Introductory Statistics Using SPSS

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Pub. Date: 2022
Product: Sage Research Methods
DOI: https://doi.org/10.4135/9781071878910
Methods: T-test, Descriptive statistics, Normal distribution
Keywords: population, students
Disciplines: Psychology, Mathematics
Access Date: June 27, 2024
Publisher: SAGE Publications, Inc
City: Thousand Oaks
Online ISBN: 9781071878910

Sampling

- Rationale for Sampling
- Sampling Terminology
- Representative Sample
- Probability Sampling
- Nonprobability Sampling
- Sampling Bias

Ya gots to work with what you gots to work with.

—Stevie Wonder

Learning Objectives

Upon completing this chapter, you will be able to:

- Comprehend the rationale for sampling: time, cost, feasibility, extrapolation
- Understand essential sampling terminology: population, sample frame, sample
- Derive a representative sample to facilitate external validity
- Select an appropriate method to conduct probability sampling: simple random sampling, stratified

sampling, proportionate sampling, disproportionate sampling, systematic sampling, area sampling

- Select an appropriate method to conduct nonprobability sampling: convenience sampling, purposive sampling, quota sampling, snowball sampling
- Understand techniques for detecting and reducing sample bias
- Optimize sample size

Overview—Sampling

Statistics is about processing numbers in a way to produce concise, readily consumable information. One statistic you are probably already familiar with is the average. Suppose you wanted to know the average age of students in a classroom. The task would be fairly simple—you could ask each person to write down his or her age on a slip of paper and then proceed with the calculations. In the relatively small setting of a classroom, it is possible to promptly gather the data on everyone, but what if you wanted to know the age of all enrolled students or all students in a community? Now the mission becomes more time-consuming, complex, and probably expensive. Instead of trying to gather data on everyone, as in the census survey, another option is to gather a sample. Gathering a sample of a population is quicker, easier, and more cost-effective than gathering data on everyone, and if done properly, the findings from your sample can provide you with quality information about the overall population.

You may not realize it, but critical decisions are made based on samples all the time. Laboratories process thousands of blood samples every day. On the basis of the small amount of blood contained in the test tube, a qualified health care professional can make determinations about the overall health status of the patient from whom the blood was drawn. Think about that for a moment: A few cubic centimeters of blood is sufficient to carry out the tests to make quality determinations. The laboratory did not need to drain the entire blood supply from the patient, which would be time-consuming, complicated, expensive, and totally impractical—it would kill the patient. Just as a small sample of blood is sufficient to represent the status of the entire blood supply, proper sampling enables us to gather a small and manageable bundle of data from a population of interest, statistically process those data, and reasonably comprehend the larger population from which it was drawn.

Rationale for Sampling

Moving beyond the realm of a statistics course, statistics takes place in the real world to answer real-world questions. As with most things in the real world, gathering data involves the use of scarce resources; key concerns involve the time, cost, and feasibility associated with gathering quality data. With these very real constraints in mind, it is a relief to know that it is not necessary to gather *all* of the data available; in fact, it is rare that a statistical data set consists of figures from the entire population (such as the census). Typically, we proceed with a viable sample and extrapolate what we need to know to better comprehend the larger population from which that sample was drawn. Let us take a closer look at each of these factors.

Time

Some consider time to be the most valuable asset. Time cannot be manufactured or stored—it can only be used. Time spent doing one thing means that other things must wait. Spending an exorbitant amount of time gathering data from an entire population precludes the accomplishment of other vital activities. For example, suppose you are interested in people’s opinions (yes or no) regarding the death penalty for a paper you are drafting for a course. Every minute you spend gathering data postpones your ability to proceed with the completion of the paper, and that paper has a firm due date. Additionally, there are other demands competing for your time (e.g., other courses, work, family, friends, rest, recreation). Sampling reduces the amount of time involved in gathering data, enabling you to statistically process the data more promptly and proceed with the completion of the project within the allotted time.

Another aspect of time is that some (statistical) answers are time sensitive. Political pollsters must use sampling to gather information in a prompt fashion, leaving sufficient time to interpret the findings and adjust campaign strategies prior to the election. They simply do not have time to poll all registered voters—a well-drawn sample is sufficient.

Cost

Not all data are readily available for free. Some statistical data may be derived from experiments or interviews, which involves multiple costs, including a recruitment advertising budget, paying staff members to screen and process participants, providing reasonable financial compensation to study participants, facility expenses, and so on. Surveys are not free either; expenses may include photocopying, postage, website implementation charges, telephone equipment, and financial compensation to study participants and staff members. Considering the costs associated with data collection, one can see the rationale for resorting to sampling as opposed to attempting to gather data from an entire population.

Feasibility

Data gathering takes place in the real world; hence, real-world constraints must be reckoned with when embarking on such research. Because of time and budgetary constraints, it is seldom feasible or necessary to gather data on a population-wide basis; sampling is a viable option. In the case involving the blood sample, clearly it is neither necessary nor feasible to submit the patient's entire blood supply to the lab for testing—quality determinations can be made based on well-drawn samples. In addition, if a research project focuses on a large population (e.g., all students in a school district) or a population spanning a large geographical region, it may not be feasible to gather data on that many people; hence, sampling makes sense.

