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Research Sampling Methods: Types, Techniques and Examples

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Abstract

A study's sampling strategy determines which population its findings can speak for, yet in many research reports it is reduced to a few lines that name a recruitment route without naming a method. This article sets out the distinction between probability and non-probability sampling and describes the eight methods most often used in social, health and business research: simple random, stratified, cluster and systematic sampling, and purposive, convenience, snowball and quota sampling. Each method is illustrated on the same population of 120 units, so that the designs can be compared directly, and four are illustrated with extracts from recent doctoral research. The article then summarizes the evidence on sample size for statistical and interview-based studies, offers a two-step procedure for choosing a method, and identifies the five elements a sampling description should report. It is intended for students and early-career researchers designing a study, and for the educators who teach research methods.

Keywords: sampling methods; types of sampling; sampling techniques; probability sampling; non-probability sampling; sample size; saturation; research methods; open educational resource

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1. Introduction

Most research questions concern a group too large to study in full: every hospital nurse in a state, every first-year student at a university, every small firm in a sector. Sampling is the procedure by which a researcher selects a smaller group from which to collect data, and it governs what the study may later claim about the larger one. The description of sampling is frequently a single paragraph in a methods section, but its consequences extend to every result that follows. If the method does not fit the research questions, or if the description is too vague for a reader to evaluate, the findings are open to doubt, however sound the analysis.

This article is written for students and researchers preparing that description and for those who teach research methods. Section 2 defines the population, the sampling frame and the sample. Section 3 explains the division between probability and non-probability sampling. Sections 4 and 5 describe four methods from each family, each shown on the same population of 120 units and, where possible, illustrated with an extract from a published doctoral thesis. Section 6 addresses sample size, Section 7 sets out how a method is chosen, and Section 8 describes how the choice should be reported.

2. Population, Sampling Frame and Sample

The *population* is the full group about which a study intends to draw conclusions. The *sample* is the subset from which data are actually collected. Between the two lies the *sampling frame*: the concrete list or route from which the sample is drawn, such as a staff register, an enrollment list or a membership database (Figure 1). Ideally the frame covers the whole population and nobody outside it. In practice the two rarely coincide, and any gap between them is a source of coverage error that should be acknowledged in the methods section.

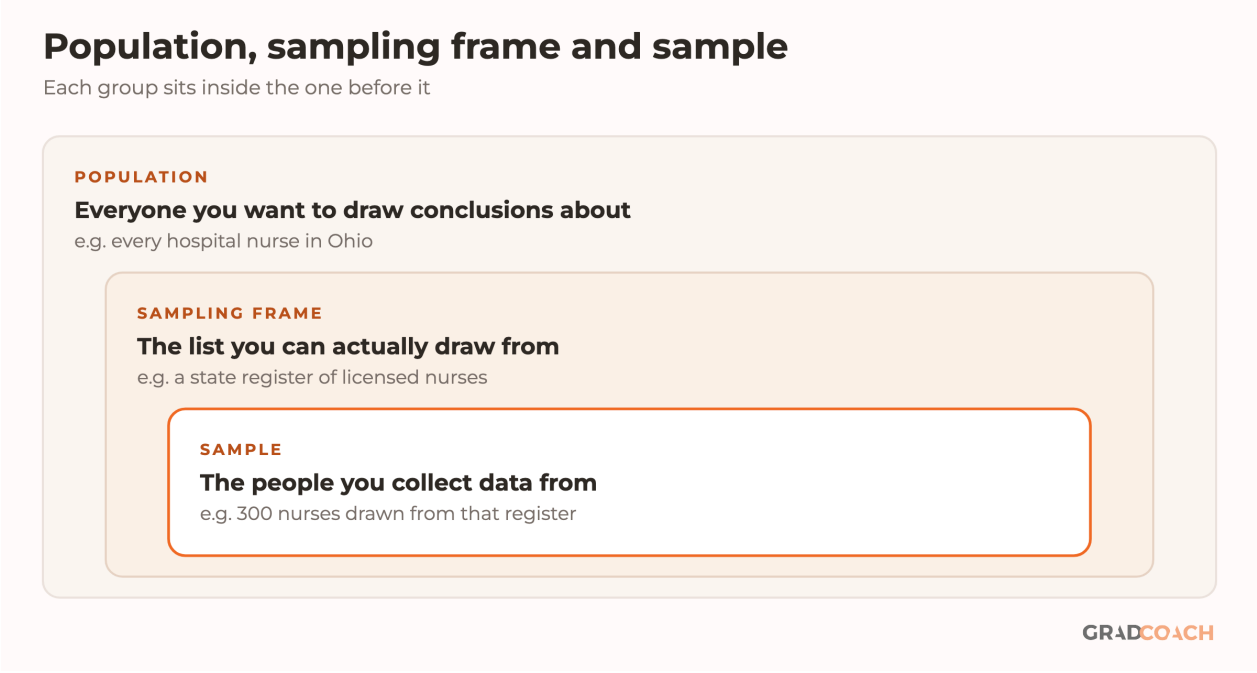


Figure 1. Population, sampling frame and sample.

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A sample that perfectly reproduced its population would allow findings to be generalized to everyone in it. No sample achieves this, and not every study requires it. Whether a study needs to generalize depends on its aims, and whether it can generalize depends more on its method than on the size of its sample.

3. Probability and Non-Probability Sampling

Every sampling method belongs to one of two families, and the family determines whether a study can generalize statistically, that is, estimate population values from sample values with a known margin of error.

