



Sampling: Choose Wisely.

A LOOK AT DIFFERENT TYPES OF SAMPLING TECHNIQUES



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Considering two TYPES OF SAMPLING

1. Nonprobability
2. Probability

Nonprobability

- ▶ Probability is usually unknown.
- ▶ Does not rely on numerical data.
- ▶ Inability to generalize to any populous.

Notions

- ▶ “What you can get” method.
- ▶ Used when you want to say something about a discrete phenomena, a few select cases (people, places, objects, etc.)

Example

- ▶ Nonrandom
- ▶ Sampling bias is present, and samples are not considered representative of the populations from which they were drawn.
- ▶ Difference between single and mixed method:
 - ▶ Bias is addressed in the Quantitative stage!

PRIMARY TYPES

- ▶ Convenience sampling
- ▶ Snowball sampling
- ▶ Quota
- ▶ Purposive

Convenience Sampling

- ▶ Cases are selected based on their availability to the researcher
- ▶ Also called haphazard, accidental, or convenience sampling
- ▶ Useful for exploratory or preliminary research when one is trying to gain an initial sense of attitudes or an idea about a new setting

Purposive Sampling

- ▶ Sample elements are selected based on
 - ▶ elective criteria that define a unique group
 - ▶ targeting knowledgeable individuals (key informants)
- ▶ Ideal for case study research
- ▶ Sampling continues until
 - ▶ Completeness: data are comprehensive
 - ▶ Saturation: little or no new knowledge is added

Snowball Sampling

- ▶ Select one member of a population, and after speaking to him/her ask that person to identify others in the population
- ▶ Ideal for studying “hard to reach” populations (e.g., homeless, criminals, prostitutes)
- ▶ Targeted incentives may be used to ensure diversity in the sample

Quota Sampling

- ▶ Available cases are selected according to defined quotas – subgroups are defined by a particular characteristics of the sample
- ▶ A slight improvement over availability sampling since sample proportions match the population on a particular feature (quota)
- ▶ The sample is not representative of the population

WHY ARE THESE IMPORTANT?

Any choice will limit the type of utilizable quantitative study.

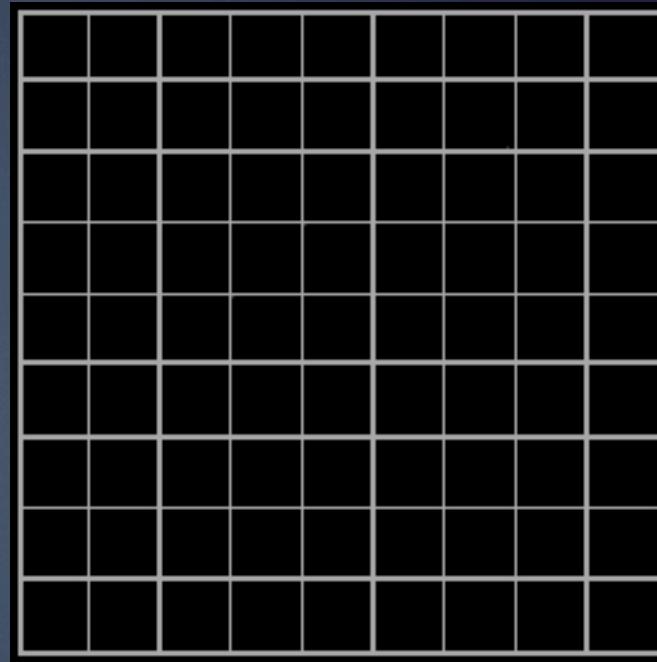
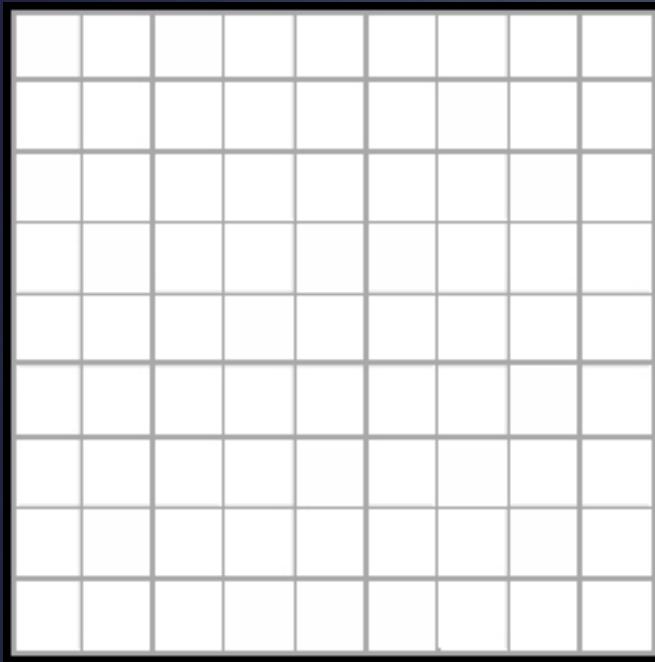
Probability Sampling

- ▶ Random selection.
 - ▶ e.g. Population representation is within some interval (e.g. 45% ($\pm 3\%$) agree).
- ▶ Ability to generalize to a certain populous.
- ▶ Inability to describe individual phenomena at any great depth.

