



Sampling Methods & Techniques

Unlocking reliable insights from the many to the few.
Explore the strategic approaches used to transform vast populations into meaningful, actionable research data.

Presented by: Rafia Islam
Research Officer
BPATC

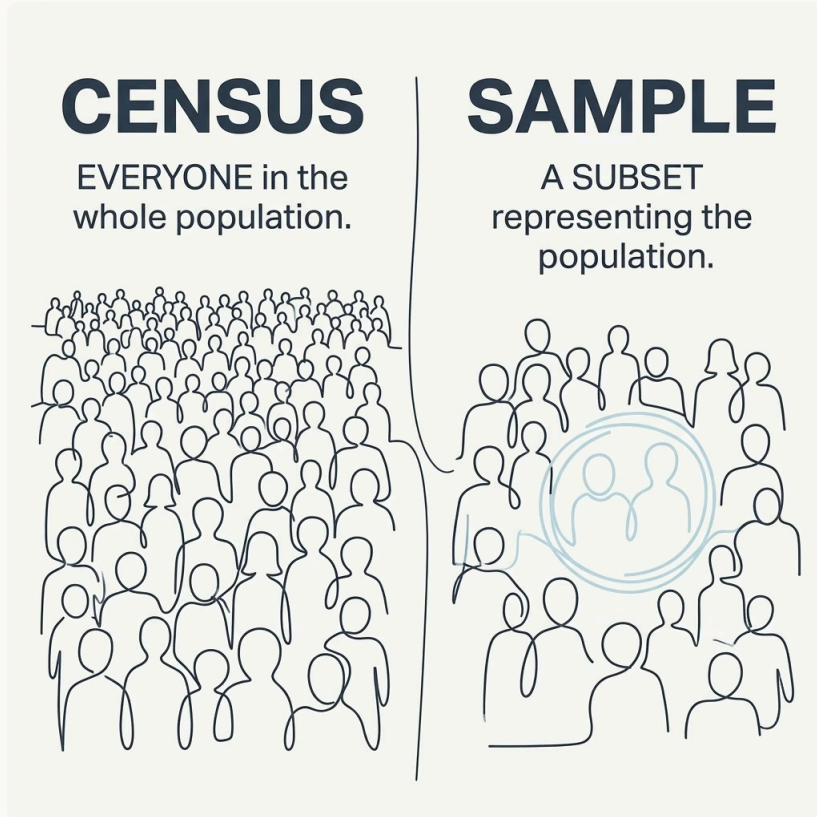
Foundations: The Essentials



Understanding the core pillars of any study is the first step toward accuracy.

- **Population:** The entire group of interest, such as all 1,000 employees at *SocialBuzz Ltd.*
- **Sample:** The selected 120 individuals representing the broader group.
- **Sampling Frame:** The master list, like an HR database, providing access to every member of the population.

Census vs. Sample



Choosing between total coverage and efficient representation.

- **Census:** Counting every unit (e.g., the 2021 UK Census). It offers the ultimate "full-picture" but at a massive scale.
- **Sampling:** A strategic necessity. By surveying 2 million farms rather than all 3.5 million, the 2024 US Agricultural Census reduced costs by 43% while maintaining a 95% confidence level.

Probability Sampling Advantage

When every unit has a known, non-zero chance of selection, researchers gain a powerful statistical foundation.

Design-Based Inference

Generalise results with precise, calculable error margins.