In **probability sampling**, every member of the population has a known, non-zero chance of selection, and chance decides who is included. Because selection follows a defined procedure, inferential statistics can estimate how far sample results are likely to lie from population values. Probability methods are therefore the usual choice in quantitative research that aims to describe or test a whole population.

In **non-probability sampling**, selection depends on the researcher's judgment, on accessibility or on referral, so the probability of any member's inclusion is unknown, and some may have no chance of inclusion at all. A conventional margin of error cannot be attached to the results (Baker et al., 2013), but participants can be chosen for what they know. These methods predominate in qualitative research, where the depth of each account matters more than statistical reach, that is, the ability to generalize to the whole population. Figure 2 assigns the eight methods discussed here to their families.

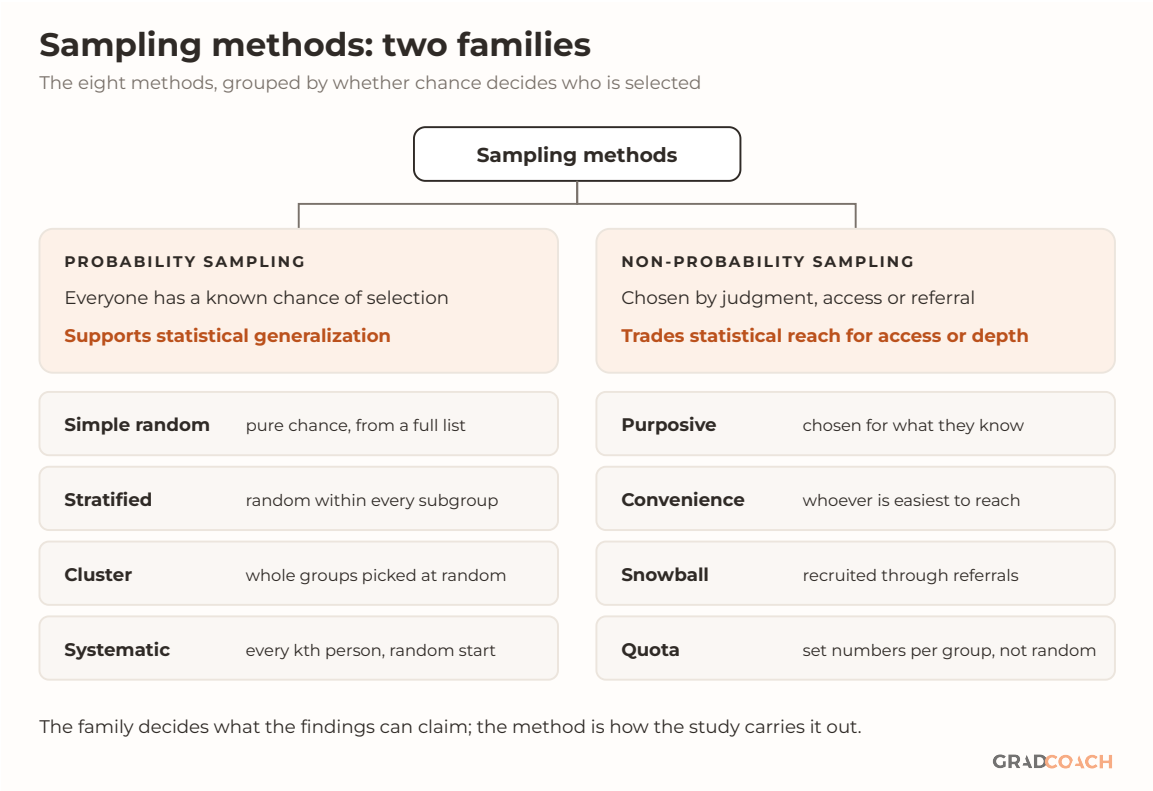


Figure 2. The eight sampling methods, grouped by family.

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Non-probability sampling is not a weaker choice in itself. A study of how six school principals managed a merger does not require a random sample of principals; it requires the six whose experience is relevant to the question. What such a study cannot do is claim that its findings hold for principals in general, and stating that limit plainly is part of using the method well.

4. Probability Sampling Methods

The four probability methods below are those most often encountered in applied research. To make their differences visible, each is drawn on the same population of 120 units, with the selected units filled.

4.1 Simple random sampling

Simple random sampling gives every member of the population the same probability of selection, and every possible sample of the required size the same probability of being drawn (Cochran, 1977). In practice, each unit on the sampling frame is numbered and a random number generator selects the sample: from a list of 500 employees, for instance, 50 numbers might be drawn and those 50 people surveyed. Figure 3 shows the same procedure on the population of 120 units.

