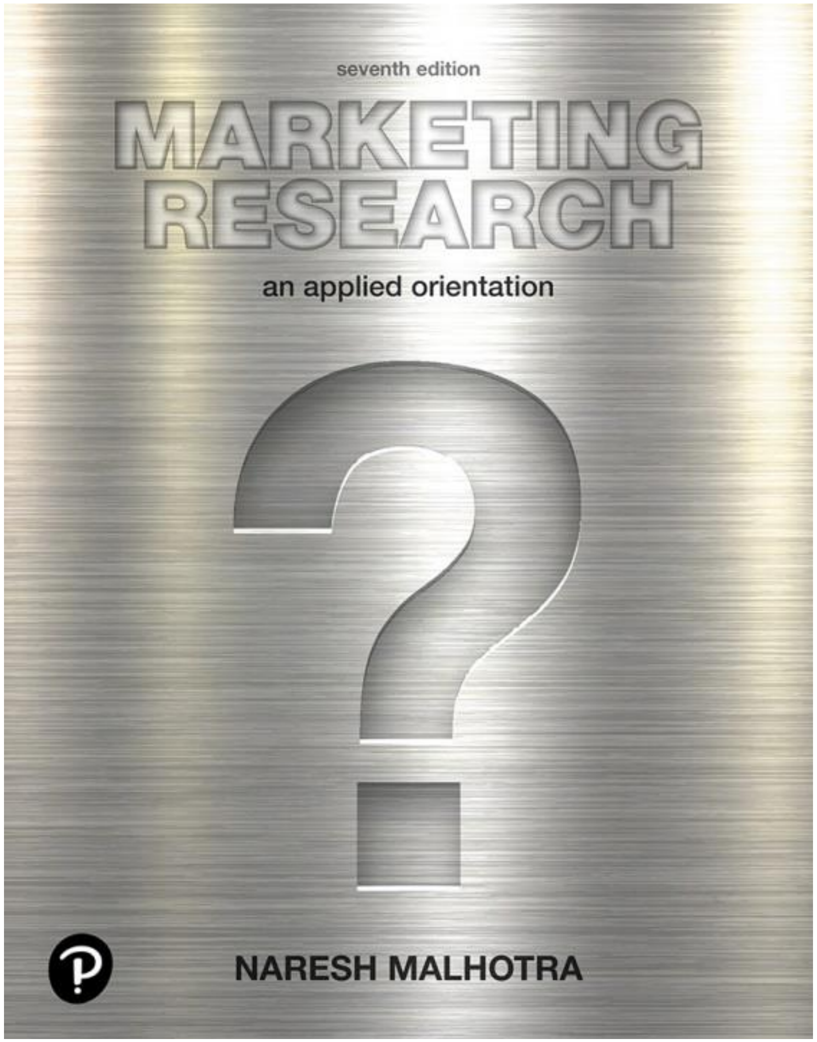
Marketing Research: An Applied Orientation

