NYU Steinhardt

Field Experiments Training

Abu Dhabi
October 6-10

DAY THREE

Randomized Control Trials

"To safely infer causality the experimenter cannot rely on natural happenings to choose the design; the experimenters must choose the design for themselves and, in particular, must introduce randomization to break the links with possible lurking variables."

- Box, Hunter, & Hunter (1978:495)

RANDOMIZATION RANDOMIZATION RANDOMIZATION

RANDOMIZATION

RANDOMIZATION

RANDOMIZATION RANDOMIZATION

RANDOMIZATION

RANDOMIZATION

RANDOMIZATION RANDOMIZATION RANDOMIZATION RANDOMIZATION RANDOMIZATION

RANDOMIZATION

RANDOMIZATION

DANIDA

- Randomization creates "balance":
  - Randomization game…

- Randomization creates "balance":

  - Randomization game…

- Random allocation of treatment prevents selection bias.

- Breaks link between lurking variables ("confounders") and program status.

- Need a reasonable number of units for it to work.

- With this, randomization "balances" groups.

- Balancing occurs on observed & *unobserved* characteristics.

- The fewer units over which you randomize…

  - the less likely the balancing property kicks in, and

  - the higher your uncertainty about impact.

DANIDA

Randomized Control Trials: Basics

- A "randomized control trial" (RCT) randomly assigns units to "treatment" and "control" or to "program A" and "program B" and then compares outcomes across these groups.

- RCTs are *prospective*: you establish learning goals, and then design the program based on the learning goals.

	1	2	3	4	5	6	7
Step	Define learning goals	Commission program	Implementation plan	Baseline	Assignment	Programming	Endline
Activities	Stakeholder assessment	Write evaluation plan & implementer RFP	Proposal & work plan	Data collection		Program activities	Data collection & analysis
MOE/NGO /Donors / program managers	X	X	X				
Researchers (NYU)		X	X	X	X		X
Implementers (NGOs)			X			X	

- RCTs maximize the potential for learning through ongoing and deep collaboration between managers, researchers, and implementers.

DANIDA
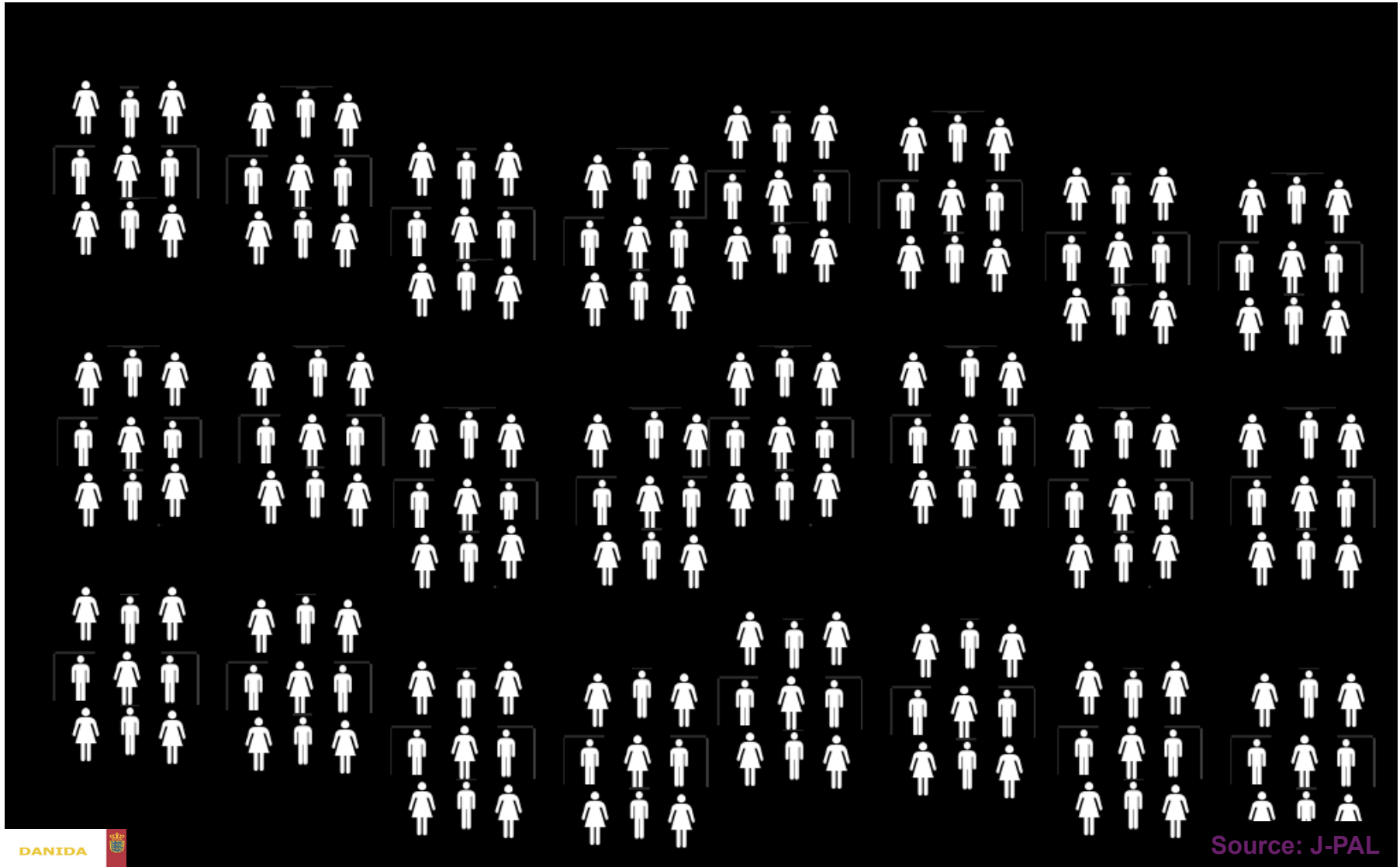
Session 3 (a): Unit of Randomization