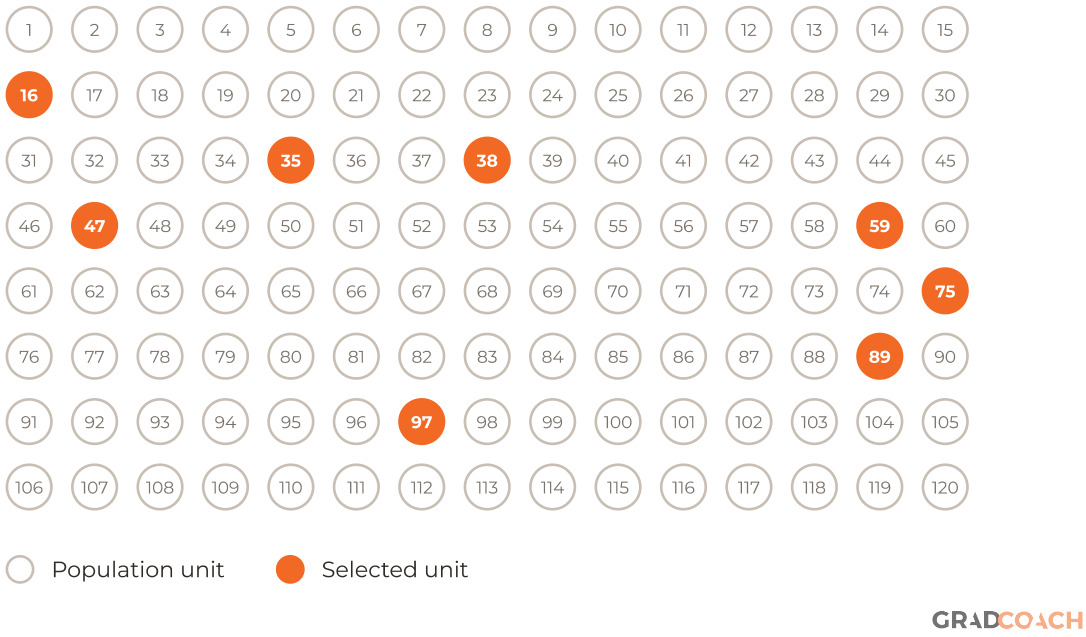


Figure 3. Simple random sampling: 8 of 120 units drawn by chance. From Jansen (2026f), CC BY 4.0.

The method is simple in principle but requires a complete list of the population, which many student projects lack. Because chance alone decides selection, a small subgroup may be represented by few members or none. Where the research questions compare subgroups, this is a serious risk, and stratified sampling (Section 4.2) is designed to remove it.

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4.2 Stratified random sampling

Stratified random sampling divides the population into non-overlapping subgroups, or *strata*, defined by a characteristic relevant to the study, such as job role, age band or region, and then draws a random sample from each stratum separately. Because every stratum is sampled, no subgroup can be omitted by chance. Figure 4 shows *proportionate allocation*, in which each stratum contributes the same share of the sample as it holds of the population, here one unit in ten.

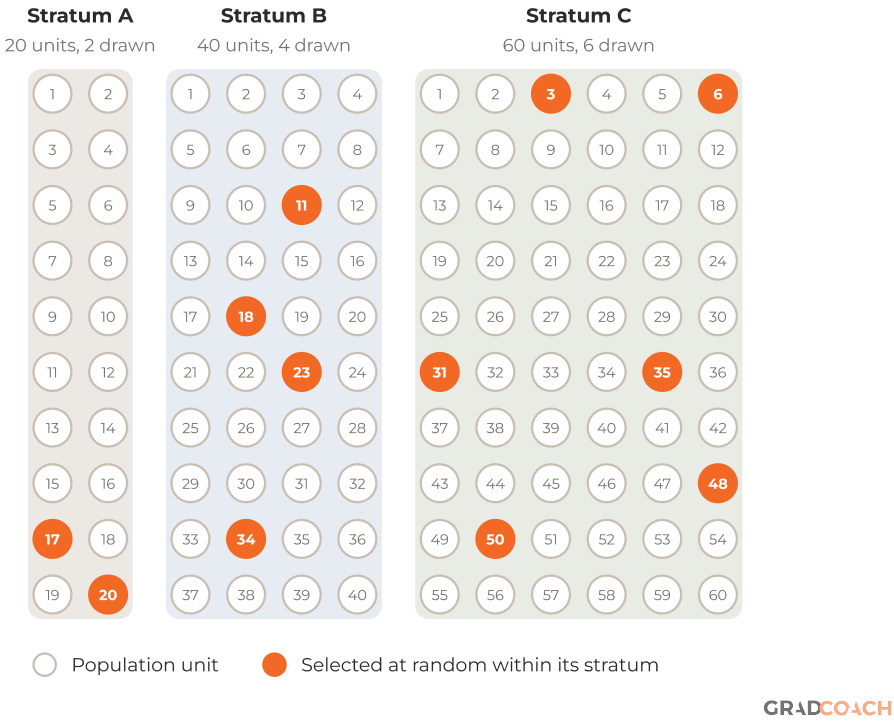


Figure 4. Stratified sampling with proportionate allocation. From Jansen (2026h), CC BY 4.0.

Allocation need not be proportionate. Consider a hospital whose staff are 80% nurses and 20% doctors. A proportionate sample of 100 would include 20 doctors, which may be too few for a comparison between the two groups; a *disproportionate* design might take 50 of each. That design supports the comparison, but describing the hospital as a whole then requires weighting the results back to the actual 80:20 composition (Kish, 1995). The allocation should therefore follow the study's purpose: disproportionate when subgroups are compared, and usually proportionate when a single estimate for the whole population is the aim. A disproportionate design that samples more heavily from strata whose members vary more can, however, also improve that estimate (Cochran, 1977). Either way, the methods section should state which was used, why, and how any weighting was applied.

4.3 Cluster sampling

Cluster sampling begins from groups that already exist in the population, such as schools, clinics or city blocks. Rather than sampling individuals from every group, the researcher randomly selects whole clusters and includes everyone within them (Figure 5). In this one-stage form, only a list of clusters is needed, which makes the design practical when no list of individuals exists.

