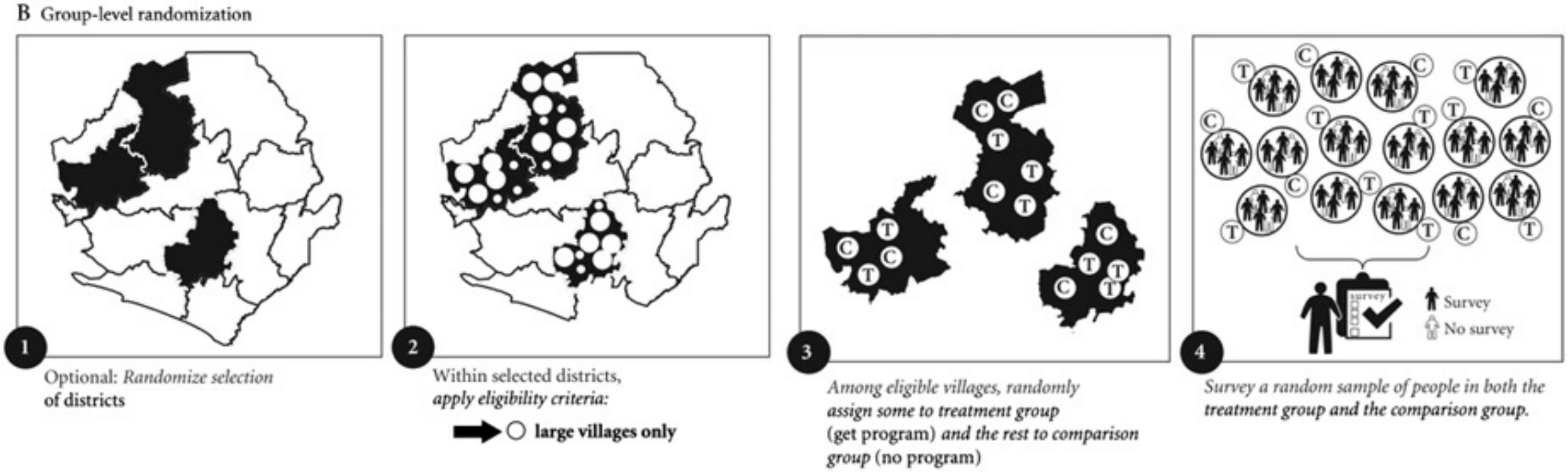
# Steps of individual randomization




Source: Glennerster & Takavarasha (2013)

page 110

# Steps of group randomization




The higher the level, the larger the number of people who are randomized together as a group.

Source: Glennerster & Takavarasha (2013) page 111

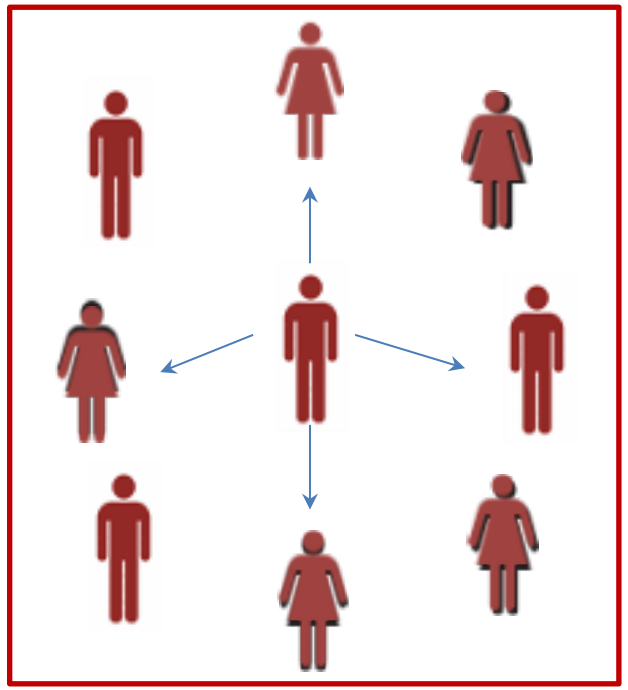
# Considerations for choosing the level of randomization

| Consideration | Question to be answered |
|---|---|
| **Unit of measurement** | What is the unit at which our outcome will be measured? |
| **Spillovers** | Are there spillovers? |
| **Attrition** | Which level is best to keep participants from dropping out of the sample? |
| **Compliance** | Which level is best to keep participants comply to the treatment assignment? |
| **Statistical power** | Which level gives us the greatest probability of detecting a treatment? |
| **Feasibility** | Which level is feasible ethically, financially, politically and logistically? |