Unit of Randomization

- Unit of randomization:
    - The unit for which we 'flip the coin'

- We can randomly select individuals to take part in an intervention, or we can select whole groups, also known as clusters:
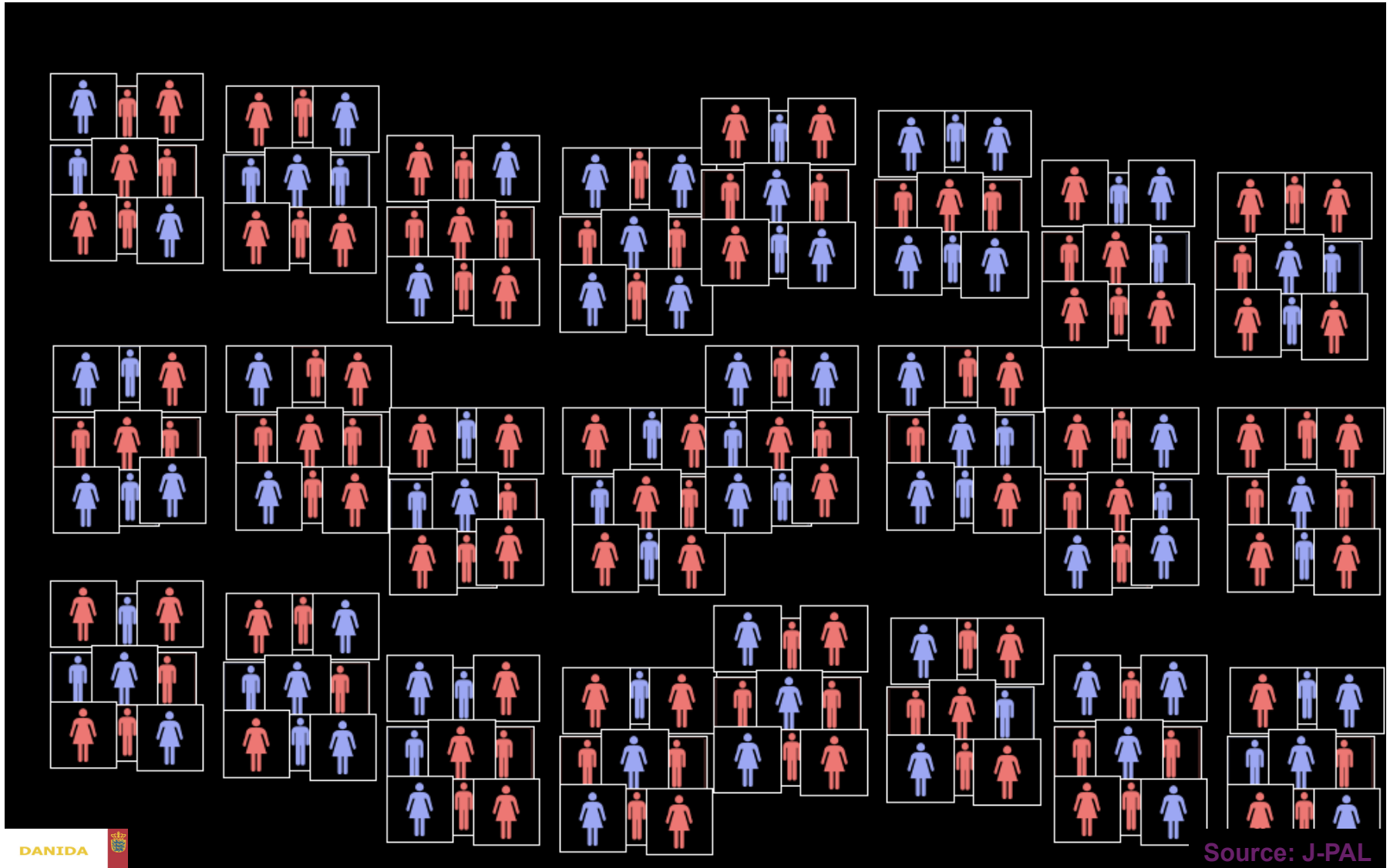
Intervention	Cluster
Conditional cash transfers	Villages
Bed net distribution	Health Clinics
Community management	Schools
Social support	Family

DANIDA

Unit of Randomization: Individual?