Extrapolation

It turns out that by sampling properly, it is unnecessary to gather data on an entire population to achieve a reasonable comprehension of it. Extrapolation involves using sampling methods and statistics to analyze the sample of data that was drawn from the population. If done properly, such findings help us (better) understand not only the smaller (sample) group but also the larger group from which it was drawn.

Sampling Terminology

As in any scientific endeavor, the realm of sampling has its own language and methods. The following terms and types of sampling methods will help you comprehend the kinds of sampling you may encounter in scientific literature and provide you with viable options for carrying out your own studies. We will begin with the largest realm (the *population*) and work our way down to the smallest (the *sample*).

Population

The *population* is the entire realm of people (or items) that could be measured or counted. A population is not simply all people on the planet; the researcher specifies the population, which consists of the entire domain of interest. For example, the population may be defined as all students who are currently enrolled at a specified campus. Additional examples of populations could be all people who reside in a city, all people who belong to a club, all people who are registered voters in an election district, or all people who work for a company. As you might have surmised, the key word here is *all*.

Sample Frame

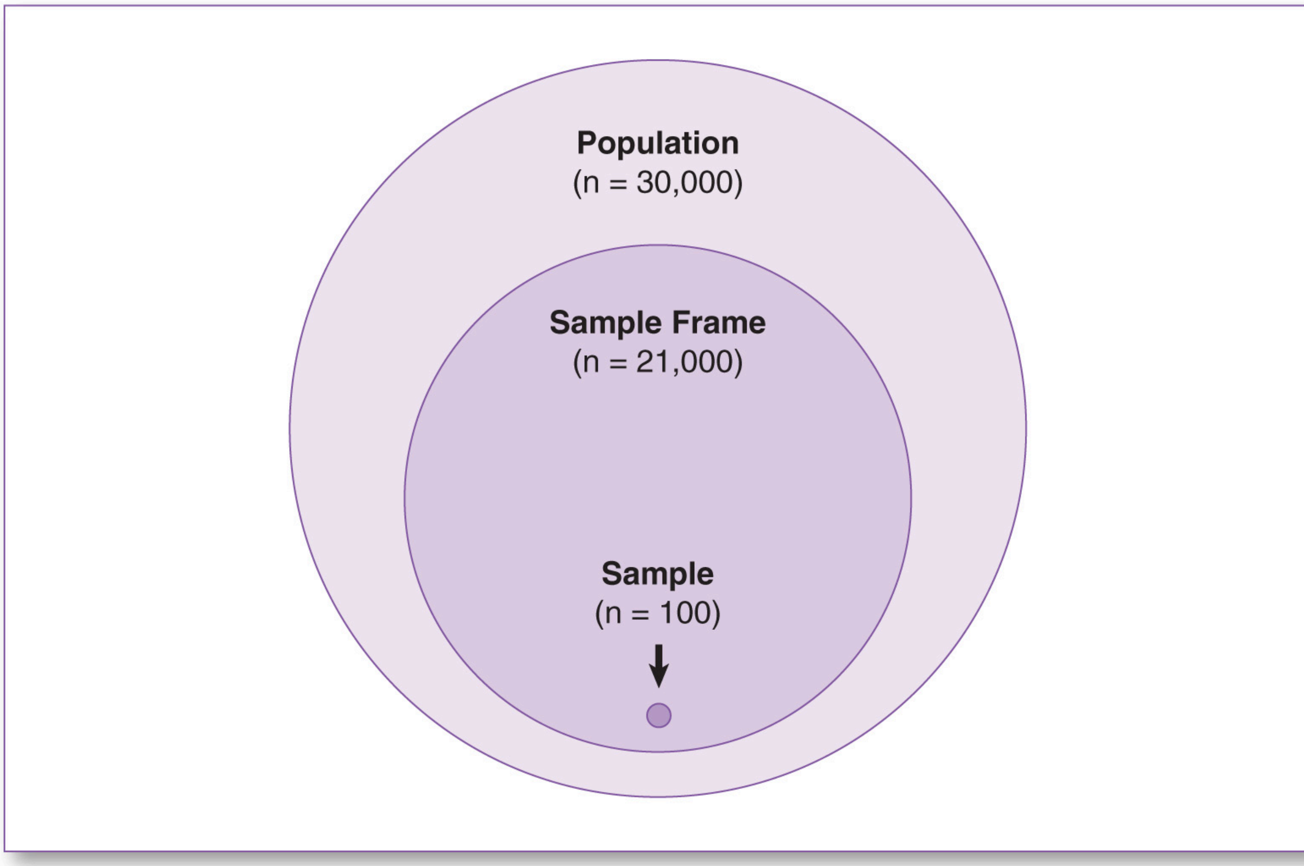
If the population you are interested in is relatively small (e.g., the 5 people visiting the public park, the 16 people who are members of a club), then gathering data from the entire population is potentially doable. More often, the population is larger than you can reasonably accommodate, or you may be unable to attain a complete list of the entire population you are interested in (e.g., all students enrolled in a school, every registered voter in an election district). The *sample frame*, sometimes referred to as the *sampling frame*, is the part of a population you could potentially access. For example, Acme University publishes a list of student names and e-mail addresses in the form of a downloadable report on the school's public website. If this list included every single student enrolled, it would represent the entire population of the school; however, students have the privilege to opt out of this list, meaning that each student can go to his or her online profile and check a box to include or exclude his or her name and e-mail address from this public roster. Suppose the total population of the university consists of 30,000 enrolled students, and 70% chose to have their names appear on this list; this would mean that the sample frame, the list from which you could potentially select subjects, consists of 21,000 students (30,000 × .70).