Seventh Edition



Chapter 11

Sampling: Design and Procedures

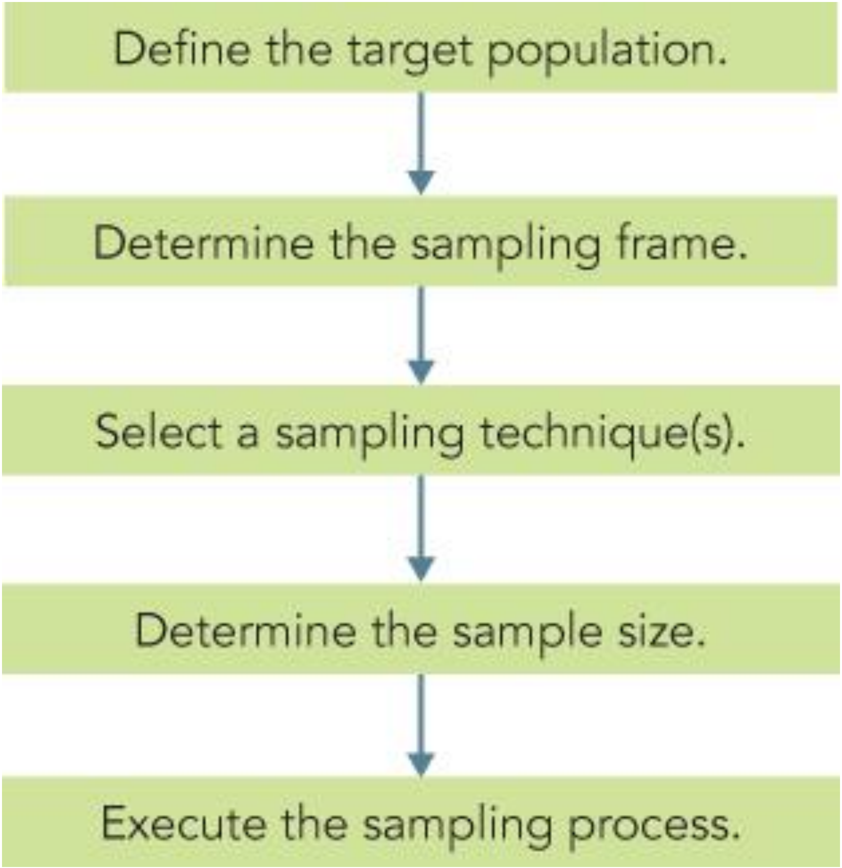
Sample Vs. Census

Table 11.1 Sample Versus Census

	Conditions Favoring the Use of	
	Sample	**Census**
1. Budget	Small	Large
2. Time available	Short	Long
3. Population size	Large	Small
4. Variance in the characteristic	Small	Large
5. Cost of sampling errors	Low	High
6. Cost of nonsampling errors	High	Low
7. Nature of measurement	Destructive	Nondestructive
8. Attention to individual cases	Yes	No

The Sampling Design Process

Figure 11.1 The Sampling Design Process



Define the Target Population (1 of 2)

The target population is the collection of elements or objects that possess the information sought by the researcher and about which inferences are to be made. The target population should be defined in terms of elements, sampling units, extent, and time.

- An **element** is the object about which or from which the information is desired, e.g., the respondent.
- A **sampling unit** is an element, or a unit containing the element, that is available for selection at some stage of the sampling process.
- **Extent** refers to the geographical boundaries.
- **Time** is the time period under consideration.

Determine the Sample Size

Important qualitative factors in determining the sample size are:

- the nature of the research
- the number of variables
- the nature of the analysis
- sample sizes used in similar studies
- incidence rates
- completion rates
- resource constraints

