

Chapter 7

Answers to Study Questions

7-1. What type of sampling produces representative samples?

Random sampling techniques, in particular, equal probability selection methods.

7-2. What is a representative sample, and when is it important to obtain a representative sample?

A representative sample is a sample that resembles the total population. It is important to use a sampling method that produces representative samples when your goal is to understand the characteristics of a population based on study of a sample (i.e., when you want to directly generalize from your sample to your population).

7-3. What is the difference between a statistic and a parameter?

A statistic is a numerical characteristic of a sample. A parameter is a numerical characteristic of a population. To see some commonly used symbols, take a look at the symbols in Table 16.1:

■ **TABLE 16.1**

A List of Symbols Used
for Statistics and
Parameters

Name	Sample Statistic	Population Parameter
Mean	\bar{X}	μ (mu)
Variance	SD^2	σ^2 (sigma squared)
Standard deviation	SD	σ (sigma)
Correlation	r	ρ (rho)
Proportion	p	π (pi)
Regression coefficient	b	β (beta)

Note: Statistics are usually symbolized with Roman letters and parameters with Greek letters.

Even though the above table is from a later chapter, I thought I'd let you peek at it now because it shows how we also use different symbols for statistics and parameters.

7-4. What is a sampling frame?

It's the list of all the elements or all the people in a population. Here is the one we used in the chapter (which by the way has age and gender included even though that information would not be included in a real sampling frame; we included age and gender so that you could select some samples and then do some calculations on age and gender):

■ **FIGURE 7.2** A sampling frame with information on gender and age included^a

Number	Name	Age	Number	Name	Age	Number	Name	Age
01	Johnny Adams (M)	64	21**	Scott House (M)	21	41	Beth Sanders (F)	63
02*	Fred Alexander (M)	18	22	Jan Hoffman (F)	60	42*	Lena Schmitt (F)	33
03**	Kathy Anderson (F)	57	23	Robert Johnson (M)	43	43	Cindy Scott (F)	31
04	Larry Barnes (M)	30	24	John Jones (M)	18	44	Sam Shepherd (M)	20
05	Hasem Basaleh (M)	38	25	John Locke (M)	52	45**	Max Smart (M)	47
06*	Tom Baxter (M)	31	26	Carlton Lawless (M)	35	46	Rhonda Smith (F)	23
07*	Barry Biddlecomb (M)	52	27*,**	Pam Mackey (F)	35	47	Kin Sullivan (F)	29
08	Don Campbell (M)	42	28	Ronald May (M)	20	48	Jimmy Thompson (M)	42
09**	Martha Carr (F)	21	29	Mike McNuty (M)	64	49	Susan Tyler (F)	23
10*	Eugene Davis (M)	21	30*	John Mills (M)	19	50	Lisa Turner (F)	57
11	Marion Dunn (F)	55	31	Doug Morgan (M)	33	51**	Velma Vandenberg (F)	43
12	James East (M)	44	32	Jean Neal (F)	33	52	Richard Viatle (M)	20
13	Greg Ellis (M)	50	33**	Anh Nguyen (M)	40	53*	Larry Watson (M)	26
14	Alex Evans (M)	65	34	David Payne (M)	57	54	Melvin White (M)	29
15**	Donna Faircloth (F)	27	35	Susan Poole (F)	28	55	Mark Wiggens (M)	46
16*	Barbara Flowers (F)	37	36	Brenda Prine (F)	38	56	Leon Wilson (M)	31
17	Kirk Garner (M)	37	37	Andrea Quinn (F)	30	57**	Andrew Young (M)	39
18*	Marie Gaylord (F)	46	38	Mohamed Rashid (M)	64	58	Hun Yu (F)	51
19	William Gilder (M)	30	39**	Anneke Reeves (F)	32	59	Alex Zellars (F)	42
20	Mark Harris (M)	63	40	Charlie Rogers (M)	46	60	Ellen Zimmer (F)	46

^aData on variables such as age and gender are usually not included in a sampling frame. Data are obtained after they are collected from the sample respondents. To do a couple of calculations, data on age and gender are provided in the columns and parentheses.