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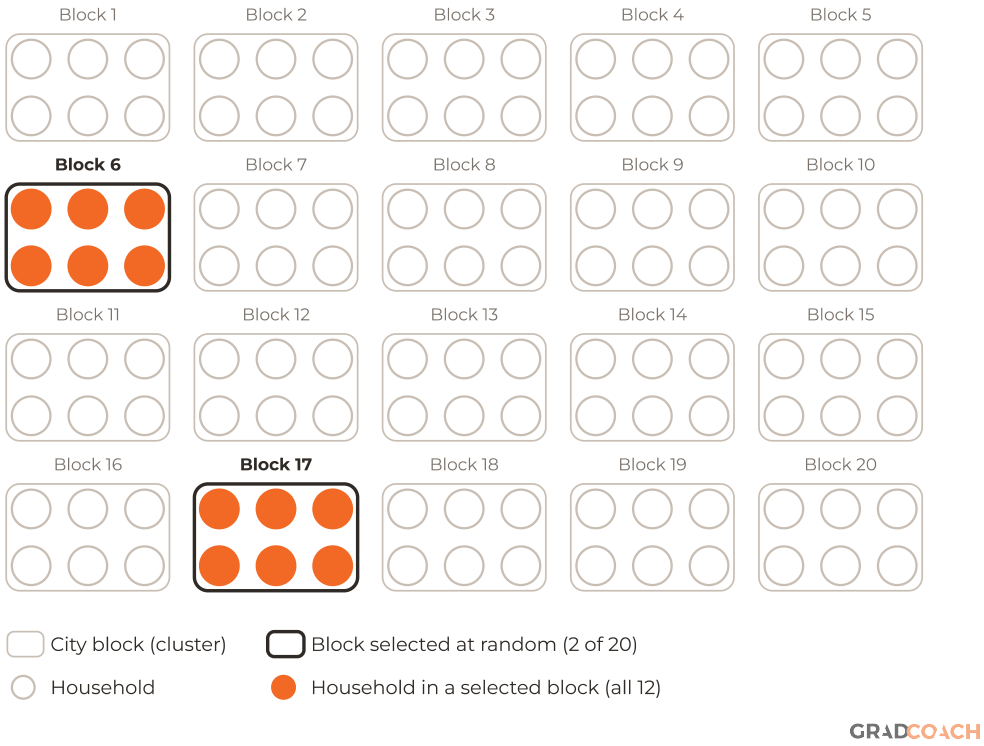


Figure 5. One-stage cluster sampling: two whole blocks drawn. From Jansen (2026a), CC BY 4.0.

Stratified and cluster sampling both divide the population into groups, but they use the groups in opposite ways: stratified sampling draws individuals from every group, whereas cluster sampling draws whole groups and omits the rest. Concentrating fieldwork in a few places usually reduces cost when a population is geographically dispersed. The trade-off is a loss of precision: results vary more from one sample to another than they would with a simple random sample of the same size (Killip et al., 2004). The design works best when each cluster resembles the population as a whole; as one university statistics guide puts it, "Cluster sampling is ideal when there are not major differences between the clusters" (National University Library, n.d.). Where members of a cluster resemble one another, as neighbors often do, drawing only two clusters, as in Figure 5, can leave the sample unbalanced.

Where clusters are large, sampling can be repeated within them, which produces a *multistage* design: districts, then blocks within districts, then households within blocks (Jansen, 2026c). Large national surveys combine several of the probability methods described above, and a study that uses such a survey as secondary data must describe its design accurately. The following extract from a doctoral dissertation in applied economics does so in three sentences:

> The outcome variables and controls are extracted from the Demographic Health Surveys (DHS) conducted in Sub-Saharan Africa between 2005 and 2019. The survey adopts a stratified two-stage cluster sampling design in which the enumeration areas are generally selected from the country's census and a sample of households is drawn from each enumeration area. The sample is representative at the national level, residence level (rural/ urban) and a regional level (state/ province).
>
> Chauhan (2024, p. 99)

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The second sentence names three layers of design: stratified (sampling proceeds separately within each stratum), two-stage (areas first, then households) and cluster (the enumeration areas). The third states the levels at which the sample is representative. A study using survey data it did not collect should give its readers the same information: who designed the sample, how it was drawn and which populations it represents.

4.4 Systematic sampling

Systematic sampling selects every kth unit on a list, beginning from a random point within the first interval (Cochran, 1977). The interval k is the population size divided by the required sample size. For a numbered list of 120 people and a sample of 8, k = 120 ÷ 8 = 15; with a random start of 11, the sample comprises units 11, 26, 41, 56, 71, 86, 101 and 116 (Figure 6).

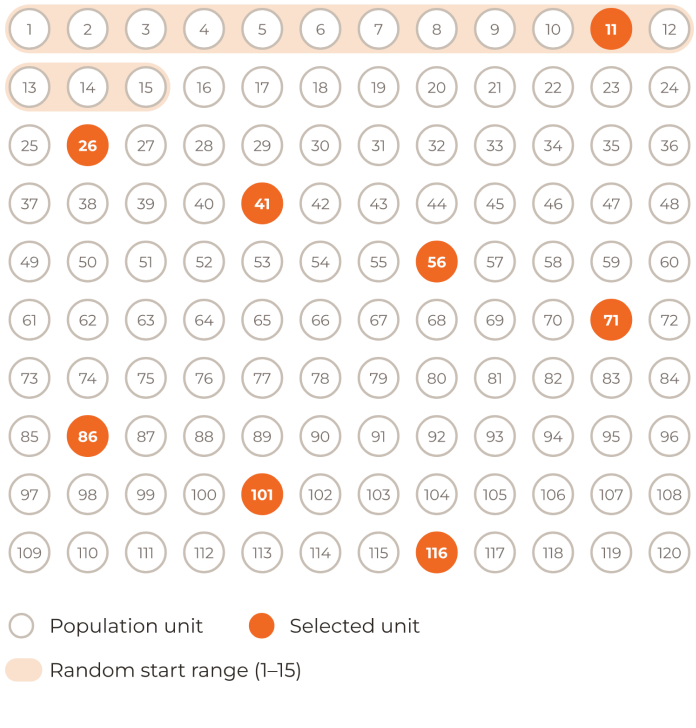


Figure 6. Systematic sampling: interval 15, random start 11. From Jansen (2026i), CC BY 4.0.