# Spillovers

- Spillovers are indirect effects of the program (or externalities).
  - Physical: vaccination, mosquito nets, deworming
  - Behavioral: adoption of some agricultural techniques, sanitations
  - Informational: teaching materials
- Some actions or outcomes of some participants in the control group might be influenced by their neighbors who are in the treatment group.
- The difference in outcomes between the treatment and control group no longer represents the impact of the program.

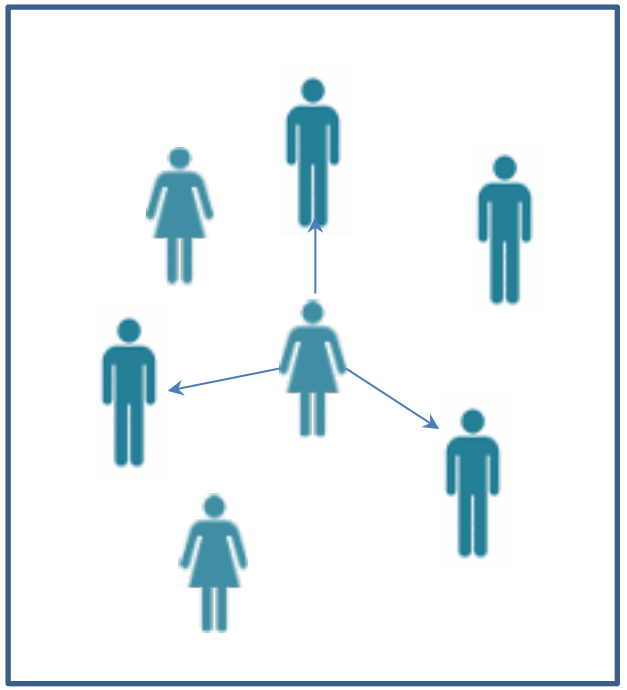
# Varying the unit to contain spillovers



treatment

comparison

friends



There should not be any transmission channel between treatment and control groups.

Source: J-PAL SEA training material

# Attrition

- When outcome data are missing from some of the people in the sample.
  - When people drop out of the study.
  - When people refuse to answer some question or cannot be found by the enumerator.
- People in the comparison group might be less cooperative for data collection when they see others receiving benefitsfrom participating while they receive nothing.
- Note: mostly attrition results from people's moving or finding the survey too long.

# Compliance

- Participants should adhere as closely as possible to their assigned treatment.
- Compliance by program staff:
  - Problem when program staffs see the evaluation design is unfair or it makes their job too complicated
  - e.g., share resources for both equally needy children although only one was in the treatment.
  - e.g., confused about the different intervention.
- Compliance by participants:
  - A participant in the treatment group might share resources with the neighbor from the control group.

# Feasibility

- Ethics:
  - In principle: respect participants, balance any risks and benefits of doing the evaluation, ensure the benefits go in part to the participants.
  - In practice: not create harmful tensions in the community, get informed consent.
- Politics:
  - Perception of the program allocation as fair? Is it permtted?
- Logistics:
  - e.g. delivering school meals to some children but not others in the same class
- Cost:
  - e.g. is there enough budget to pay for the treatment for the entire villages?

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- Stratified randomization

# The ingredients of random assignment

- **A list of eligible units**
  - administrative data, e.g., school registers, census with basic needs assessment
- **The number of randomization cells**: number of treatments
- **Allocation fractions**
- **Randomization device**: must perceived as fair, well-accepted
  - fixed probability: e.g., coins, dice, ไม้สั้นไม้ยาว
  - fixed proportion: e.g., cards, สลาก
  - Computer-generated numbers, Statistical package
- **Initial data** on the eligible units (for stratification or balance check)
  - Balance check after the randomization
  - The more variables we consider, the hgiher risk of unbalance in some variables

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- **Stratified and paired randomization**