Sample

A *sample* is a portion of individuals selected from the sample frame. Certainly 21,000 is considerably less than 30,000, but that may still be an unwieldy amount for your purposes. Consider that your investigation involves conducting a 1-hour interview with participants and that each participant will be compensated $10 for his or her time; the subject fee budget for this study would be $210,000, and assuming you conducted back-to-back interviews for 8 hours a day, 7 days a week, you would have your data set in a little over 7 years. Considering the constraints mentioned earlier (time, cost, and feasibility), you can probably already see where this is going: (a) Is a $210,000 budget for subjects really feasible? (b) Do you really have 7 years to gather your findings? (c) Most of the students on this list will not be students 7 years from now. (d) After students graduate, their e-mail addresses may change. In this case, accessing the entire sample frame is untenable, but the sample frame is still useful; instead of attempting to recruit the 21,000 students, you may choose to gather information from a subset of 100 students from this sample frame. These 100 students will constitute the sample. Selecting a sample of 100 students from the sample frame of 21,000 means that your subject fee budget is reduced from $210,000 to $1,000, and instead of taking more than 7 years to gather the data, using the same interviewing schedule, you would have your complete data set in less than 2 weeks. In terms of time, cost, and feasibility, sampling is clearly the way to go. As for *how* to select that sample of 100 students from among the sample frame of 21,000, there are a variety of techniques covered in the sections on probability sampling and nonprobability sampling.

Just to recap, you can think of the population, sample frame, and sample as a hierarchy (Figure 2.1):

Figure 2.1 Three tiers of sampling: population, sample frame, and sample.



- The *population* is the entire realm of those in a specified set (e.g., every person who lives in a city, all members of an organization or club, all students enrolled on a campus).
- The *sample frame* is the list of those who could be potentially accessed from a population.
- The *sample* is the sublist of those selected from the sample frame whom you will (attempt to) gather data from.

Representative Sample

You may not realize it, but you already understand the notion of a *representative sample*. Suppose you are at a cheese-tasting party, and the host brings out a large wheel of cheese from Acme Dairy. You are served a small morsel of the cheese that is less than 1% of the whole cheese and, based on that, you decide if you like it enough to buy a hunk of it or not. The assumption that you are perhaps unknowingly making is that the rest of that big cheese will be exactly like the tiny sample you tasted. You are presuming that the bottom part of the cheese is not harder, that the other side of the cheese is not sharper, that the middle part of the cheese is not runnier, and so on. Essentially, you are assuming that the sample of cheese you tasted is representative of the flavor, color, and consistency of the whole wheel of cheese. This is what a representative sample is all about: The small sample you drew is proportionally representative of the overall population (or big cheese) from which it was taken. Often, it is the goal of researchers to select a representative sample, thereby facilitating *external validity*—meaning that what you discover about the sample can be viably generalized to the overall population from which the sample was drawn.

Sampling is about gathering a manageable set of data so that you can learn something about the larger population through statistical analysis. The question remains: *How do you get from the population, to the sample frame, to the actual representative sample?* Depending on the nature of the information you are seeking and the availability of viable participants and data, you may opt to use *probability sampling* or *nonprobability sampling* methods.

Probability Sampling

You can think of probability sampling as equal-opportunity sampling, meaning that each potential element (person or data record) has the same chance of being selected for your sample. There are several ways of conducting probability sampling, which include simple random sampling, systematic sampling, stratified sampling, proportionate or disproportionate sampling, and area sampling.

Simple Random Sampling

Simple random sampling begins with gathering the largest sample frame possible and then numbering each item or person (1, 2, 3, . . . 60). For this example, let us assume that there are 60 people (30 women and 30 men) on this list, and you want to recruit 10 participants (Figure 2.2); you could use SPSS to generate 10 random numbers ranging from 1 to 60. It is not essential that you perform this procedure at this time; Chapter 10 (“Supplemental SPSS Operations”) has a section that provides step-by-step instructions for generating random numbers to your specifications.

Figure 2.2 Simple random sampling. The researcher randomly selects a sample of 10 from a sample frame of 60.

Stratified Sampling

In the above example, simple random sampling rendered a sample consisting of 80% women and 20% men, which may not suit your needs. Suppose you still want a sample of 10 from the sample frame of 60, but instead of leaving the gender counts to random chance, you want to specifically control for the numbers of women and men in your sample; stratified sampling would ensure that your sample is balanced by gender. To draw a stratified sample based on gender, divide your sample frame into two lists (strata): women and men. In this case, the initial sample frame of 60 is divided into two separate strata: 30 women and 30 men. Suppose you still want to draw a (total) sample of 10; you would use simple random sampling to randomly select 5 participants from the female stratum and another 5 participants from the male stratum (Figure 2.3).

Figure 2.3 Stratified sampling. The researcher splits the sample frame into two strata, women and men, and randomly selects a sample of five from each stratum.