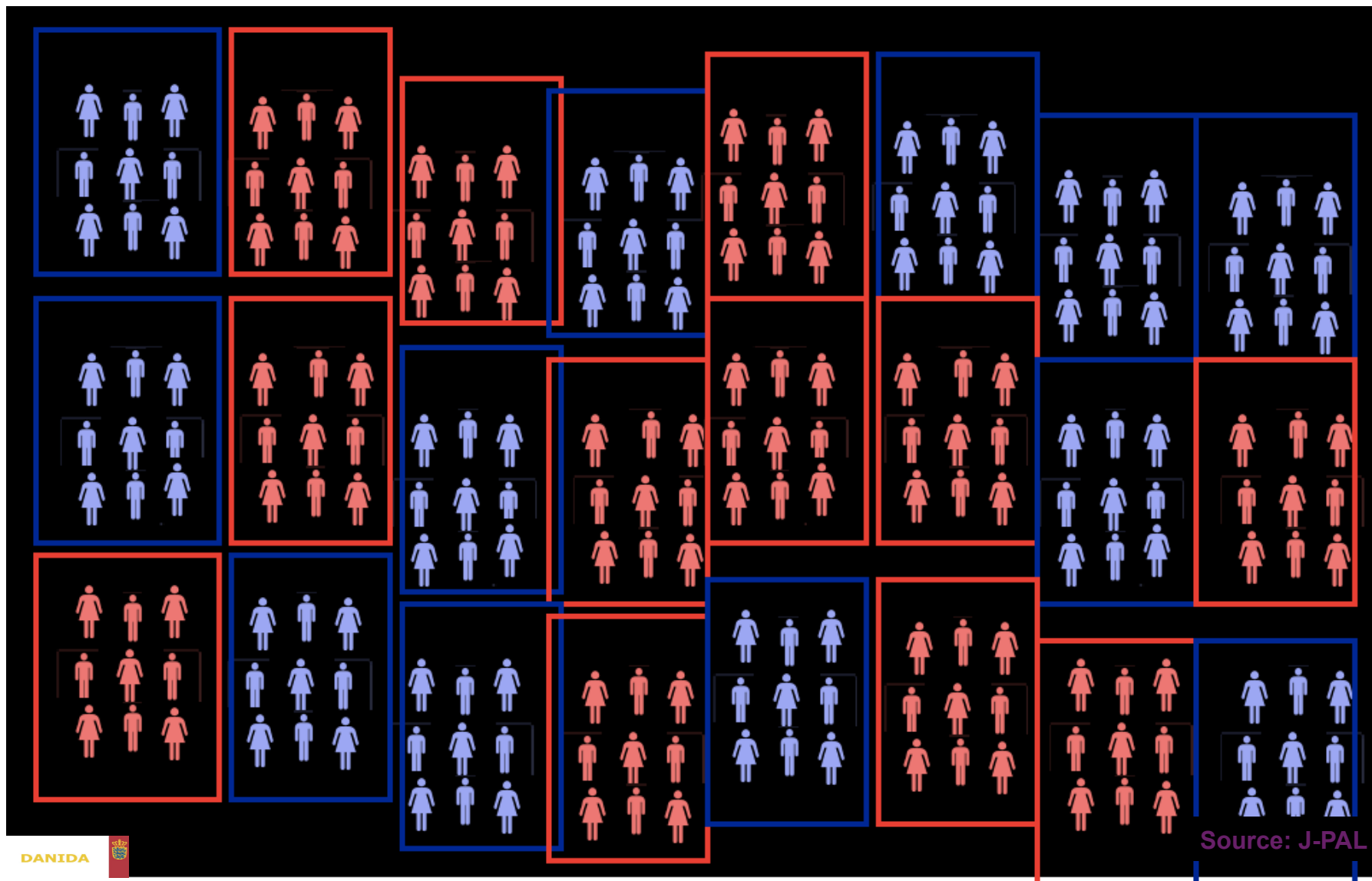Source: J-PAL

Unit of Randomization: Individual?

