3. Participants, Subjects, and Sampling for Quantitative Designs

KEY TERMS

unit of study
unit of analysis
sample population
probability sampling
random sampling
margin of error
simple random sampling
systematic sampling

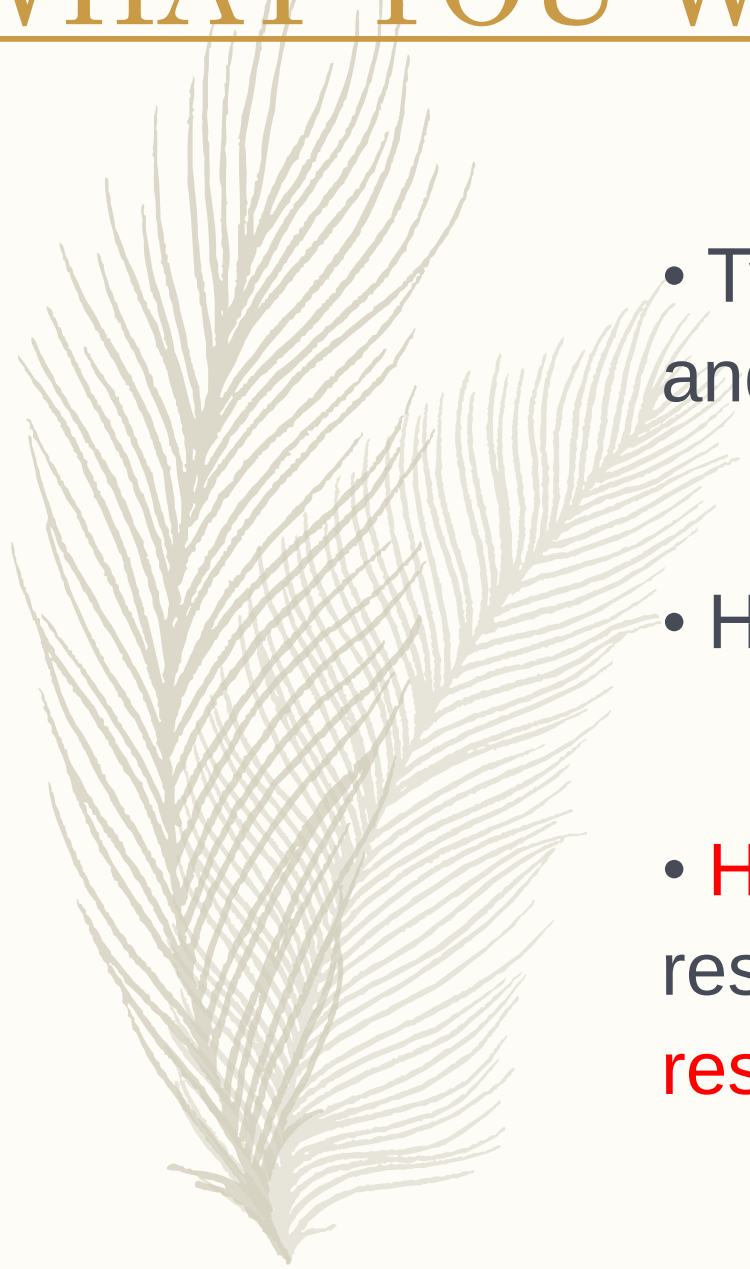
KEY TERMS

stratified random sampling
proportional sampling
nonproportional sampling
cluster sampling
multistage cluster sampling
nonprobability sampling
convenience sampling
purposeful sampling quota sampling

WHAT YOU WILL LEARN

- The difference between populations and samples.
- The importance of determining the unit of study and unit of analysis.
- Types of probability sampling, including systematic and stratified sampling.
- How margin of error is used in reporting results.

WHAT YOU WILL LEARN



- Types of nonprobability sampling, including available and purposeful sampling.
- How to estimate an appropriate sample size.
- How sample size, sampling bias, subject motivation, response variability, and volunteer samples affect results.

UNITS OF STUDY

1. The unit of study refers to the individuals, groups, documents, sites, or other sources from which data are gathered.

2. The unit of analysis is used for design and statistical purposes to identify the variable of interest that will be the basis for the analyses.

3. The descriptions of those individuals and/or groups are important in interpreting the results and in making generalizations of findings to other individuals and/or groups.

SAMPLING

1. The group of subjects or participants from whom the data are collected is referred to as the sample.

2. The sample can be selected from a larger group of persons, identified as the population, or can simply refer to the group of subjects from whom data are collected.

Population

1. A group of elements or cases, whether individuals, objects, or events, that conform to specific criteria and to which we intend to generalize the results of the research.