PRIMARY TYPES

- ▶ Census
- ▶ SRS
- ▶ Systematic
- ▶ Stratified
- ▶ Cluster

Census



An official count or survey of a population, typically recording various details of individuals.

Census Example

- ▶ Population: all healthcare institutions in a county that perform surgery.
- ▶ What to do:
 - ▶ Create a list of all healthcare institutions in the county that perform surgery.
 - ▶ Number them $1, 2, \dots, N$ where N is the total number of healthcare institutions (here $N = 81$).
 - ▶ This total number is your sample so $n = N = 81$.

Benefits of a Census

- ▶ “Easy” to administer.
- ▶ Self-Weighting. (i.e. no sample element is worth more than another element)
- ▶ No estimation error.
- ▶ Bias/Sampling error is 0.
- ▶ Simplification of data analysis.

Drawbacks of a Census

- ▶ Weaknesses
 - ▶ Extremely expensive.
 - ▶ Time consuming.
 - ▶ Typically infeasible.

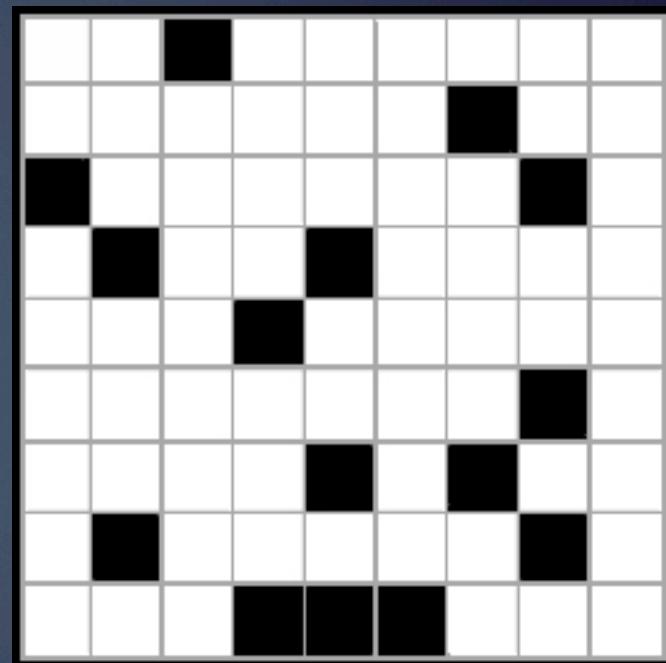
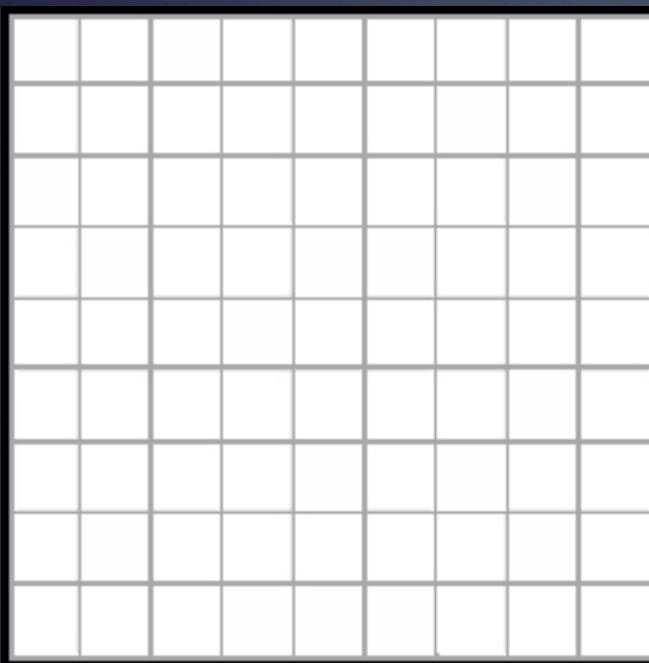
When Should You Use a Census?