Source: J-PAL

Unit of Randomization: Household?
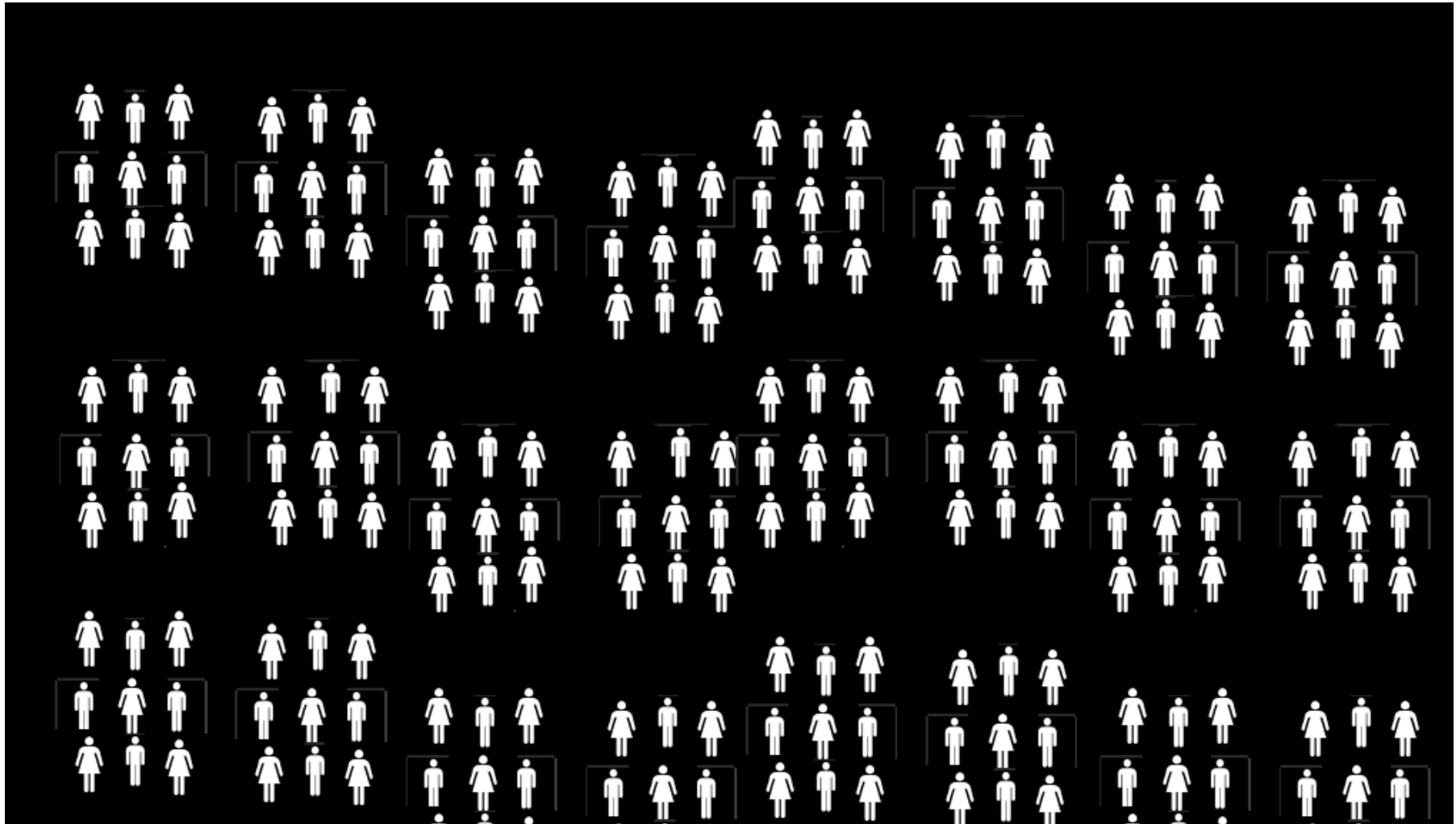
"Groups of individuals": Cluster Randomized Trial

DANIDA

Unit of Randomization: Household?

Source: J-PAL

DANIDA

Unit of Randomization: School?