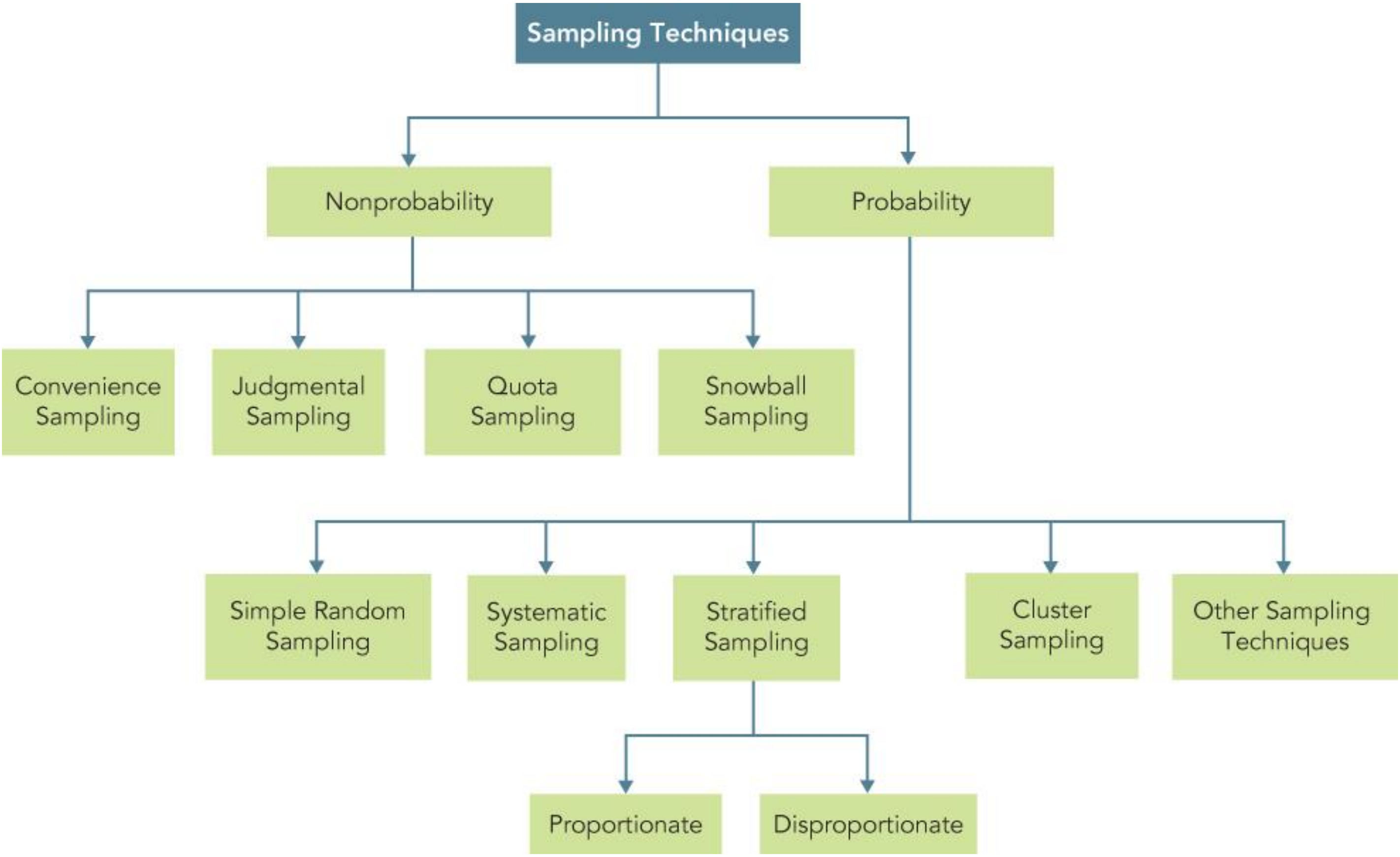
Sample Sizes Used in Marketing Research Studies

Table 11.2 Sample Sizes Used in Marketing Research Studies

Type of Study	**Minimum Size**	**Typical Range**
Problem identification research (e.g., market potential)	500	1,000–2,500
Problem-solving research (e.g., pricing)	200	300–500
Product tests	200	300–500
Test-marketing studies	200	300–500
TV/radio/print advertising (per commercial or ad tested)	150	200–300
Test-market audits	10 stores	10–20 stores
Focus groups	2 groups	6–15 groups