- ▶ Small sample.
- ▶ Generalize to an overall populous.

Example of a Census

- ▶ Survey of work conditions at a small restaurant.
- ▶ Evaluation of teachers in a school.
- ▶ Exception (to size restriction): U.S. population.

Simple Random Sample (SRS)



Each element of the frame is given an equal probability of selection.

SRS Example

- ▶ Population: all healthcare institutions in a county that perform surgery.
- ▶ What to do:
 - ▶ Create a list of all healthcare institutions in the county that perform surgery.
 - ▶ Number them $1, 2, \dots, N$ where N is the total number of healthcare institutions (here $N = 81$).
 - ▶ Use a random method to obtain n (here $n = 15$).

Benefits of a SRS

- ▶ Strengths
 - ▶ Easy to administer.
 - ▶ Self-Weighting.
 - ▶ Estimation of error is easy to calculate.
 - ▶ Minimization of bias/sampling error.
 - ▶ Simplification of data analysis.

Drawbacks of a SRS

- ▶ Weaknesses
 - ▶ Vulnerable to sampling errors.
 - ▶ Possible underrepresentation of subgroups.
 - ▶ Can be tedious, costly, and possibly impractical.

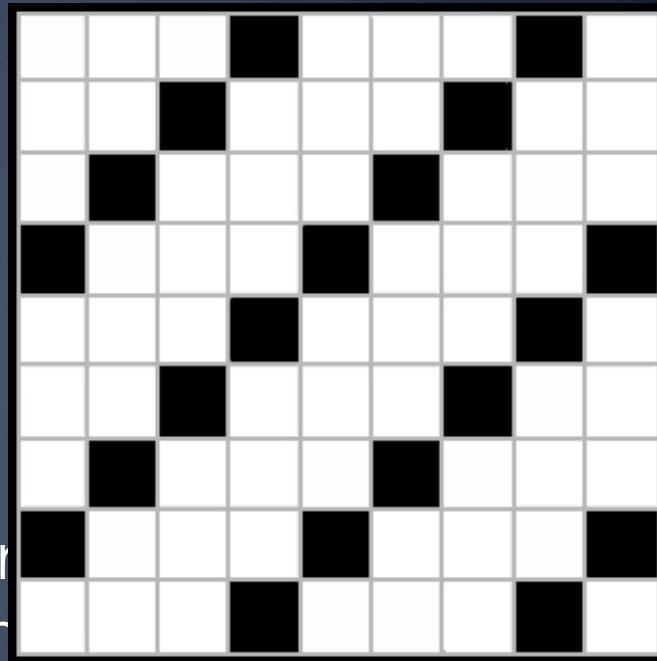
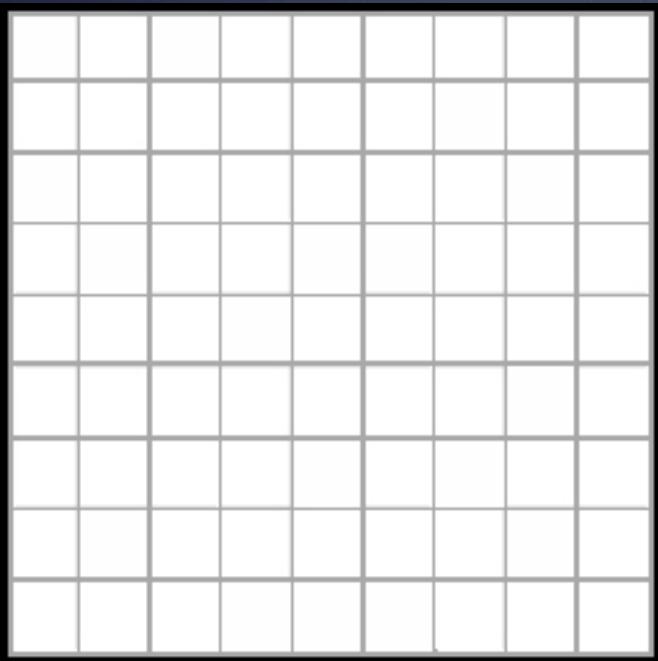
When Should You Use a SRS?

- ▶ Large sample.
- ▶ Complete sampling frame.
- ▶ Generalize to a specific populous.
- ▶ Not a great deal of information is available about the population.
- ▶ Data collection can be efficiently performed on randomly distributed items.
- ▶ Low cost of sampling.

Examples

- ▶ Survey of a large corporation with multiple subsidiaries.
- ▶ Survey of college students who use read their textbooks on an iPad.