NOTE: Systematic sampling (which will be discussed on page 28) could also be used to make selections within each strata.

Proportionate and Disproportionate Sampling

Within the realm of stratified sampling, you can further specify if you want to gather a *proportionate* or *disproportionate* sample. Continuing with the gender stratification example, suppose you were conducting a survey of people that consists of 30 women and 10 men, and for the purposes of this survey, gender is relevant.

The first step is to split the sample frame into two strata (lists) based on gender: women and men. You then have the option to draw a proportionate sample or a disproportionate sample. To draw a proportionate sample, you would draw the same percentage (in this case, 10%) from each stratum: 3 from the 30 in the female stratum and 1 from the 10 in the male stratum (Figure 2.4).

When the count within one or more strata is relatively low, proportionate sampling will expectedly produce a sample of the stratum that may be too small to be viable; in the above case, sampling 10% from the 10 in the male strata means selecting only 1 male participant. In such instances, disproportionate sampling may be a better choice.

To gather a disproportionate sample, randomly select the same number of participants from each stratum, regardless of the size of the stratum. In this case (Figure 2.5), three are being drawn from each stratum: three women and three men. Although the sample sizes from the two strata are now equal (three from each stratum), the proportions are now different; 10% of the women have been selected, whereas 30% of the men have been selected.

Figure 2.4 Proportionate stratified sampling. The researcher randomly selects the same percentage from each strata.

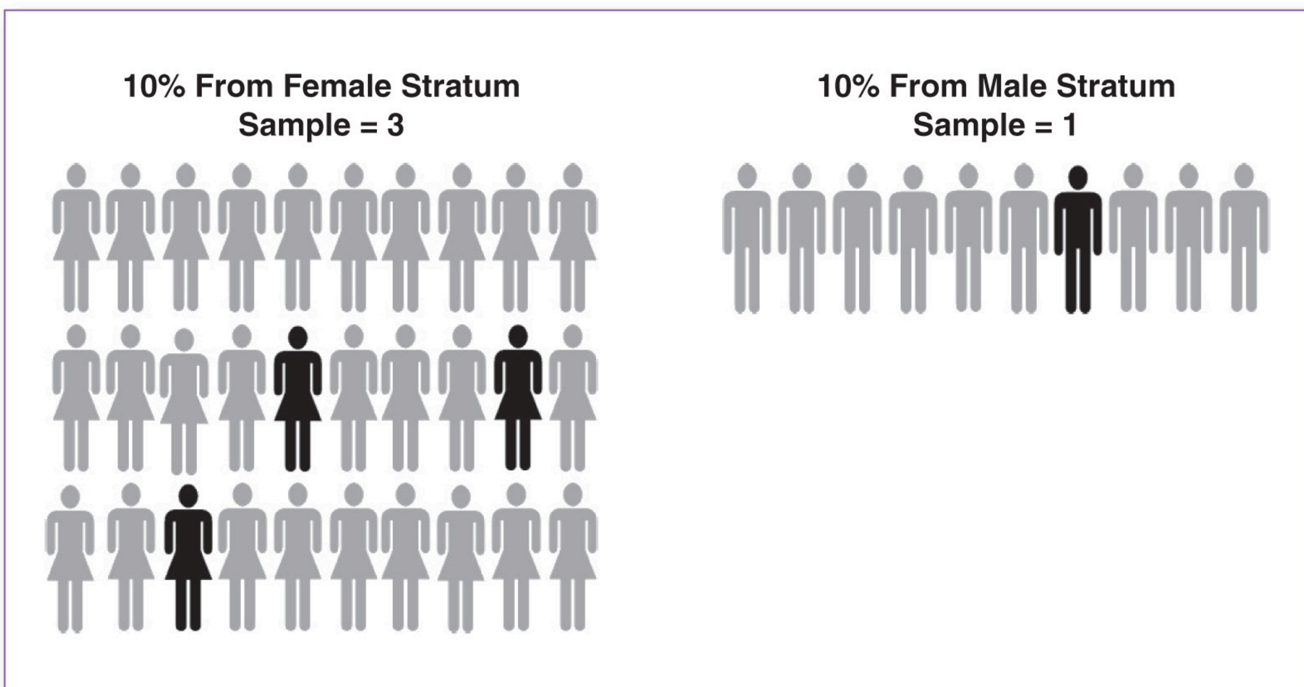
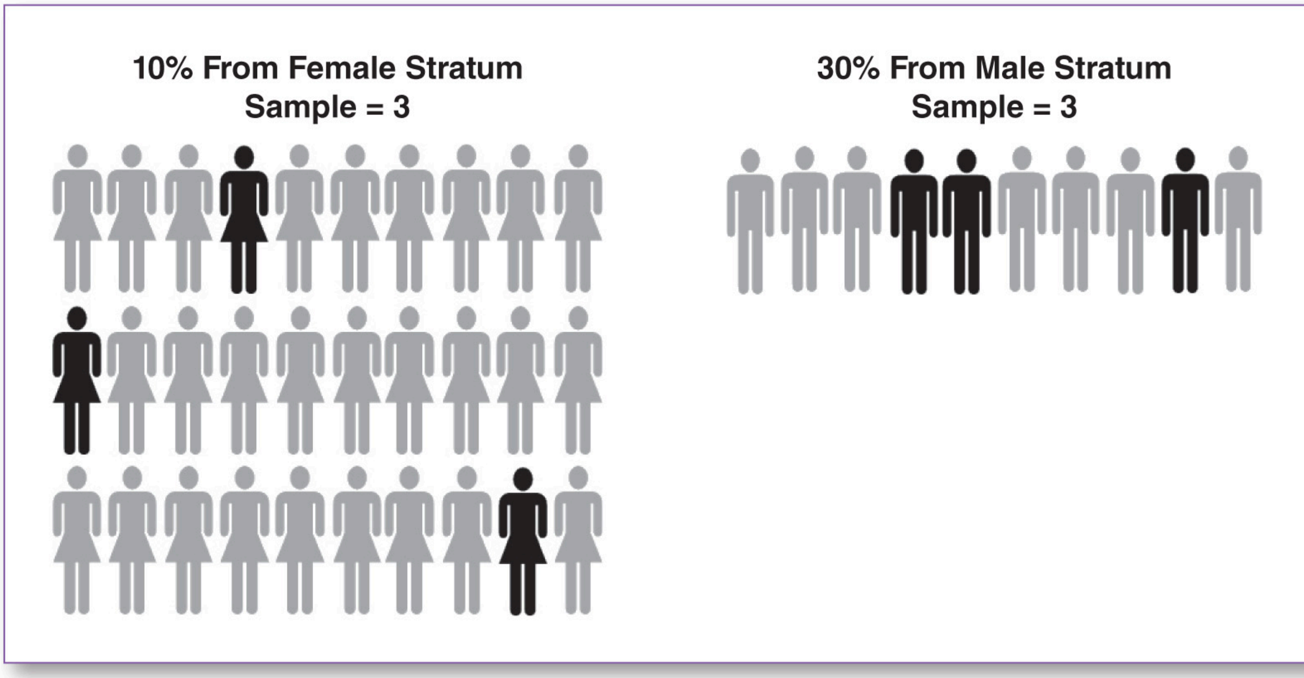