Classification of Sampling Techniques

Figure 11.2 A Classification of Sampling Techniques



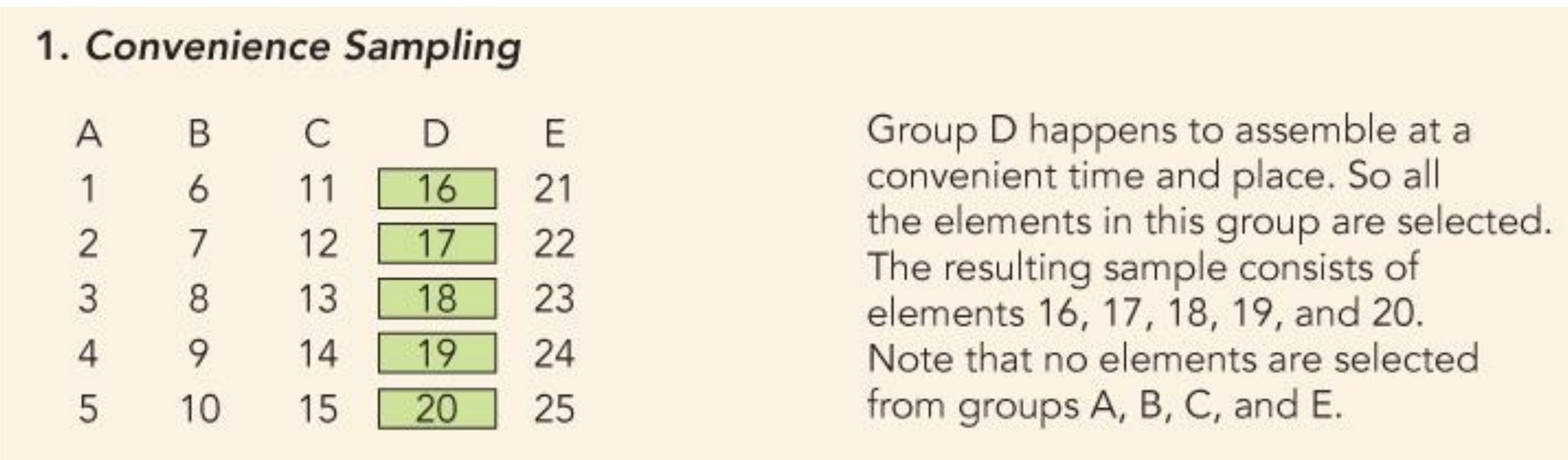
Convenience Sampling

Convenience sampling attempts to obtain a sample of convenient elements. Often, respondents are selected because they happen to be in the right place at the right time.

- Use of students, and members of social organizations
- Mall intercept interviews without qualifying the respondents
- Department stores using charge account lists
- "People on the street" interviews

A Graphical Illustration of Convenience Sampling

Figure 11.3 A Graphical Illustration of Nonprobability Sampling Techniques



Judgmental Sampling

Judgmental sampling is a form of convenience sampling in which the population elements are selected based on the judgment of the researcher.

- Purchase engineers selected in industrial marketing research
- Bellwether precincts selected in voting behavior research
- Expert witnesses used in court

Graphical Illustration of Judgmental Sampling

Figure 11.3 A Graphical Illustration of Nonprobability Sampling Techniques

2. *Judgmental Sampling*

A	B	C	D	E
1	6	11	16	21
2	7	12	17	22
3	8	13	18	23
4	9	14	19	24
5	10	15	20	25

The researcher considers groups B, C, and E to be typical and convenient. Within each of these groups one or two elements are selected based on typicality and convenience. The resulting sample consists of elements 8, 10, 11, 13, and 24. Note that no elements are selected from groups A and D.

Quota Sampling

Quota sampling may be viewed as two-stage restricted judgmental sampling.

- The first stage consists of developing control categories, or quotas, of population elements.
- In the second stage, sample elements are selected based on convenience or judgment.

	Population Composition	Sample Composition	
Control Characteristic	**Percentage**	**Percentage**	**Number**
Sex			
Male	48	48	480
Female	52	52	520
	100	100	1,000

A Graphical Illustration of Quota Sampling

Figure 11.3 A Graphical Illustration of Nonprobability Sampling Techniques

3. *Quota Sampling*

A	B	C	D	E
1	6	11	16	21
2	7	12	17	22
3	8	13	18	23
4	9	14	19	24
5	10	15	20	25

A quota of one element from each group, A to E, is imposed. Within each group, one element is selected based on judgment or convenience. The resulting sample consists of elements 3, 6, 13, 20, and 22. Note that one element is selected from each column or group.