Systematic Sample



An ~~an~~ ordered list of elements. A ~~sample~~ systematic sample is a ~~subset~~ collection of ~~elements~~ that are chosen from a population or ~~list~~ at regular intervals from that ~~that~~ ordered list.

Systematic Sample Example

- ▶ Population: all healthcare institutions in a county that perform surgery.
- ▶ What to do:
 - ▶ Create a list of all healthcare institutions in the county that perform surgery.
 - ▶ Number them $1, 2, \dots, N$ where N is the total number of healthcare institutions (here $N = 81$).
 - ▶ Pick every i^{th} element to get n (here $i = 4$ and $n = 20$).

Benefits of a Systematic Random Sampling

- ▶ Strengths
 - ▶ Easy to administer.
 - ▶ Simple selection process.
 - ▶ Less subjective to selection error than SRS.
 - ▶ Most likely will provide a more robust information set per unit cost than SRS.
 - ▶ May provide more information about a population than in SRS.

Drawbacks of a Systematic Random Sampling

- ▶ Weaknesses
 - ▶ Vulnerable to periodicities.
 - ▶ Dependence on a previous and next unit.

When Should You Use a Systematic Random Sampling?

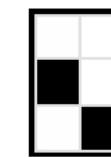
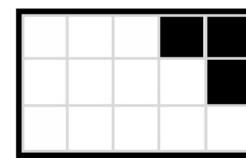
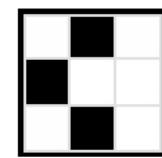
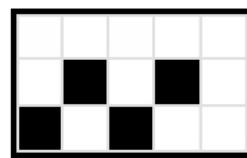
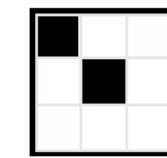
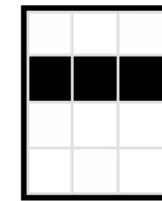
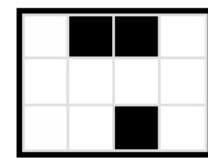
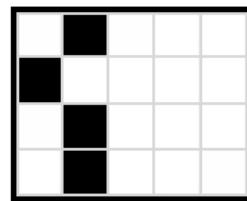
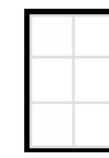
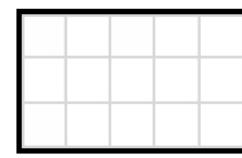
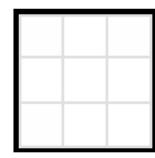
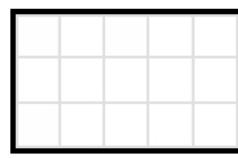
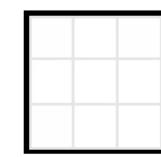
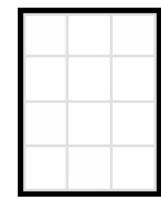
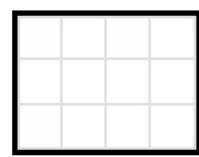
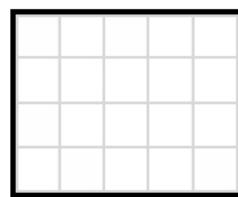
- ▶ Given population is homogeneous (where all elements can be regarded as the same type).
- ▶ Sample units are uniformly distributed over a population.

Examples of a Systematic Random Sampling

- ▶ Sampling a neighborhood with 10 houses on each block.
- ▶ Cars on a factory line.

Stratified Sample

- ▶ Population can be divided and subdivided into distinct **categories**, a sampling frame can be separated into what is labeled as strata.
- ▶ Then simple random sampling or systematic sampling is applied within each stratum.



Stratified Sample Example

- ▶ Population: all healthcare institutions in a county that perform surgery.
- ▶ What to do:
 - ▶ Create a list of all healthcare institutions in the county that perform surgery.
 - ▶ Number them $1, 2, \dots, N$ where N is the total number of healthcare institutions (here $N = 81$).
 - ▶ Divide them up into distinct M categories and use an SRS or systematic sampling method. (here $M = 8$ and $n = 24$)

Benefits of a Stratified Random Sampling

- ▶ Strengths
 - ▶ Reduced error and increases precision compared to SRS.
 - ▶ Guaranteed inclusion of members for each defined category.
 - ▶ Reduced sampling error.
 - ▶ Less variability than an SRS. (We'll look at this later)

Drawbacks of a Stratified Random Sampling

- ▶ Weaknesses
 - ▶ Can be expensive.
 - ▶ Stratifications must be implicitly defined.

When Should You Use a Stratified Random Sampling?