2. Different from the list of elements from which the sample is actually selected, which is termed the survey population or sampling frame.

3. Carefully and completely define both the target population and the sampling frame.

Probability Sampling

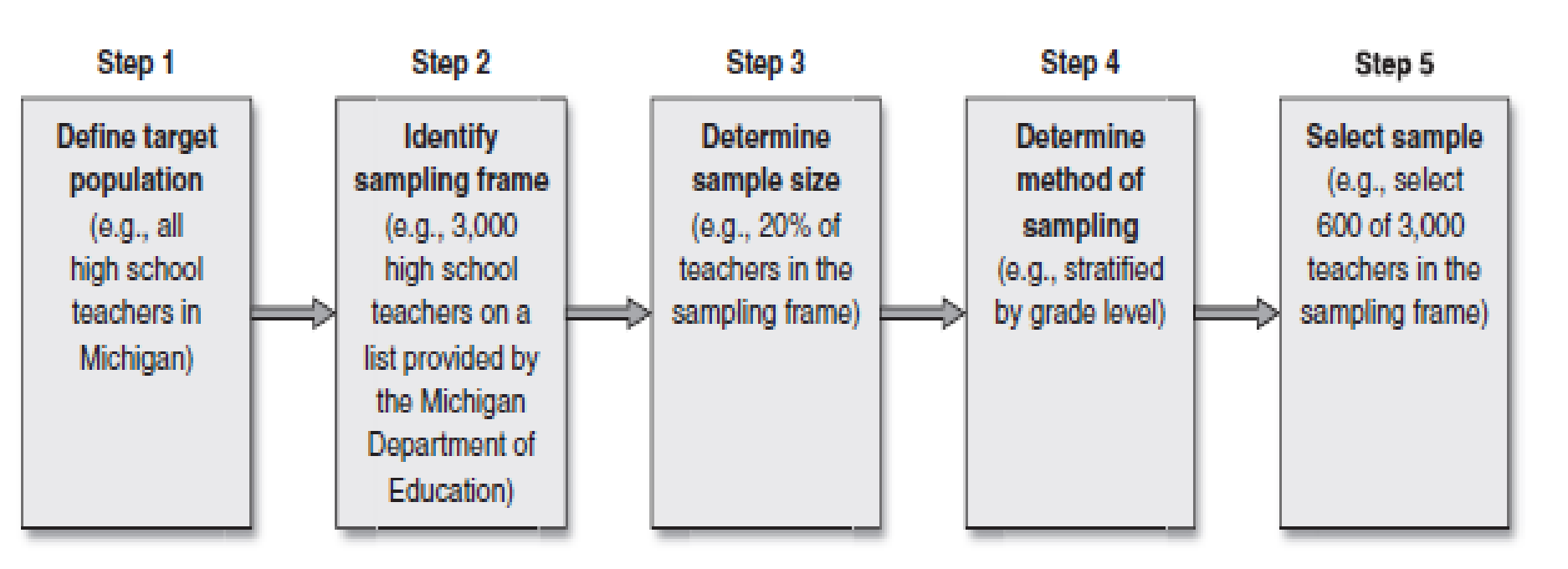
1. In probability sampling subjects are drawn from a larger population in such a way that the probability of selecting each member of the population is known.

2. This type of sampling is conducted to efficiently provide estimates of what is true for a population from a smaller group of subjects.

3. That is, what is described in a sample will also be true, with some degree of error, of the population.

Random Sampling

1.Steps in Probability sampling



A key concept in sampling is that there is always some degree of error in random sampling, and that error must be considered in interpreting the results.

Random Sampling

① Simple Random Sampling

- In simple random sampling, subjects are selected from the population so that all members have the same probability of being chosen.
- This method is often used when the population is small.

〈표 4-1〉 난수표

행	열									
	1	2	3	4	5	6	7	8	9	10
1	32388	52390	16815	69298	82732	38480	73817	32523	41961	44437
2	05300	22164	24369	54224	35983	19687	11052	91491	60383	19746
3	66523	44133	00679	35552	35970	19124	63318	29686	03387	59846
4	44167	64486	64758	75366	76554	31601	12614	33072	60332	92325
5	47914	02584	37680	20801	72152	39339	34806	08930	85001	87820
6	63445	17361	62825	39908	05607	91284	68833	25570	38818	46920
7	89917	15665	52875	78323	73144	88662	88970	74492	51805	99378
8	92648	45454	09552	88815	16553	51125	79375	97596	16296	66092
9	20979	04508	64535	31355	86064	29472	47689	05974	52468	16834
10	81959	65642	74240	56302	00033	67107	77510	70625	28725	34191

Random Sampling

② Systematic Sampling

•every nth element is selected from a list of all elements in the survey population, beginning with a randomly selected element.