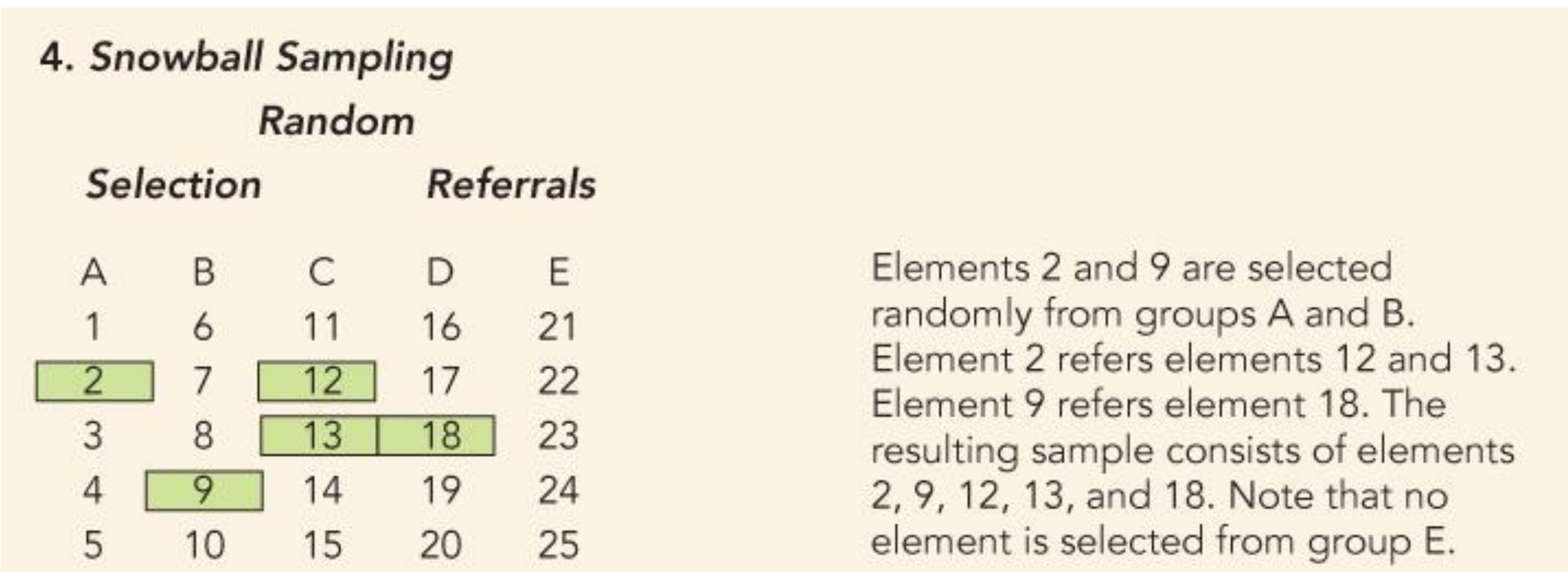
Snowball Sampling

In **snowball sampling**, an initial group of respondents is selected, usually at random.

- After being interviewed, these respondents are asked to identify others who belong to the target population of interest.
- Subsequent respondents are selected based on the referrals.

A Graphical Illustration of Snowball Sampling

Figure 11.3 A Graphical Illustration of Nonprobability Sampling Techniques



Simple Random Sampling

- Each element in the population has a known and equal probability of selection.
- Each possible sample of a given size (n) has a known and equal probability of being the sample actually selected.
- This implies that every element is selected independently of every other element.

A Graphical Illustration of Simple Random Sampling

Figure 11.4 A Graphical Illustration of Probability Sampling Techniques

A Graphical Illustration of Probability Sampling Techniques

1. ***Simple Random Sampling***

A	B	C	D	E
1	6	11	$\boxed{16}$	21
2	$\boxed{7}$	12	17	22
$\boxed{3}$	8	13	18	23
4	$\boxed{9}$	14	19	$\boxed{24}$
5	10	15	20	25

Select five random numbers from 1 to 25. The resulting sample consists of population elements 3, 7, 9, 16, and 24. Note that there is no element from Group C.

Systematic Sampling (1 of 2)

- The sample is chosen by selecting a random starting point and then picking every ith element in succession from the sampling frame.
- The sampling interval, i, is determined by dividing the population size N by the sample size n and rounding to the nearest integer, i.e., $\left\lfloor \frac{N}{n} \right\rfloor$
- When the ordering of the elements is related to the characteristic of interest, systematic sampling increases the representativeness of the sample.