Source: J-PAL
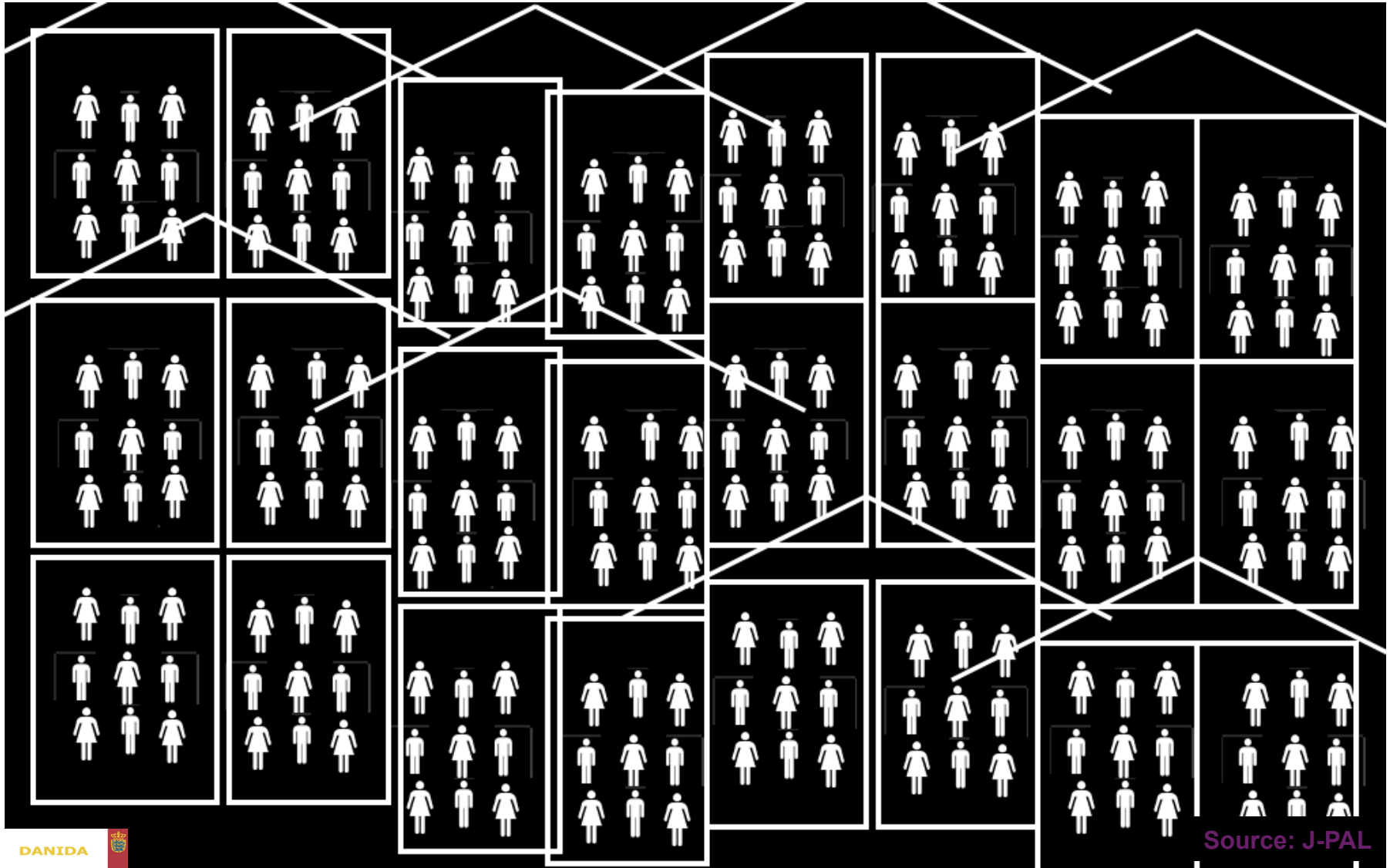
Unit of Randomization: School?