The random start is what gives every unit a chance of selection and makes the method a probability design; a fixed starting point, or one outside the first interval, removes that property. The list need not be shuffled, but it must not contain a pattern that repeats in step with the interval. If a staff list ran one manager followed by fourteen team members, an interval of 15 would land on the same position in every team, yielding every manager or none. Where a list has such an order, it should be shuffled first, or simple random sampling used instead.

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5. Non-Probability Sampling Methods

None of the four methods below gives every member of the population a known chance of selection, so none supports statistical generalization. A strong non-probability sample differs from a weak one in how clearly the researcher explains who was chosen and why.

5.1 Purposive sampling

Purposive sampling, also called judgment, selective or subjective sampling, selects participants deliberately because they hold the knowledge or experience the research questions require (Palinkas et al., 2015; Figure 7). It is more demanding than it appears. Novice nurse researchers tend to regard it as either simple or too difficult (Tuckett, 2004, as cited in Campbell et al., 2020), and may fall back on convenience sampling (Section 5.2) for the wrong reasons (Campbell et al., 2020).



Figure 7. Purposive sampling: 8 chosen from 14 who fit the criteria. From Jansen (2026d), CC BY 4.0.

For example, a study might compare what retains a retailer's most loyal customers with what deters its occasional ones. A random sample would mostly return customers in between, so the study would recruit deliberately from both extremes. Expert panels, such as those in Delphi studies, are likewise selected against written criteria rather than at random. Because the researcher's judgment shapes the sample, the method is open to researcher bias, and the safeguard is to make that judgment visible by recording the selection criteria and the sources of participants. The following extract records the expert sample for an international survey in a public health dissertation on health technology reassessment (HTR) and knowledge translation (KT):

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> HTR and KT experts were selected through purposive and snowball sampling. Names were initially derived through the KT Canada website, Health Technology Assessment international (HTAi) Disinvestment Interest group, authors of relevant publications, and in consultation with other experts.
>
> Esmail (2020, p. 134)

Each source of names is specific enough for another researcher to follow, and the same section sets a minimum number of experts for each country or region, which shows that selection followed a plan. A sampling section should name its criteria and its sources together in the same way.

5.2 Convenience sampling

Convenience sampling takes participants who are easiest to reach: colleagues, classmates or members of the researcher's social network (Figure 8). Çetinkaya-Rundel and Hardin (2024) list it among the common pitfalls of sampling from a population: "a convenience sample, where individuals who are easily accessible are more likely to be included in the sample" (Section 2.1.4). The method is quick and inexpensive, which accounts for its frequency in student research, and it is often appropriate for piloting a questionnaire.

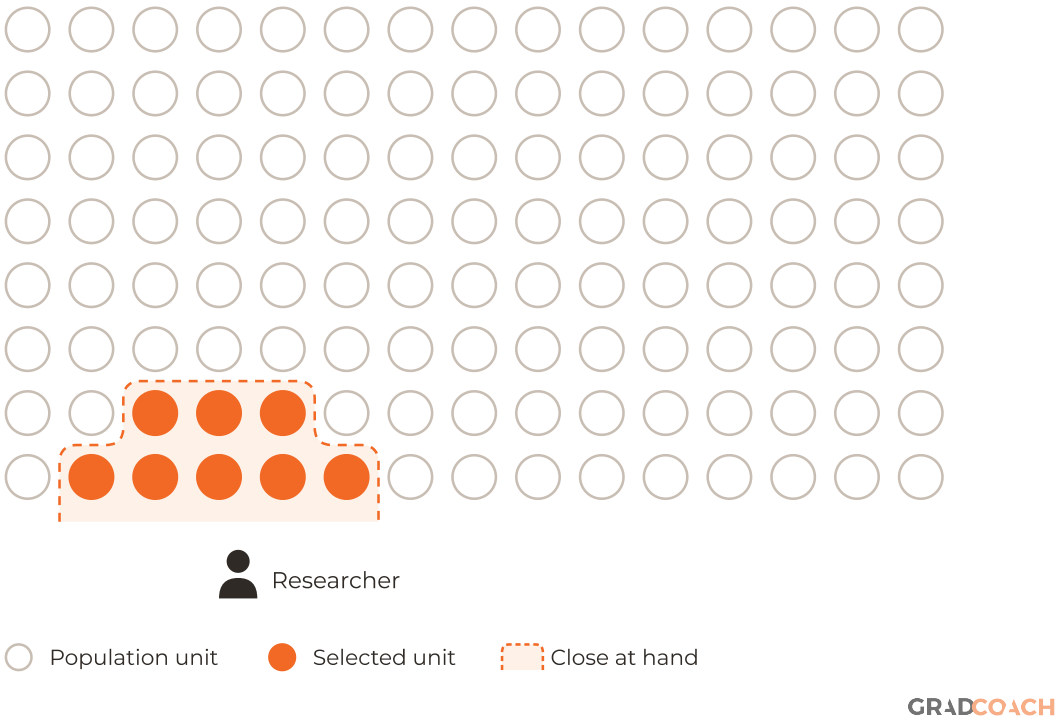


Figure 8. Convenience sampling: only the nearest units can be chosen. From Jansen (2026b), CC BY 4.0.