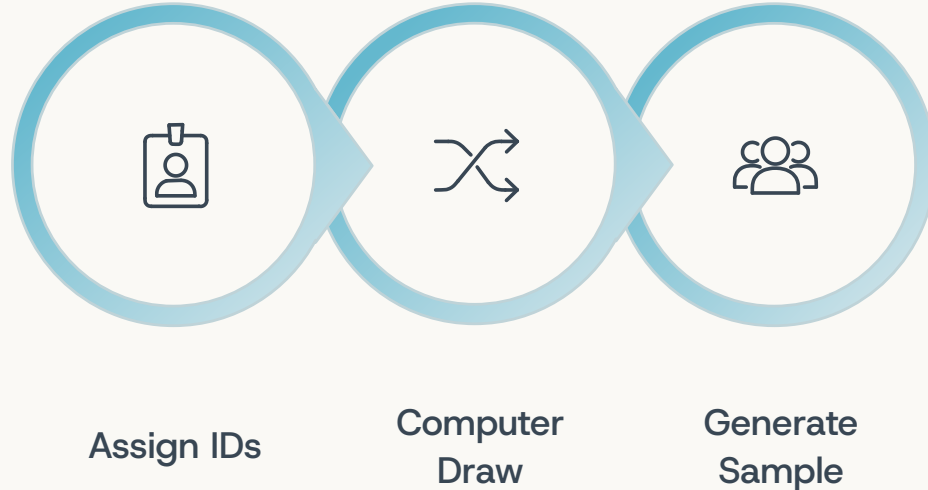
Reduced Bias

Minimises the systematic skew common in non-random convenience sampling.

Advanced Modelling

Supports Bayesian updates and multilevel regression for deep insights.

Simple Random Sampling (SRS)



The "lottery" approach remains a gold standard for statistical purity.

- Each unit in the population is assigned a unique ID.
- A computer-generated list selects the required number of participants.
- Ideal for homogeneous populations where a complete, accessible frame exists, such as the 2023 NHS Health Survey.

Systematic Sampling: Easy Selection

This method is good for big lists because it's fast and organized.



Random Start

First, pick a random number to start from within your first small group (for example, numbers 1 to 20).



Fixed Interval

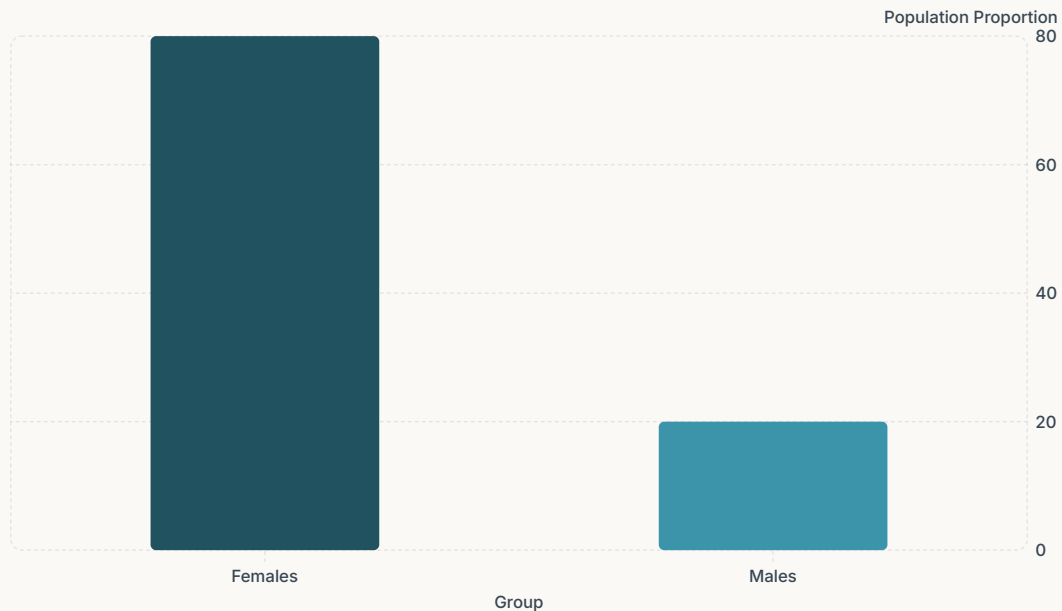
Then, pick every 20th name or item from your full list, following that same step.



Watch for Patterns

Be careful of hidden patterns in your list. If your picking step matches a pattern, your sample might be biased (unfair).

Stratified Random Sampling



Guard against hidden imbalances by dividing your population into sub-groups (strata) before sampling.