•This approach can be used only when the researcher has a sequential list of all the subjects in the population, but it is easier than simple random sampling because not every member of the population needs to be numbered.

•If 5 is selected, every 10th name on the list will then be selected: 5, 15, 25, 35, and so on.

Random Sampling

③Stratified Random Sampling

•In this procedure, the population is divided into subgroups, or strata,on the basis of a variable chosen by the researcher, such as gender, age, location, or level of education

•Once the population has been divided, samples are drawn randomly from each subgroup.

•The number of subjects drawn is either proportional or nonproportional.

Random Sampling

④Cluster Sampling

•the researcher identifies convenient, naturally occurring groups, such as neighborhoods, schools, districts, and regions, not individual subjects, and then randomly selects some of these units for the study.

•Once the units have been selected, individuals are selected from each one.

•the researcher cannot obtain a complete list of all members of the population but can identify groups, or clusters,

Random Sampling

⑤multistage cluster sampling

•Using more than two stages (e.g.,school districts, schools within districts, classrooms within schools, students within classrooms) would be called multistage cluster sampling.

•Depending on how many times you go through the stage of a sampling, you can call it stage 2 and stage 3.

•The sampling methods for each step can be used in various ways, such as systematic sampling, random sampling, and cluster sampling.

Nonprobability Sampling

- In many quantitative studies, particularly experimental and quasi-experimental investigations, probability samples are not required or appropriate, or it may be impossible or unfeasible to select subjects from a larger group.
- Rather, **nonprobability sampling is used.**

" In fact, this form of sampling is the most common type in educational research.."

Nonprobability Sampling

① Convenience Sampling

In convenience sampling *(also called available sampling)* a group of subjects is selected on the basis of being accessible or expedient.

Convenience samples are widely used in both quantitative and qualitative studies

because this may be the best the researcher can accomplish due to practical constraints, efficiency, and accessibility.

Nonprobability Sampling

② Purposeful Sampling

In purposeful sampling *(sometimes called purposive sampling)*, the researcher selects particular elements from the population that will be representative or informative about the topic of interest.

In quantitative studies, the emphasis is more on relying on the judgment of the researcher to select a sample that is representative of the population or that includes subjects with needed characteristics.

Nonprobability Sampling

③ Quota Sampling

Quota sampling is used when the researcher is unable to take a probability sample but is still able to select subjects on the basis of characteristics of the population. Certain quotas are established so that the sample represents the population according to these characteristics. Different composite profiles of major groups in the population are identified, and then subjects are selected, nonrandomly, to represent each group.

How Sampling Affects Research

- In both planning and evaluating research, you will need to know which type of sampling will provide the best answers to the research questions.
- At issue is how sampling procedures may have had an impact on the results.
- The nature of the sample is critical in determining statistical significance, in interpreting the meaning of the results, and in generalizing the conclusions.

" five important considerations about how sampling affects research are summarized: sample size, subject motivation, sampling bias, response variability, and use of volunteer samples. "

How Sampling Affects Research

① Sample Size

A very important consideration in conducting and evaluating research is the size of the sample or the number of participants.

There are two approaches to determining adequate sample size. One uses published tables or sample size calculators (easily found on the Internet), based on established formulas. A second approach uses various rules of thumb or general guidelines.

Statistical significance is directly related to sample size—the larger the sample, the smaller the difference or relationship needed to be statistically significant.

※ http://www.nownsurvey.com/calculator
__ https://www.surveymonkey.com/mp/sample-size-calculator/

How Sampling Affects Research

② Subject Motivation

The extent to which subjects are motivated to respond in certain ways can have substantial effects. Whether or not subjects are motivated for reasons that will skew the results is determined by the nature of the procedures used, especially in what subjects are told or how data are collected.

How Sampling Affects Research

③ Sampling Bias

Sampling bias occurs when the researcher consciously or unconsciously selects subjects that result in an inaccurate finding. This is deliberately accomplished by including subjects who have the point of view that is desired by the researcher.

Biased samples also occur nondeliberately, often because of inadequate knowledge of what is needed to obtain an unbiased sample. This occurs in studies in which the researcher wants, from the beginning, to “prove” that something is true.

How Sampling Affects Research

④ Response Variability

In quantitative studies and maximum variation designs, there is a need to sample a sufficient number of participants so that adequate variability of responses is obtained. In quantitative studies, variation is needed to show differences and relationships.

⑤ Volunteer Samples

A continual and nagging issue in educational and social science research is the use of volunteer samples and participants. It is well documented that volunteers differ from nonvolunteers in important ways. Whenever there is a volunteer sample, it is critical to carefully consider whether or not volunteering has an impact on the findings.

Thank you