Its limitation is that accessible participants are rarely typical of the wider population, and nothing in the method indicates how they differ. The following doctoral study of online shoppers in Vietnam illustrates the effect:

> The survey targeted online consumers aged 18 and above in Hanoi, Vietnam. Due to the large population, non-probability sampling was used, specifically convenience and snowball sampling. The survey was distributed via Facebook, Vietnam's most popular social platform, with respondents encouraged to share it within their networks.
>
> A total of 440 valid responses were collected for final analysis. The sample primarily comprised young consumers, with 85.5% aged between 18–25, 10% between 26–35, 3.9% between 36–49, and 0.7% aged above 50.
>
> Luong (2025, p. 78)

More than four in five respondents were aged 18 to 25, which suggests that distribution through Facebook and onward sharing reached younger users far more than older ones. The dissertation's limitations section acknowledges this directly, noting that "the sample representation is limited primarily to young, urban consumers in Hanoi" (Luong, 2025, p. 113). That is the appropriate response to any convenience sample: report the composition actually obtained and confine conclusions to it.

5.3 Snowball sampling

Snowball sampling recruits through referral: initial participants, or *seeds*, nominate others, who nominate others in turn. The term comes from Goodman (1961), whose design drew its seeds at random; in applied research the seeds are usually a convenience sample, which makes the method a non-probability one (Baker et al., 2013). It is the method of choice for populations with no list from which to sample, such as people with a rare condition, members of a closed professional community, or participants who would discuss a sensitive topic only after a trusted introduction (Figure 9).

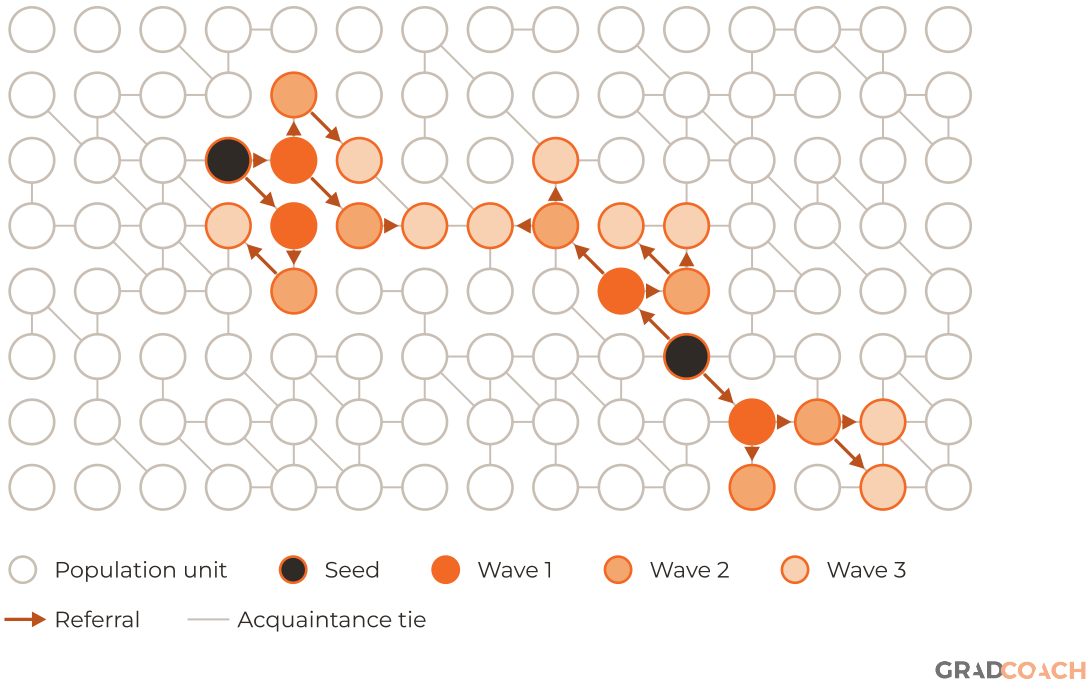


Figure 9. Snowball sampling: three referral waves from two seeds. From Jansen (2026g), CC BY 4.0.

The method's weakness is structural: only people connected to the seeds can be reached, so the sample inherits the seeds' networks and their omissions. The following extract, from a doctoral dissertation on land reform in South Africa, shows three ways of counteracting this:

> In terms of selecting interviewees from the broader pool of the South African population, I used a conventional snowball approach. I relied on a number of sources, including local research affiliates and contacts within the judiciary and development sectors, to start off in various agricultural sectors, farming communities, government agencies and activist circles. At the end of each interview I would seek out recommendations for future interviews and deliberately asked interviewees if they could recommend people with different viewpoints. Further, I used a method of cold calling employees of various organizations by email or phone when I could not access them via existing networks.
>
> Dyzenhaus (2022, pp. 51–52)

First, the design starts from several seeds in different sectors, so that no single network dominates. Second, it asks for people "with different viewpoints," so that referrals do not simply reproduce the referrer's perspective. Third, it reaches beyond existing networks through cold calls. A study using snowball sampling should describe its seeds by type and explain how the chain was widened beyond them.

5.4 Quota sampling

Quota sampling resembles stratified sampling in its first step: the population is divided into groups and a number is set for each, usually in proportion to the population. The second step differs. Each quota is filled by whatever means are available, typically with whoever is easiest to reach, rather than at random (Figure 10).