Source: J-PAL
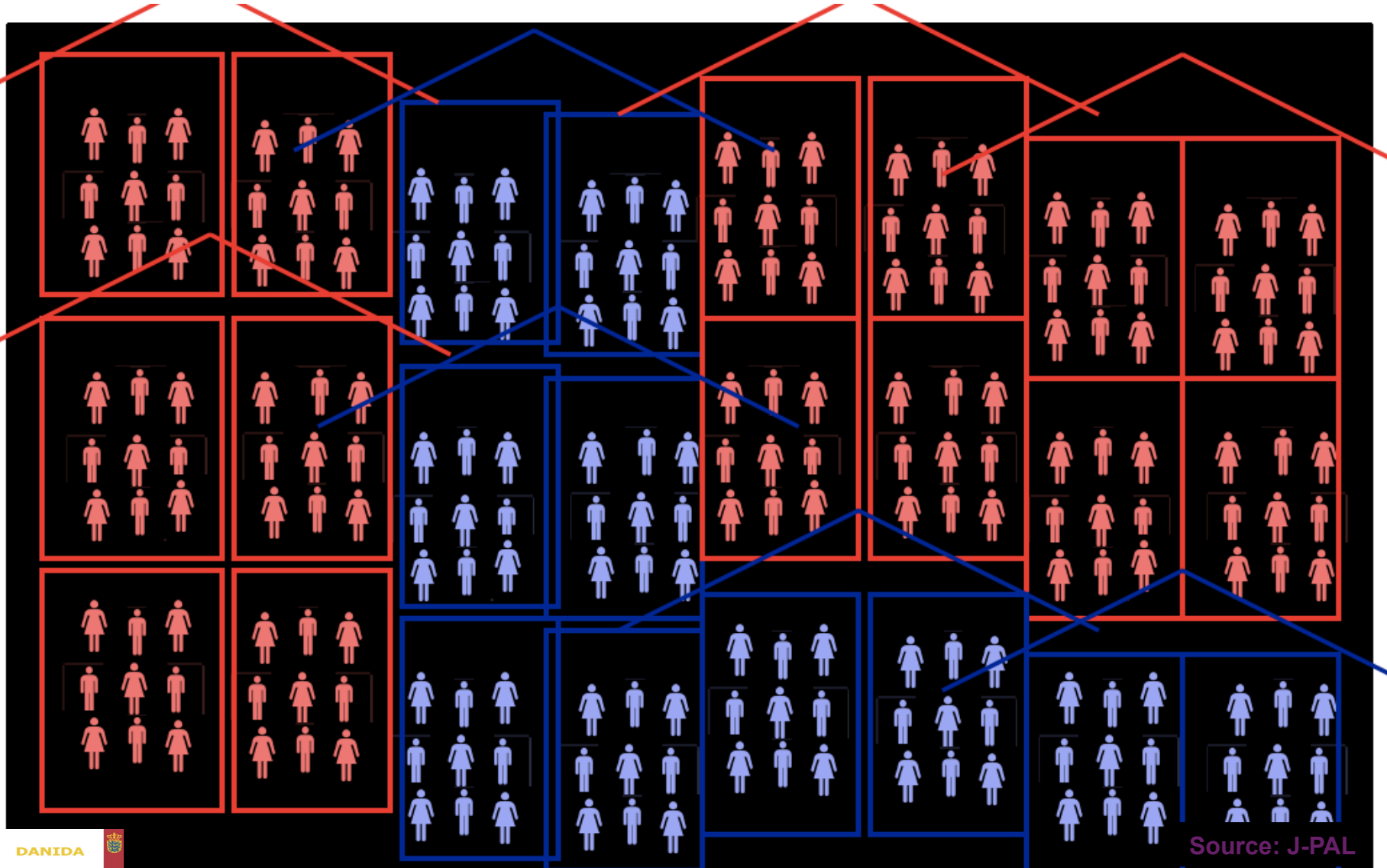
How to Choose the Level

- Nature of the treatment
  - How is the intervention administered?
  - How many people are likely to be affected by intervention?

- Generally, best to randomize at the level at which the treatment is administered
  - Madagascar: intervention is at the school level so schools randomized

- BUT there are **practical concerns:**

E.g. randomly assign schools to receive teaching tools

→ Contamination: can we prevent teachers from sharing resources with other schools?

→ Fairness: Do school principals / teachers / parents agree to our research design?

Randomized Control Trials II

- Methods of randomization

- Treatment variations

Method of Randomization

- Lottery

- Phase-in design

- Encouragement design

I. Lottery

- Suppose there are 2000 (eligible) applicants for a public service project, but only enough resources for 1000 participants

- Randomization can serve the purpose way *and help us to evaluate*

- Randomization mechanisms:
  – Pull out of a <u>hat/bucket</u> ⟶
  – Use a <u>computer programme</u> (e.g. Stata) to generate random numbers

Source: J-PAL

DANIDA

I. Lottery

- Advantages

  - Lotteries are simple, common and transparent

  - Not as politically problematic as often claimed

  - Participants know the "winners" and "losers"

  - Useful when there is no good reason to discriminate

  - Perceived as fair

II. Phase-in design

- Over a period of time, extend intervention to entire population

- Natural approach when expanding programme faces resource constraints

Advantages
- Everyone gets something eventually
- Provides incentives for those in control group to maintain contact

Concerns
- Can make it difficult to measure long-run effects
- Do expectations of future receipt change actions today?