Figure 2.5 Disproportionate stratified sampling. The researcher randomly selects the same (total) number from each stratum.



Systematic Sampling

Whereas simple random sampling may produce a sample wherein the items may be drawn from similar proximity (e.g., several participants who are next to one another may all be selected), systematic sampling uses a periodic selection process that draws the sample more evenly throughout the sample frame.

Suppose you have 60 people, and you decide that the target sample size will be 15 participants. Begin by dividing the sample frame by the target sample size (60 ÷ 15 = 4); the solution (4) is the "*k*" or skip term. Next, you need to identify the start point; this will be a random number between 1 and *k*. For this example, suppose the randomly derived start point number is 3. The process begins with selecting the third person and then skips ahead *k* (4) people at a time to select each additional participant who will be included in the sample. In this case, the following 15 participants would be selected: 3, 7, 11, 15, 19, 23, 27, 31, 35, 39, 43, 47, 51, 55, and 59 (Figure 2.6).

Figure 2.6 Systematic sampling. The researcher selects a periodic sample from the sample frame: k (skip term) = 4 (k = sample frame ÷ target sample size: 60 ÷ 15 = 4). Start = 3 (start = a random number between 1 and k).

Area Sampling

Area sampling, also referred to as *cluster sampling* or *multistage cluster sampling*, is typically used when it comes to gathering samples from a geographical region or when a sample frame is not available. Since the characteristics of neighborhoods and their residents can vary substantially from block to block, it is unwise to gather data from only one region. Area sampling enables you to gather a more representative sample that spans the entire geographical region specified.

This multistage process begins with acquiring a sample frame containing a list of the domestic addresses within a given geographical domain. For example, Smalltown consists of a population of 2,000 people spanning 20 residential blocks. Your target sample size is 40 surveys. Based on these figures, calculate the number of samples that will be drawn from each block using the following formula: **Samples per block = Target sample size ÷ Blocks**:

Area Sampling

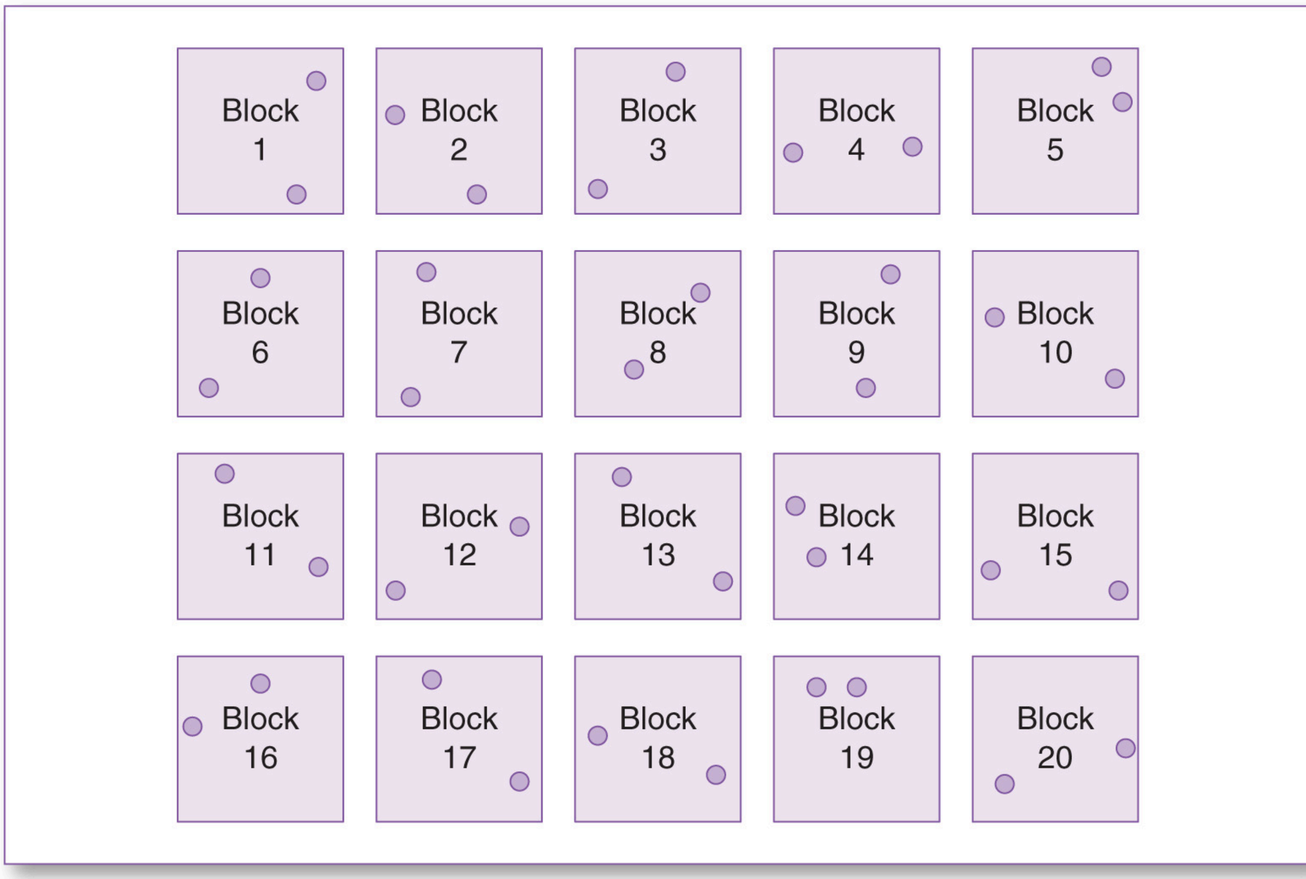
Samples per block = Target sample size ÷ Blocks
Samples per block = 40 ÷ 20
Samples per block = 2

In this case, two samples will be randomly selected from each of the 20 blocks. Next, build the block strata (Block 1, Block 2, Block 3, . . . Block 20). Each block stratum contains the address of every dwelling on that block. Finally, randomly select two addresses from each of the 20 blocks (strata) (20 blocks × 2 households per block = target sample size of 40) (Figure 2.7).

Area sampling is similar to systematic sampling, in that both are designed to help draw the sample more evenly from the sample frame as opposed to taking the chance that simple random sampling may draw too many (or too few) from any one area.

For simplicity, this example presumes uniform population density across the 20 blocks of Smalltown—that each block contains about the same number of dwellings and about the same number of people living in each dwelling. Naturally, prior to selecting the sample, it would be wise to statistically check this assumption and consider adjusting the sampling proportions to best represent the residents of Smalltown. For example, if it is found that 10% of the residents of Smalltown live on one block, then it would be appropriate to draw 10% of the overall sample from that single block.

Figure 2.7 Area sampling. The researcher will survey two households (indicated by dots) from each of the 20 blocks rendering a target sample of 40.



Nonprobability Sampling

In *probability sampling*, each item in the sample frame has an equal chance of being selected when it comes to being included in the sample. In *nonprobability sampling*, either the sample frame does not exist or the researcher does not consider it relevant to the investigation at hand.

In nonprobability sampling, the elements that will constitute the sample will not be drawn randomly from a sample frame; rather, they will have some special characteristic(s), which is not proportionally representative of the overall population. As such, *external validity*, the ability to viably generalize the findings from your sample to the overall population, is the first casualty of nonprobability sampling. Still, much can be learned from nonprobability sampling. Methods of nonprobability sampling include convenience sampling, purposive sampling, quota sampling, and snowball sampling.

Convenience Sampling

Convenience sampling, sometimes referred to as *availability sampling*, is exactly what it sounds like; the researcher recruits whomever is relevant to the line of investigation and readily accessible. For example, suppose you wanted to conduct a survey detailing the activities people engage in on weekends. You may opt to approach people who are waiting in line at an ATM and ask them if they would be willing to respond to your brief survey—essentially, your sample of participants would be *available* to you at your *convenience* (Figure 2.8).

Figure 2.8 Convenience or availability sampling. The researcher gathers data from people who are readily accessible.