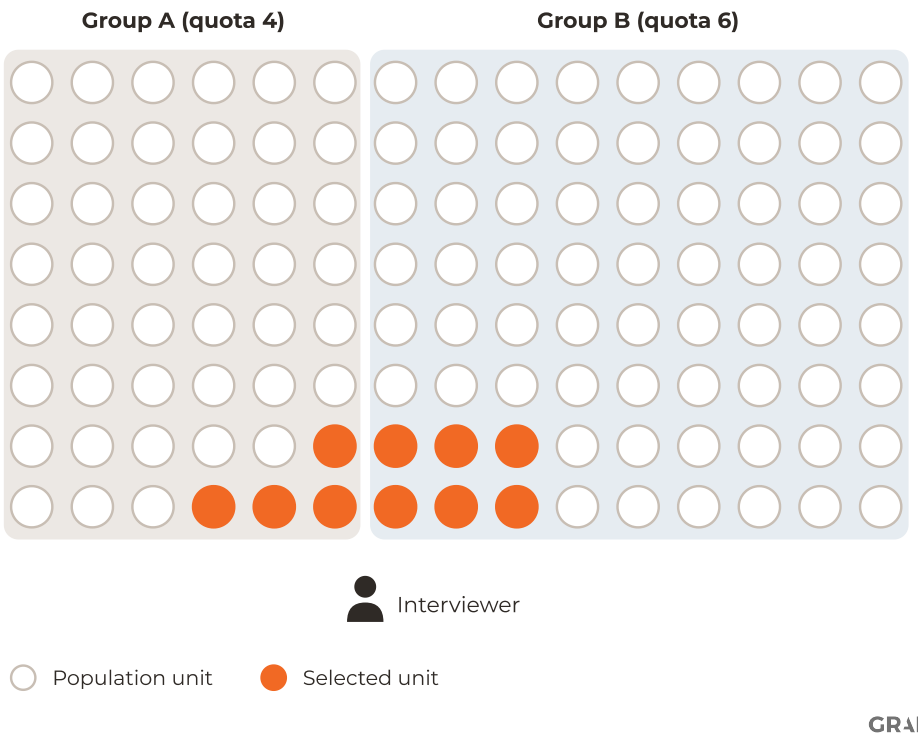


Figure 10. Quota sampling: quotas of 4 and 6, filled nearest first. From Jansen (2026e), CC BY 4.0.

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The resulting sample is balanced on the characteristics for which quotas were set, and on no others. A quota sample of shoppers may match the population's age profile exactly and still consist only of people who shop on weekday mornings, because that is when the interviewer was present. Quota sampling is suited to studies that need a balanced composition but cannot obtain a list from which to sample at random, and it should be reported as a non-probability method (Baker et al., 2013).

6. Sample Size

The reasoning behind sample size differs between the two families. For studies that will conduct statistical tests, sample size should be derived from a power analysis matched to the planned test. A power analysis identifies the smallest sample that offers an adequate probability of detecting the effect of interest. Rules of thumb circulate, such as at least five respondents per questionnaire item (Luong, 2025, cites this rule), but a power analysis is a justification a reviewer can verify (Lakens, 2022).

For interview studies, the usual justification is saturation, the point at which additional interviews cease to yield new insight (Saunders et al., 2018). Research has put approximate numbers on this point. In a systematic review of studies that tested saturation, Hennink and Kaiser (2022) concluded:

> Studies using empirical data reached saturation within a narrow range of interviews (9-17) or focus group discussions (4-8), particularly those with relatively homogenous study populations and narrowly defined objectives.
>
> Hennink & Kaiser (2022, Abstract)

Most of the studies reviewed measured code saturation, the point at which no new codes (labels attached to segments of the data) appear. Studies that assessed meaning saturation (a fuller understanding of each theme) required larger samples, as did studies that spanned several countries. Doctoral studies have tended to be larger still. Mason (2010) analyzed 560 UK and Irish doctoral theses that used qualitative interviews and found a median of 28 participants and a mean of 31. Samples of 20 and 30 were the most common, a pattern Mason interpreted as reflecting numbers fixed in advance rather than reached at saturation.

A round number without reasoning will not persuade a reviewer. A defensible plan specifies a range and the condition for stopping. For interviews, that condition is saturation demonstrated in the study's own data. For surveys, it is the figure produced by a power analysis, or by a margin-of-error calculation where only a population value is being estimated, increased to allow for non-response and attrition (participants who drop out).

7. Choosing a Method

Two considerations determine the choice: the research questions and the resources available (Figure 11). Questions about prevalence, or about whether a finding holds across a population (for example, "What proportion of first-year nurses consider leaving within a year?"), require a proba-

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bility sample. Questions about how or why people experience something ("How do first-year nurses decide whether to stay?") are usually better served by a non-probability sample selected for relevant experience.

