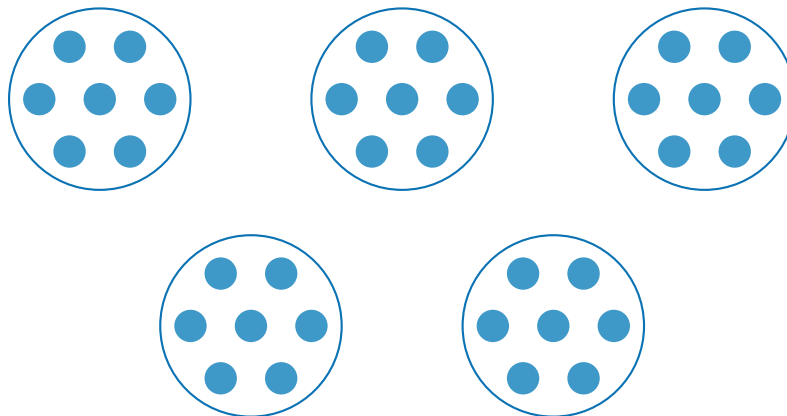


## What Happens When We Assign Treatment at the Cluster Level?



## Power Calculations in Cluster-Randomized Trials

$$MDE = (t_{1-\kappa} + t_{\alpha/2}) \sqrt{\frac{1}{P(1-P)}} \sqrt{\frac{\sigma^2}{N}} \sqrt{1 + (n_g - 1)\rho}$$

**Moulton factor or design effect**

$n_g$  = observations per cluster

$\rho$  = intra-class correlation

## What Is $\rho$ ?

Outcome	ICC	Context	Cluster	Reference
Microenterprise assets	0.01	Hyderabad, India	Urban neighborhood	Banerjee et al. (2015)
Borrowing from banks	0.04	Hyderabad, India	Urban neighborhood	Banerjee et al. (2015)
Microcredit borrowing	0.11	Hyderabad, India	Urban neighborhood	Banerjee et al. (2015)
Height-for-age z-score	0.02	Kisumu, Kenya	Rural village	Jakiela et al. (2023)
Mother tongue receptive vocabulary	0.02	Kisumu, Kenya	Rural village	Jakiela et al. (2023)
English receptive vocabulary	0.03	Kisumu, Kenya	Rural village	Jakiela et al. (2023)
Expressive vocabulary	0.05	Kisumu, Kenya	Rural village	Jakiela et al. (2023)
Neonatal mortality	0.01	Malawi	DHS clusters	Godlonton and Okeke (2015)
Skilled birth attendant presnet	0.14	Malawi	DHS clusters	Godlonton and Okeke (2015)
Household has electricity	0.29	Malawi	DHS clusters	Godlonton and Okeke (2015)
Math and language test scores	0.22	Busia, Kenya	Classroom	Miguel and Kremer (2004)
Math and language test scores	0.23	Udaipur, India	Classroom	Duflo and Hanna (2005)
Math test scores	0.62	Busia, Kenya	Classroom	Glewwe et al. (2004)