Purposive Sampling

Purposive sampling is used when the characteristics the researcher is interested in are presumed to be of low prevalence in the population; in other words, since most of the people in the population would not meet the (multiple) criteria of interest, probability sampling would be an inefficient recruitment method. For example, suppose a researcher is interested in the effects a particular drug has on patients undergoing radiation therapy. To be a viable participant in this study, each individual must meet all of the following criteria:

Participant Eligibility Criteria

- ☑ Between 18 and 65 years old
- ☑ Diagnosed with cancer
- ☑ Set to begin radiation therapy
- ☑ The prescribed course of radiation therapy consists of three to five treatments
- ☑ Willing to take an experimental drug or placebo
- ☑ Not using any nonprescribed medications

Purposive sampling may involve one or several criteria for participant selection. In this case, all six criteria must be met in order for an individual to be a potential participant. Clearly, it would be virtually impossible to encounter a sufficient number of individuals who meet all of these criteria simply by chance, as would be used in probability sampling. As you have likely surmised by now, each time an additional criterion is added in purposive sampling, the potential participant pool shrinks.

Quota Sampling

Quota sampling is typically used when a prompt response is needed from the population. In quota sampling, one or several attributes are identified, and quotas are set for each. For example, suppose you are interested in the number of sleep hours per night among those who smoke and those who do not smoke, and you set the following quotas: 20 smokers and 20 nonsmokers (Figure 2.9). Once the quota is met for a group, no further data will be collected for that group. Suppose after the first hour of gathering data in a public park, you have completed surveying 15 smokers and 20 nonsmokers; at this point, you would stop attempting to gather data from nonsmokers, even if they actively volunteered, since that quota has been satisfied. You would continue your efforts to gather data from an additional 5 smokers, at which point you could (immediately) process your data.

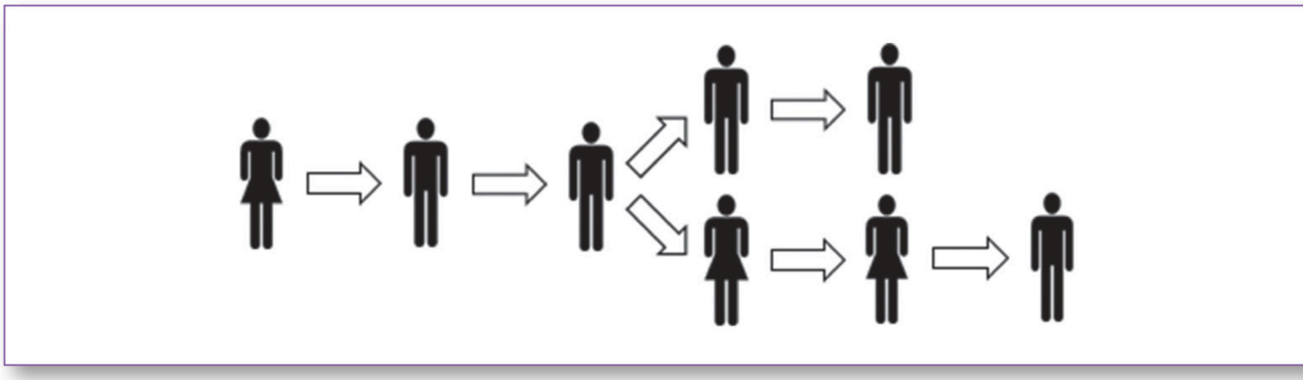
Figure 2.9 Quota sampling. The researcher recruits the first 20 participants (from each stratum).

Snowball Sampling

The term *snowball sampling* comes from the (cartoon) notion that if you roll a small snowball downhill from the top of a snowy mountain, it will pick up more snow as it rolls along, ultimately amassing into a giant snowball. When it comes to snowball sampling, consider the proverb: *Birds of a feather flock together.*

Snowball sampling is useful when viable participants are scarce or difficult to readily identify. For example, suppose you are conducting a study of people who use a wheelchair, and by luck, you find someone in a wheelchair who is willing to participate in your study. After administering your survey or experiment, you courteously ask this person if he or she knows of anyone else who uses a wheelchair who might be interested in taking this survey. You would then follow up with these referrals and progressively ask each following participant for his or her list of referrals, and so on—hence, the sample snowballs up. Referrals may lead to one or more direct sources (e.g., their friends, family, colleagues) or indirect sources (e.g., a wheelchair repair shop, a wheelchair accessory website, a rehabilitation center). Figure 2.10 depicts an example of snowball sampling, wherein the first suitable participant refers you to the second participant, the second person refers you to the third, the third directs you to two more people, and so on.

Figure 2.10 Snowball sampling. The researcher requests referrals from each participant.



Unlike the wheelchair example, the sample you are interested in may need to be drawn from an *invisible* or a *hidden* population. This does not mean that these individuals are literally invisible or in hiding; it merely means that the feature(s) you are interested in is not readily observable. For instance, such individuals may be invisible in that upon casual observation, they simply possess no identifying characteristics that would suggest that they meet your research criteria (e.g., single parent, bisexual, dyslexic, musician). Alternatively, some individuals deliberately hide the fact that they would meet the criteria for your research because revealing such information could have legal consequences (e.g., undocumented immigrants, involvement in criminal activities) or be embarrassing (e.g., peculiar obsessions, fetishes, unpopular belief systems, stigmatized disease or disorder, uncommon interests).