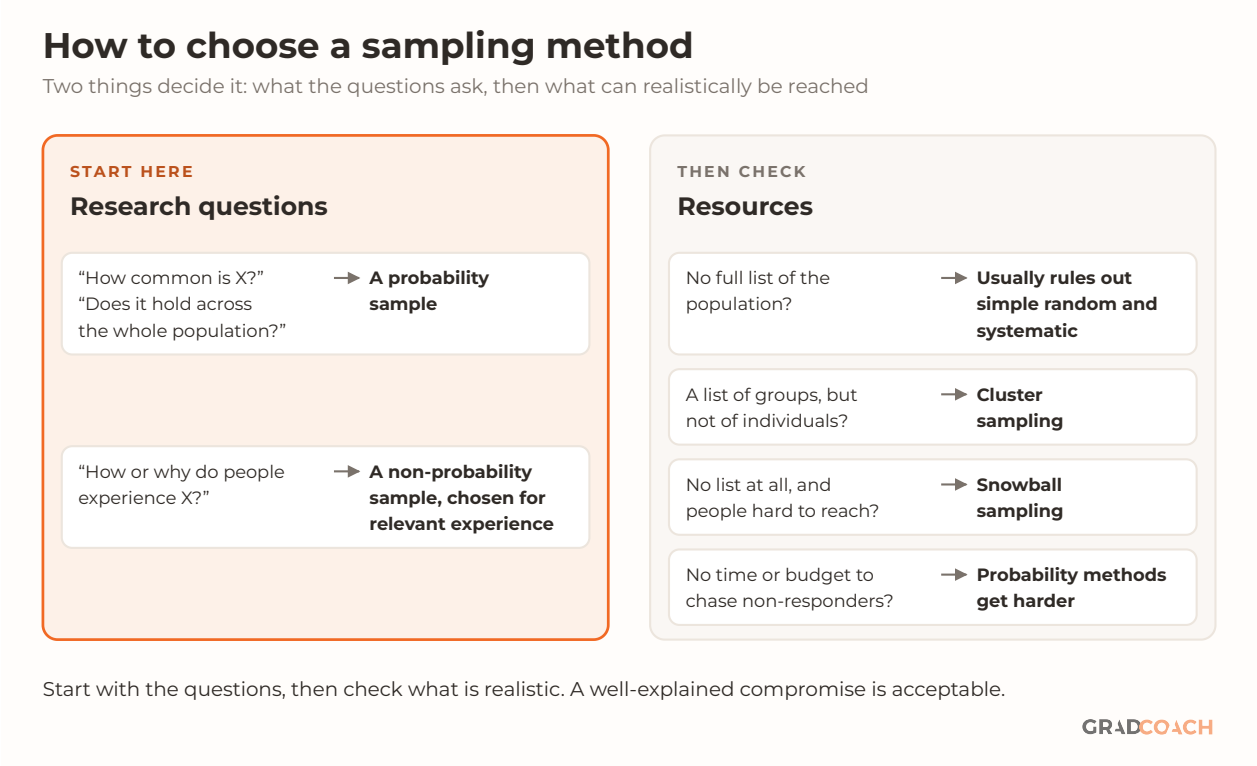


Figure 11. Choosing a sampling method: questions first, then resources.

As for resources, simple random and stratified sampling require a list of the whole population. Systematic sampling usually requires one too, although it can sometimes be applied to a flow of people instead, for example every tenth visitor through a door. Cluster sampling needs only a list of the clusters. Table 1 summarizes how each of the eight methods selects participants and the main risk that each carries.

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Table 1. The eight sampling methods compared. The first four are probability methods; the last four are not.

Method	How participants are chosen	Principal risk
Simple random	By chance, from a complete list of the population	Requires the complete list; small groups may be missed
Stratified	At random within defined subgroups	Each member's subgroup must be known in advance
Cluster	Whole groups (schools, blocks) at random	Less precise where members of a group are alike
Systematic	Every kth unit after a random start	A pattern in the list that coincides with k
Purposive	By the researcher's judgment, against stated criteria	The criteria shape the findings
Convenience	Whoever is easiest to reach	Rarely typical of the wider population
Snowball	Through referrals from earlier participants	Reaches only people linked to the seeds
Quota	Set numbers per group, filled without random selection	Balanced only on the quota characteristics

The ideal method is frequently out of reach, and most student studies settle for a compromise. The appropriate response is to adopt the strongest method that can actually be carried out and to report what that choice costs.

8. Reporting the Sampling Strategy

Three errors recur in sampling descriptions, particularly in student research. The first is **naming the route instead of the method**: "participants were recruited through social media" describes how people were reached, not how they were chosen. A shared post usually produces a convenience sample or a voluntary response sample (one made up of people who choose to respond), or a snowball sample if it is passed on, and the method should be named alongside the route. The second is **borrowing a method's name**. Theoretical sampling belongs to grounded theory (Glaser & Strauss, 1967), in which ongoing analysis determines who is sampled next; a sample chosen in advance against fixed criteria is purposive, and labeling it theoretical invites a question the researcher cannot answer. The third is **treating a number as a rule**. Figures such as twelve interviews or four hundred survey responses circulate as fixed requirements, often without the conditions their original sources set; a sample size requires the reasoning described in Section 6.

A complete sampling description anticipates the questions a reviewer or examiner would otherwise ask. It should report five elements:

1. **The population and the sampling frame:** who the study concerns, and the list or route used to reach them.
2. **The method, named and defined,** with a methodological source.
3. **The fit with the research questions,** stated in a sentence that links the two directly.

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4. **The recruitment detail:** inclusion and exclusion criteria, the means of contact, and the numbers approached and participating (von Elm et al., 2007).
5. **What the sample can and cannot support,** with any shortfall carried into the discussion of limitations.

Each of the four doctoral extracts quoted in this article covers several of these elements, and none is long.

9. Conclusion

The choice between probability and non-probability sampling determines whether a study can generalize statistically, and the research questions should decide it. Probability methods (simple random, stratified, cluster and systematic sampling) give every member of the population a known chance of selection; non-probability methods (purposive, convenience, snowball and quota sampling) select by judgment, access or referral and suit studies that value access or depth over statistical reach. In either case, the sample size requires its own justification: a power analysis for statistical tests and a saturation argument for interviews. Above all, a sampling description should state what was actually done in the method's proper terms, report the sample obtained, and limit its claims to the population that sample can represent.

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