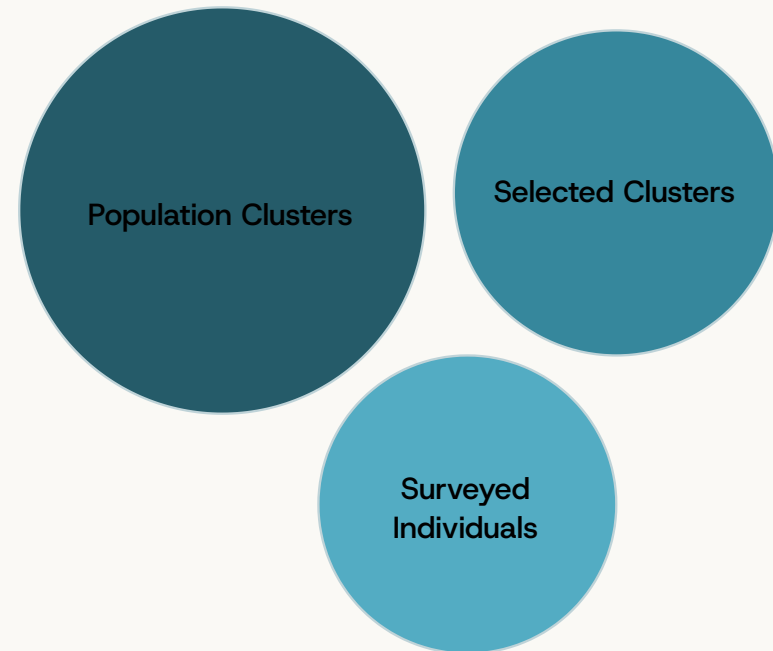
At *Riverdale University*, rather than a naïve SRS which might accidentally miss the minority group, we force a sample that mirrors the 80/20 gender split. This ensures high representation across every critical dimension.

Cluster Sampling

When surveying every individual is impractical, **cluster sampling** provides an efficient alternative.

- Divide a large population into smaller, naturally occurring groups, or "**clusters**".
- **Randomly select** a few of these clusters.
- Survey everyone (or a random sample) within **those chosen clusters**.
- Simplifies logistics, especially when populations are spread out, leading to **reduced travel** and **administrative burden**.

Example: In the 2023 PISA assessment, researchers sampled 75 schools (clusters) instead of thousands of individual students across numerous schools.



Non-Probability Techniques

Non-probability sampling involves selecting participants using non-random methods. This approach is often employed when random selection is impractical, impossible, or when specific characteristics are sought within a population. While less generalizable than probability sampling, it can be valuable for exploratory research, qualitative studies, or when resources are limited. Here are three common non-probability methods:



Convenience

Surveying accessible individuals (e.g., office staff on a Monday).
Fast, but lower validity.



Purposive

Judgement-based selection of experts or specific groups (e.g., frontline nurses).



Snowball

Referral-based recruitment; perfect for reaching hidden, underground populations.

Choosing the Right Sampling Approach

☐ Use Cochran's Formula for sample sizing: $n_0 = \frac{Z^2 \times p \times (1-p)}{e^2}$

This formula helps determine an ideal sample size for a given set of conditions. Here's a breakdown of its components:

- **Z:** The critical value (Z-score) for the desired confidence level. Commonly, 1.96 for a 95% confidence level, or 2.58 for a 99% confidence level.
- **p:** The estimated proportion of the population that possesses the attribute in question. If unknown, 0.5 (50%) is often used for maximum sample size.
- **(1-p):** The complement of the estimated proportion, representing the proportion of the population that does not possess the attribute.
- **e:** The desired margin of error, expressed as a decimal (e.g., 0.05 for a 5% margin of error). This indicates how close the sample estimate will be to the true population value.

For generalizable, statistically robust results, always prioritize probability methods. But when facing constraints like limited access, urgent timelines, or hidden populations, non-probability approaches are your indispensable tool.

Your choice of sampling method directly dictates the validity and actionability of your findings. Align it precisely with your research goals and operational constraints. Choose wisely to unlock truly actionable insights.