Systematic Sampling (2 of 2)

- If the ordering of the elements produces a cyclical pattern, systematic sampling may decrease the representativeness of the sample.

  Example: There are 100,000 elements in the population and a sample of 1,000 is desired. In this case the sampling interval, i, is 100. A random number between 1 and 100 is selected. If, for example, this number is 23, the sample consists of elements 23, 123, 223, 323, 423, 523, and so on.

A Graphical Illustration of Systematic Sampling

Figure 11.4 A Graphical Illustration of Probability Sampling Techniques

2. *Systematic Sampling*

A	B	C	D	E
1	6	11	16	21
2	7	12	17	22
3	8	13	18	23
4	9	14	19	24
5	10	15	20	25

Select a random number between 1 to 5, say 2. The resulting sample consists of population 2, $(2 + 5 =)$ 7, $(2 + 5 \times 2 =)$ 12, $(2 + 5 \times 3 =)$ 17, and $(2 + 5 \times 4 =)$ 22. Note that all the elements are selected from a single row.

Stratified Sampling (1 of 3)

- A two-step process in which the population is partitioned into subpopulations, or strata.
- The strata should be mutually exclusive and collectively exhaustive in that every population element should be assigned to one and only one stratum and no population elements should be omitted.
- Next, elements are selected from each stratum by a random procedure, usually SRS.
- A major objective of stratified sampling is to increase precision without increasing cost.

Stratified Sampling (2 of 3)

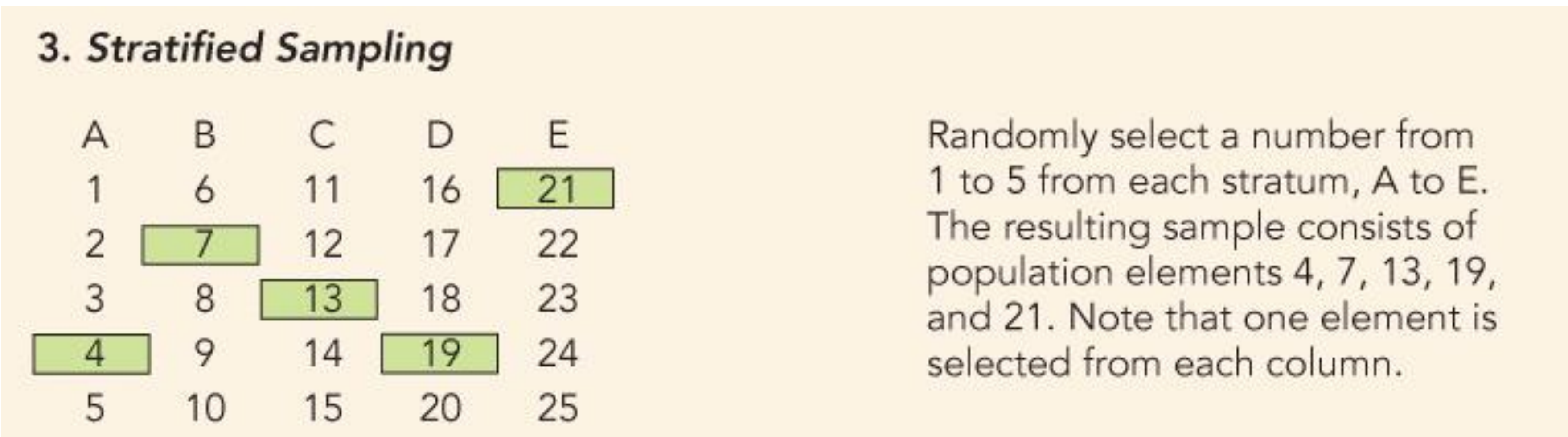
- The elements within a stratum should be as homogeneous as possible, but the elements in different strata should be as heterogeneous as possible.
- The stratification variables should also be closely related to the characteristic of interest.
- Finally, the variables should decrease the cost of the stratification process by being easy to measure and apply.