*Elements selected in simple random sampling example discussed in the text.

**Elements selected in systematic sampling example discussed in the text.

Some additional examples of sampling frames are phone books, college student directories, directories of members of an association, a list of all the teachers in your county, etc. Note that some sampling frames are better than others; for example, the phone book excludes many people (that's why a special technique called random digit dialing is used to obtain telephone samples rather than relying on the phone book).

7-5. How do you select a simple random sample?

There are several ways: the hat model, a computer random number generator, and a table of random numbers. In the lecture there is a link to a random number generator that you can use. In the book chapter, we relied on the table of random numbers (provided in Figure 7.1).

7-6. What do all of the “equal probability selection methods” (i.e., EPSEM) have in common?

Each member of the population has an equal chance of being selected into the sample in each of these selection methods. By the way, note that simple random sampling is not the only equal probability sampling method.

7-7. What are the three steps for selecting a systematic sample?

First, determine the sampling interval; second, select a random starting point between one and k ; third, select every k^{th} element (including and starting with the element selected in step two). Note that our definition of systematic sampling includes these steps in it.

7-8. How do you select a stratified sample?

First divide your sampling frame into subpopulations based on one or more stratification variable. Then you take random samples from each of these subpopulations.

- The sample sizes from the subpopulations will depend on whether you are using proportional stratified sampling or disproportional sampling.

7-9. What is the difference between “proportional” and “disproportional” stratified sampling?

In both types, the sampling frame, first, is divided into subpopulations.

- In proportional stratified, the sample proportions are made to be the same as the population proportions on the stratification variable(s).
- In disproportional stratified sampling, the sample proportions are made to be different from the proportions on the stratification variable(s).
- For example if gender is your stratification variable and the population is composed of 75% females and you want a sample of 100 people, then you would randomly select 75 females and 25 males. In disproportional stratified sampling you might instead select 50 males and 50 females from this same population. In the first case the percentages are proportional; in the second case they are not proportional.

7-10. When might a researcher want to use cluster sampling?

When the population is widely dispersed and you must visit the people in your sample (e.g., for in-person interviews).

7-11. Are convenience samples used very often by experimental researchers?

Yes, believe it or not, they are used most of the time in experimental research, even in strong experimental research! This, by the way, is not a problem if the experiment has random assignment and is replicated in different places at different times with different people.

- Remember that the primary purpose of an experiment is make statements about cause and effect. Making statistical generalizations to populations is of secondary importance for individual experimental studies.
- In chapter 8, this difference will be discussed under the terms internal validity (making valid causal statements) and external validity (making generalizations). The bottom line will be that random assignment is very important for internal validity and random selection is very important for external validity.

7-12. If your goal is to generalize from a sample to a population, then which is more important: random selection or random assignment?

Random selection is more important in this case because you need a representative sample in order to generalize from that specific sample to the population. Note that random selection and random assignment have different purposes:

- random selection is used to obtain a sample that resembles the population (i.e., to obtain a representative sample).
- random assignment is used to create groups that are similar to one another.

7-13. If your population size is 250,000, then how many participants will you need, at a minimum, for your research study? (Hint: Look at Figure 7.5).

You would need 384 people according to the figure.

7-14. Sampling in qualitative research is similar to which type of sampling in quantitative research?

It is similar to purposive sampling. Here is a list of the different types:

- Maximum variation sampling (purposively selecting a wide range of cases)
- Homogeneous sample selection (selecting a small and homogeneous case or set of cases for intensive study)
- Extreme-case sampling (identifying the extremes or poles of some characteristic and then selecting cases representing these extremes for examination)
- Typical-case sampling (selecting what are believed to be average cases)
- Critical-case sampling (selecting what are believed to be particularly important cases)
- Negative-case sampling (selecting cases that disconfirm the researcher's expectations and generalizations)
- Opportunistic sampling (selecting cases when the opportunity arises)
- Mixed purposeful sampling (mixing of more than one of the above sampling strategies).