DANIDA

Source: J-PAL

II. Phase-in design

Round 1
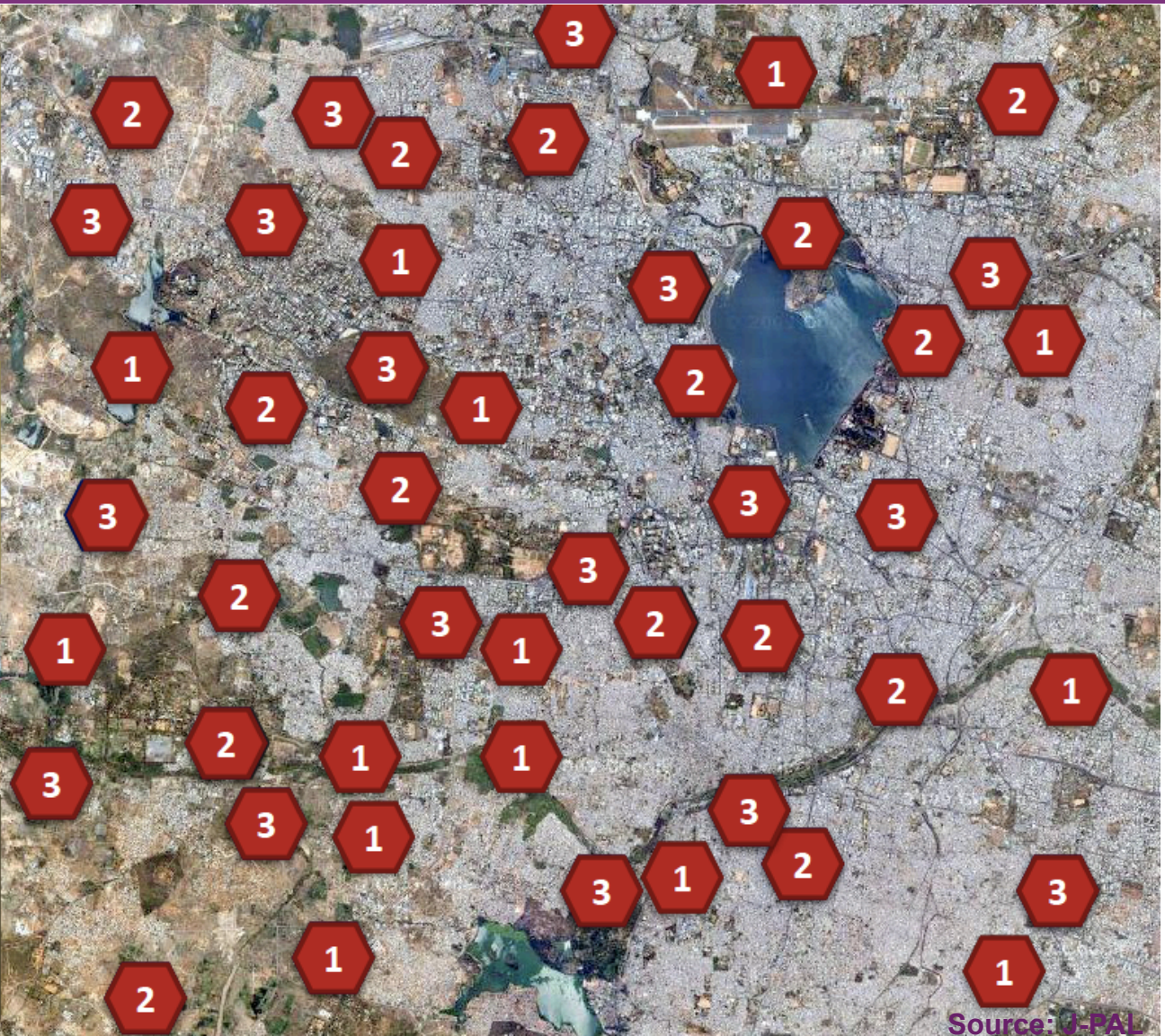Treatment: 1/3
Control: 2/3

Round 2
Treatment: 2/3
Control: 1/3

Randomized evaluation ends
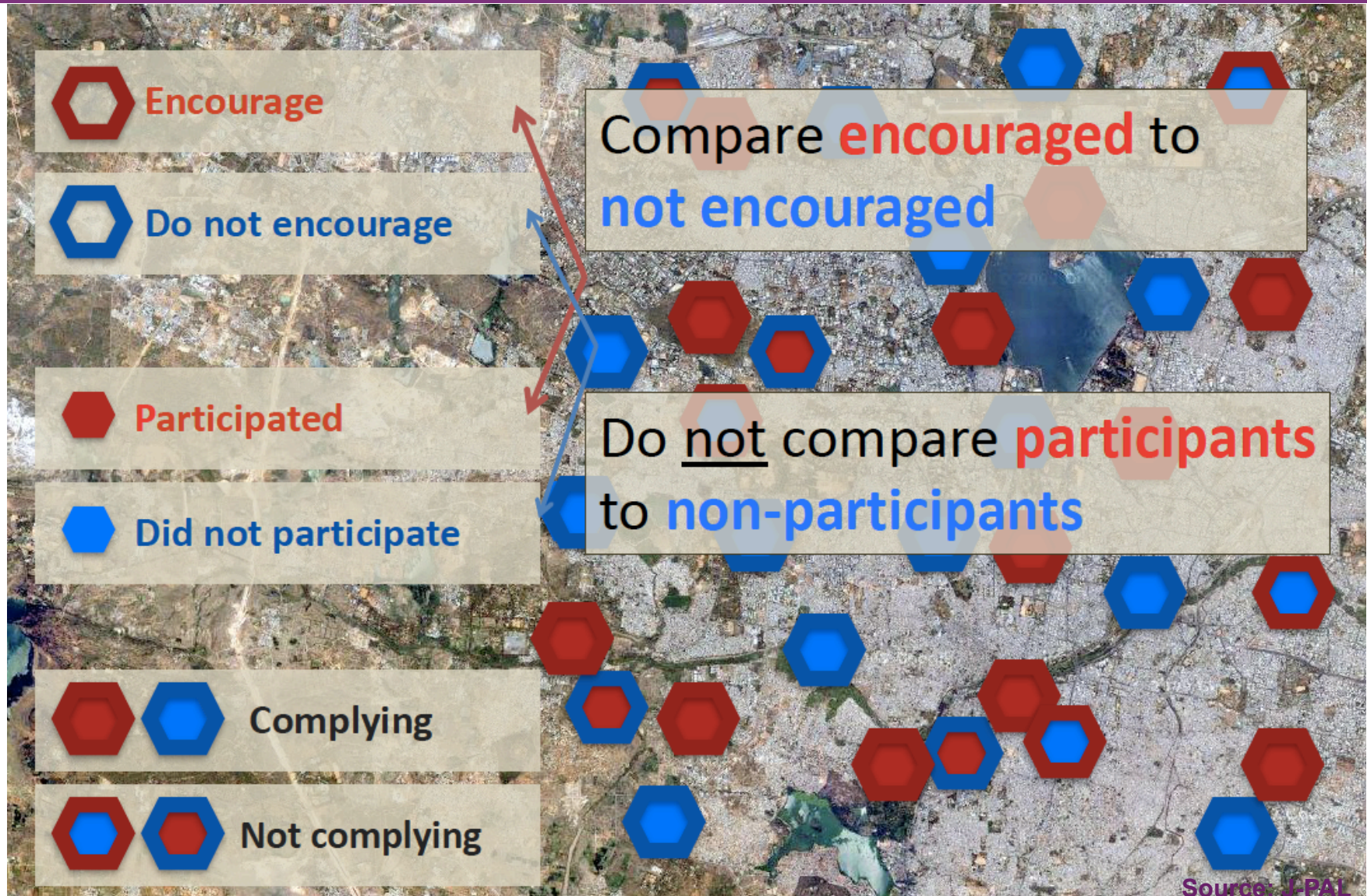
Round 3
Treatment: 3/3
Control: 0

Source: J-PAL

III. Encouragement design

- Sometimes it is practically or ethically impossible to randomize program access

- Instead, randomize encouragement to receive treatment

- Encouragement = something that makes some people more likely to use program than others

We compare those who were encouraged to those who were not.

II. Phase-in design

Encourage

Do not encourage

Participated

Did not participate

Complying

Not complying

Compare **encouraged** to **not encouraged**

Do <u>not</u> compare **participants** to **non-participants**

Source: J-PAL

Method of Randomization Summary

• Lottery

• Phase-in design

• Encouragement design

Not mutually exclusive

⟶ You choose a randomization plan to suit the context and the program.

Randomized Control Trials: Example

- Suppose a small business mentoring program.

- Goal is to study its effectiveness for improving income.

- You want a "balanced" comparison between businesses that participate in the program and those that do not.

- Randomization provides a balanced comparison.

- Units of randomization and observation are small businesses.

- *How would you use randomization to create a balanced comparison between businesses that participate and those that don't?*

Randomized Control Trials: Example

- Solicit applications & business plans from small businesses.