Stratified Sampling (3 of 3)

- In **proportionate stratified sampling**, the size of the sample drawn from each stratum is proportionate to the relative size of that stratum in the total population.
- In **disproportionate stratified sampling**, the size of the sample from each stratum is proportionate to the relative size of that stratum and to the standard deviation of the distribution of the characteristic of interest among all the elements in that stratum.

A Graphical Illustration of Stratified Sampling

Figure 11.4 A Graphical Illustration of Probability Sampling Techniques



Cluster Sampling (1 of 2)

- The target population is first divided into mutually exclusive and collectively exhaustive subpopulations, or clusters.
- Then a random sample of clusters is selected, based on a probability sampling technique such as SRS.
- For each selected cluster, either all the elements are included in the sample (one-stage) or a sample of elements is drawn probabilistically (two-stage).

Cluster Sampling (2 of 2)

- Elements within a cluster should be as heterogeneous as possible, but clusters themselves should be as homogeneous as possible. Ideally, each cluster should be a small-scale representation of the population.
- In **probability proportionate to size sampling**, the clusters are sampled with probability proportional to size. In the second stage, the probability of selecting a sampling unit in a selected cluster varies inversely with the size of the cluster.

A Graphical Illustration of Cluster Sampling (2-Stage)

Figure 11.4 A Graphical Illustration of Probability Sampling Techniques

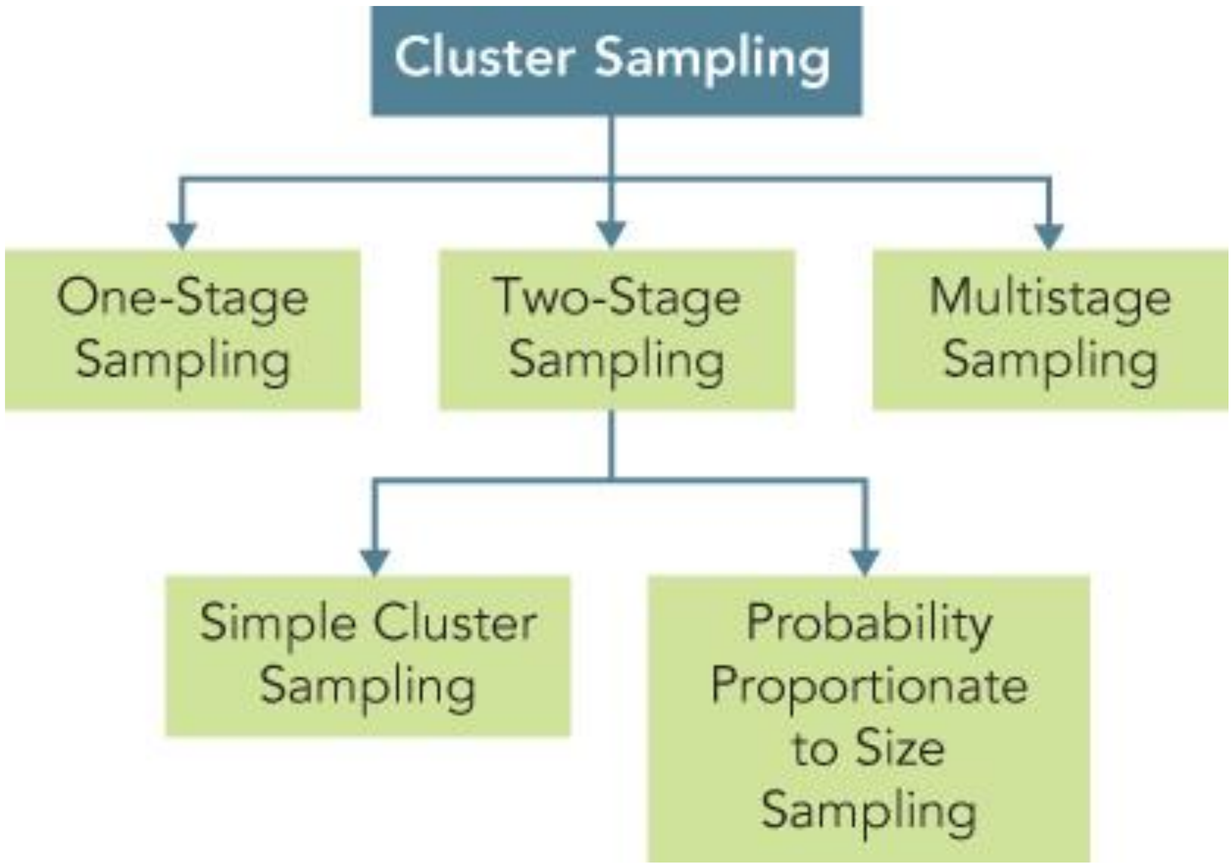
4. *Cluster Sampling (Two-Stage)*

A	B	C	D	E
1	6	11	16	21
2	7	12	17	22
3	8	13	18	23
4	9	14	19	24
5	10	15	20	25

Randomly select three clusters, B, D, and E. Within each cluster, randomly select one or two elements. The resulting sample consists of population elements 7, 18, 20, 21, and 23. Note that no elements are selected from clusters A and C.

Types of Cluster Sampling

Figure 11.5 Types of Cluster Sampling



Cluster Sampling Vs. Stratified Sampling

Table 11.3 Differences Between Stratified and Clustering Sampling

Factor	**Stratified Sampling**	**Cluster Sampling (One-Stage)**
Objective	Increase precision	Decrease cost
Subpopulations	All strata are included	A sample of clusters is chosen