In any case, if you are fortunate enough to find one such person and are able to establish a professional rapport with a genuinely nonthreatening and nonjudgmental demeanor, snowball sampling may lead you to other suitable subjects.

Sampling Bias

Sampling bias occurs, perhaps unintentionally, when participants with certain characteristics are more (or less) likely to be selected. Such bias can corrupt the external validity of the findings. Depending on the methods used to identify potential participants or gather the sample, sampling bias can be a concern. For example, while it may seem reasonable to administer a survey via the Internet, this method would preclude individuals who are not computer savvy or do not have access to the Internet.

Recruitment location can also introduce survey bias; imagine the bias your data would be subject to if you were to post recruitment flyers (only) in a women's locker room, a sports bar, the lobby of a technology company, a liquor store in an impoverished neighborhood, and so forth. Such strategies would clearly be inappropriate unless you were deliberately seeking to sample and comprehend individuals who frequent those domains.

It may not be possible to completely control for sample bias in every situation, but awareness of this potential confound can be helpful when considering the credibility of the research of others and in designing and implementing your own investigations.

Optimal Sample Size

When it comes to determining the optimal sample size, there are disadvantages to samples that are too small or too large. Samples that are too small can produce unstable statistical findings, wherein a slight change in one or several scores could radically alter the statistical outcome. On the other hand, sample sizes that are too large involve spending more time, money, and effort to gather the data, as well as unnecessarily placing additional subjects at potential risk. The process of determining an optimal sample size is managed by *power calculations*. Each statistical test has its own set of power calculation equations. Although this text does not formally cover such calculations, the **Pretest Checklists** included in future chapters specify the minimum sample size necessary to produce robust statistical results. As a rule of thumb, when it comes to sample sizes, it is better to have too many than too few.

Good Common Sense

When it comes to sampling, keep in mind that the quality of your statistical findings is dependent on the quality of the data gathered and from whom it was gathered. Methodological errors in sampling can produce misleading findings. For example, consider the relative ease of assembling and deploying a web-based survey; without careful consideration and control, your survey may attract inappropriate responders who may offer less-than-genuine responses, possibly more than once. Make it a point to best target a sample that suits the desired characteristics of your study. Additionally, anything you can do to administer your data collection in an environment that has the fewest distractions will help enhance the quality of your findings.

Key Concepts

- Rationale for sampling
    - Time
    - Cost
    - Feasibility
    - Extrapolation
- Population
- Sample frame
- Sample
- Representative sample
- External validity
- Probability sampling
    - Simple random sampling
    - Stratified sampling
        - Proportionate sampling
        - Disproportionate sampling
    - Systematic sampling
    - Area sampling
- Nonprobability sampling
    - Convenience or availability sampling
    - Purposive sampling
    - Quota sampling
    - Snowball sampling
- Sampling bias
- Optimal sample size

Practice Exercises

Exercise 2.1

Explain the rationale for sampling in terms of:

a. Time
b. Cost
c. Feasibility
d. Extrapolation

Exercise 2.2

Define the following terms and provide an example for each:

a. Population
b. Sample frame
c. Sample
d. Representative sample

Exercise 2.3

A school is considering building a new library, which would involve a 1% tuition increase and take 2 years to complete. The school has selected you to conduct a survey of students to gather opinions regarding funding the new library. You will use simple random sampling.

a. Define the population.
b. Define the sample frame.
c. Explain how you would select the sample.
d. Explain how you would gather the data.

Exercise 2.4

An Internet provider has commissioned you to conduct a customer satisfaction survey, providing you with a list of all its subscribers containing their names, phone numbers, and e-mail addresses. You will use systematic sampling.

a. Define the population.
b. Define the sample frame.
c. Explain how you would select the sample.
d. Explain how you would gather the data.

Exercise 2.5

A public library wants to determine the research needs of children and adults who access the reference section. You will use stratified sampling.

a. Define the population.
b. Define the sample frame.
c. Explain how you would select the sample.
d. Explain how you would gather the data.

Exercise 2.6

Prior to building a factory in Cityville, Acme Corporation wants to conduct a survey of the residents. They provide you with a list of the addresses covering the 300 blocks of Cityville. You will use area sampling.

a. Define the population.
b. Define the sample frame.
c. Explain how you would select the sample.
d. Explain how you would gather the data.

Exercise 2.7

An amusement park wants to assess how much money its patrons intend to spend at the park today (aside from the price of admission). You will use availability sampling.

a. Explain how you would select the sample.
b. Explain how you would gather the data.

Exercise 2.8

A learning lab has commissioned you to administer a survey of people with dyslexia. You will use snowball sampling.

a. Explain how you would select the sample.
b. Explain how you would gather the data.

Exercise 2.9

Acme Bus Company has selected you to conduct a survey of their riders. They want data on 50 minors (younger than 18 years) and 100 adults (18 years or older). You will use quota sampling.

a. Explain how you would select the sample.
b. Explain how you would gather the data.

Exercise 2.10

A community tutorial program is recruiting students to participate in free tutoring. Students must live within the school district, be younger than 18 years, and be available 3 days a week from 3:30 to 5:00 p.m. You will use purposive sampling.

a. Explain how you would select the sample.
b. Explain how you would gather the data.

https://doi.org/10.4135/9781071878910