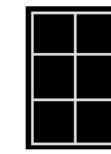
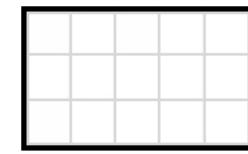
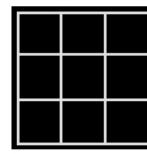
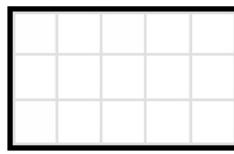
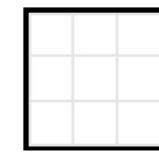
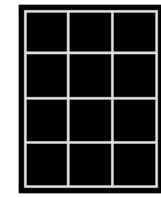
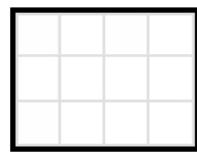
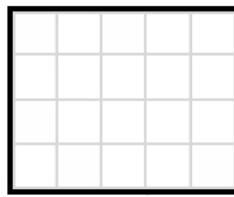
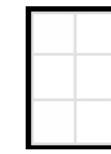
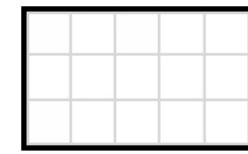
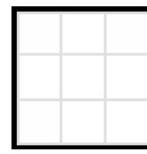
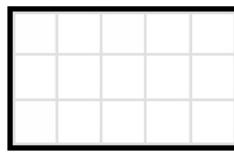
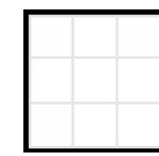
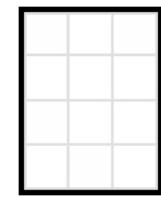
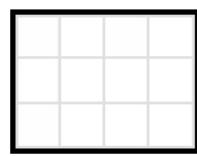
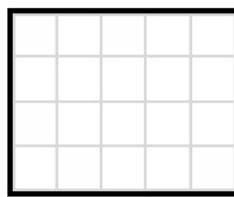
- ▶ Strata is mutually exclusive.
- ▶ Strata are collectively exhaustive.

Examples of Stratified Sampling

- ▶ Sampling students by gender in a school by classroom.
- ▶ Sampling people by country.

Cluster Sample

- ▶ Population can be divided and subdivided into distinct **groups**, a sampling frame can be separated into what is labeled as strata.
- ▶ Then simple random sampling or systematic sampling is applied within each stratum.



Cluster Sample Example

- ▶ Population: all healthcare institutions in a county that perform surgery.
- ▶ What to do:
 - ▶ Create a list of all healthcare institutions in the county that perform surgery.
 - ▶ Number them $1, 2, \dots, N$ where N is the total number of healthcare institutions (here $N = 81$).
 - ▶ Divide them up into distinct M categories and use an SRS or systematic sampling method. (here $M = 8$ and $n = 27$)

Benefits of a Cluster Random Sampling

- ▶ Strengths
 - ▶ No need for a sampling frame.
 - ▶ Clusters can be stratified if necessary.
 - ▶ Cost efficient since clusters are housed close together (reduces the average cost per interview).
 - ▶ Increased precision from stratified sampling.

Drawbacks of a Cluster Random Sampling

- ▶ Weaknesses
 - ▶ Requires a larger sample size than SRS.
 - ▶ May not represent diversity within a populous.
 - ▶ May have high sampling error.

When Should You Use a Cluster Random Sampling?

- ▶ Clusters are mutually exclusive.
- ▶ Clusters are collectively exhaustive.
- ▶ Sampling selected clusters.
- ▶ You do not have a full sampling frame.

Examples of Cluster Sampling

- ▶ Selecting all houses in multiple blocks for sampling.
- ▶ Sampling different classrooms in a school.

MIXED METHODS Pairings

- ▶ There is no steadfast rule on what quantitative method goes with what qualitative method or visa versa.
- ▶ Readings for this week will provide you with tested pairings.
- ▶ If you are intending to do a mixed methods study where the survey is one component, let's chat!

LESSONS ABOUT SAMPLE QUALITY

- ▶ Features of Quality Samples
 - ▶ The population from which the sample was drawn is clearly specified
 - ▶ The sampling method (procedures) are clearly specified
 - ▶ High response rate
 - ▶ Researcher limits discussion about implications of their findings to the population from which they actually sampled

DETERMINING SAMPLE SIZE

Smaller Sample

- ▶ Yields higher sample error
- ▶ With homogeneous populations
- ▶ For simple analysis
- ▶ When strong relationship between variables is expected

Larger Sample

- ▶ Yields lower sample error
- ▶ With heterogeneous population
- ▶ For complex analysis
- ▶ When weak relationship between variables is expected

THANK YOU!