Within subpopulations	Each stratum should be homogeneous	Each cluster should be heterogeneous
Across subpopulations	Strata should be heterogeneous	Clusters should be homogeneous
Sampling frame	Needed for the entire population	Needed only for the selected clusters
Selection of elements	Elements selected from each stratum randomly	All elements from each selected cluster are included

Strengths and Weaknesses of Basic Sampling Techniques (1 of 2)

Table 11.4 Strengths and Weaknesses of Basic Sampling Techniques

Technique	Strengths	Weaknesses
Nonprobability Sampling		
Convenience sampling	Least expensive, least time-consuming, most convenient	Selection bias, sample not representative, not recommended for descriptive or causal research
Judgmental sampling	Low cost, convenient, not time-consuming	Does not allow generalization, subjective
Quota sampling	Sample can be controlled for certain characteristics	Selection bias, no assurance of representativeness
Snowball sampling	Can estimate rare characteristics	Time-consuming

Strengths and Weaknesses of Basic Sampling Techniques (2 of 2)

[**Table 11.4** Continued]

Technique	**Strengths**	**Weaknesses**
Probability Sampling		
Simple random sampling (SRS)	Easily understood, results projectable	Difficult to construct sampling frame, expensive, lower precision, no assurance of representativeness
Systematic sampling	Can increase representativeness, easier to implement than SRS, sampling frame not necessary	Can decrease representativeness if there are cyclical patterns
Stratified sampling	Includes all important subpopulations, precision	Difficult to select relevant stratification variables, not feasible to stratify on many variables, expensive
Cluster sampling	Easy to implement, cost-effective	Imprecise, difficult to compute and interpret results

Choosing Nonprobability Vs. Probability Sampling

Table 11.5 Choosing Nonprobability Versus Probability Sampling

	Conditions Favoring the Use of	
Factors	**Nonprobability Sampling**	**Probability Sampling**
Nature of research	Exploratory	Conclusive
Relative magnitude of sampling and nonsampling errors	Nonsampling errors are larger	Sampling errors are larger
Variability in the population	Homogeneous (low)	Heterogeneous (high)
Statistical considerations	Unfavorable	Favorable
Operational considerations	Favorable	Unfavorable
Time	Favorable	Unfavorable
Cost	Favorable	Unfavorable