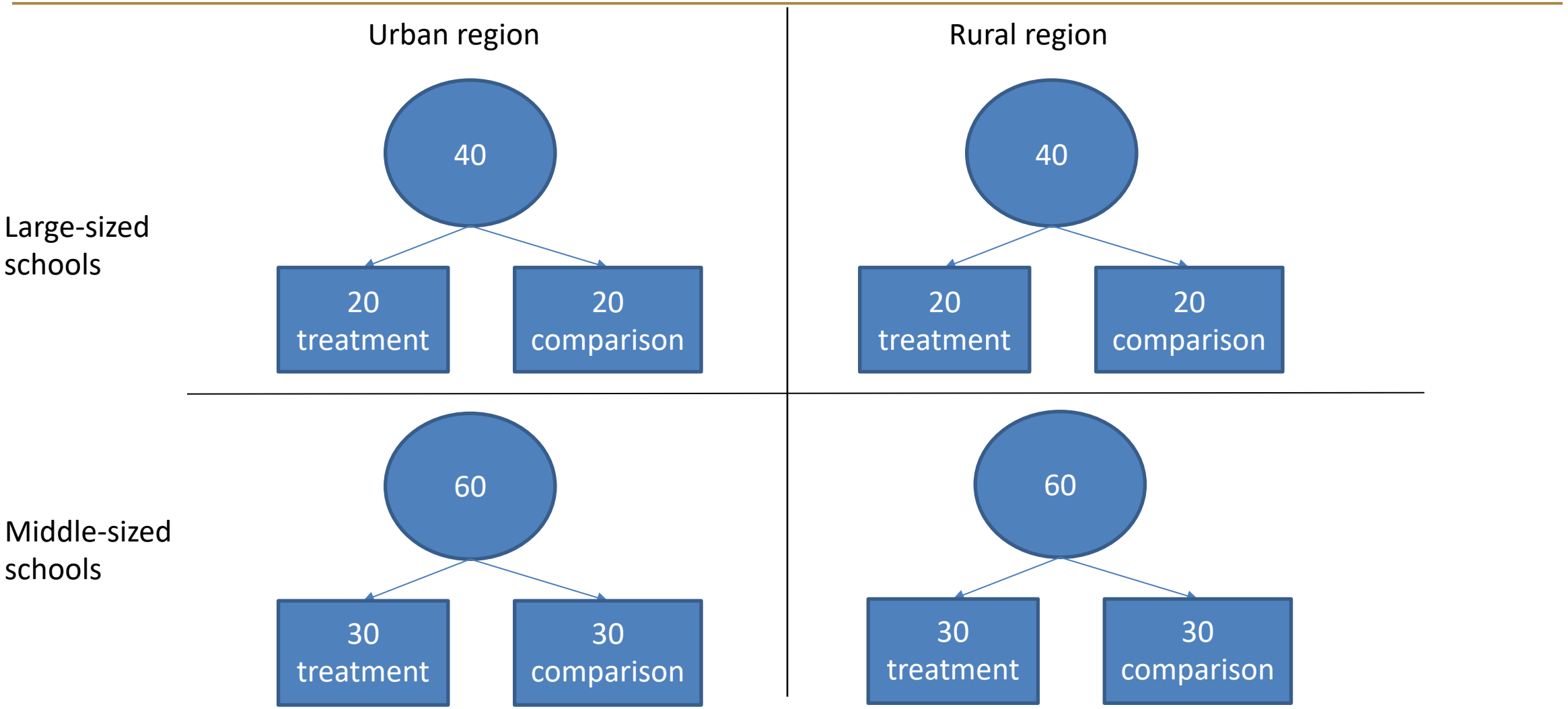
# When to stratify

- To achieve balance
  - The smaller the sample size, the more likely simple randomization leads to unbalance.
- To increase statistical power
- To analyze the impact by subgroup
  - when we want to learn how the intervention affects subgroups

# Which stratification variables

- Variables that are discrete
  - e.g., school type, test score
- Variables that are highly correlated with the outcomes of interest:
  - As confounders, they should be similar in control and treatment groups
  - e.g., baseline test score
- Variables on which we will do subgroup analysis

# Example of stratified randomization



# Paired random assignment

- One type of stratified randomization
- Two units are matched on a list of important characteristics.
- One assigned to the treatment group, the other to the comparison group.

# Thank you!

Questions?