- Create a pool of potential beneficiaries from the applicants.

- Use a lottery to select businesses to receive mentoring.
  - Could randomize different types of mentoring to learn what works best.

- Program runs for, say, six months.

- Follow up in year 2 with *both* participant and non-participant businesses to estimate impact on incomes.

Randomized Control Trials: Wrinkles

- Sometimes we need extra steps to allow for randomization:
  - Problem: Politics require that certain businesses receive programming.
  - Solution: Allow for this, but exclude these businesses from evaluation.

  - Problem: Program must be targeted, e.g. to the most needy or most promising businesses and so cannot be assigned "randomly."
  - Solution: Pre-screen businesses to establish a pool of needy or promising businesses. Randomize within that pool.

  - Problem: Cannot deny benefits to businesses that we include in the study.
  - Solution: Use randomized roll out/stepped wedge, or provide an alternative, quick-to-administer benefit (e.g. $$) to compensate after program.

  - Problem: Program is nationwide.
  - Solution: Sub-nationally randomize encouragement to take up program.

  - Problem: We cannot force people to take or not take the program.
  - Solution: Use an encouragement design.

DANIDA

Exercise

Sketch out an RCT to assess impact for your program:

- What are the units of assignment and observation?

- What are the treatment & control/comparison conditions?

- Are there program variations that you want to test?

- How will you do the treatment assignment? Will you pre-screen to create a pool?