What is This Module About?

If you want to know the average monthly income of the citizens in your barangay, how will you go about studying it? Will you ask every person in your barangay? Of course not! That will take very long.

In this module, you will learn how to compute the average monthly income without asking every person in your barangay. You will learn that only a number of people that best represents your barangay is enough to answer your inquiry. By using the monthly income of these people, you can draw a conclusion that applies for the whole barangay.

This module is divided into three lessons:

Lesson 1 – *Sampling*

Lesson 2 – *Sampling Techniques*

Lesson 3 – *Conducting a Survey*

What Will You Learn From This Module?

After studying this module, you must be able to:

- Distinguish between a sample and a population;
- Determine and differentiate parameters and statistics;
- Know the use of sampling;
- Describe and differentiate the types of sampling techniques; and
- Conduct a simple survey using sampling.

Let's See What You Already Know

Before you go on through the module, let's see how much you know about the lessons covered, by answering the following exercises:

A. Write **T** if the statement is true and **F** if the statement is false.

1. ____ A population is a part of the sample.
2. ____ A statistic is a characteristic of the sample.
3. ____ A sample size of 15 is representative of all kinds of population.
4. ____ The larger the sample, the closer the statistic to the parameter.
5. ____ Random sampling error occurs in all studies that use sampling.

B. Fill in the blanks.

1. _____ bases the selection of a sample on chance of occurrence or probability.
2. _____ divides the population into strata, and from these, members of the sample are randomly chosen.
3. _____ selects samples among clusters.
4. _____ is a non-probability sampling that selects the sample directly from the population, and it does not use a list of the population in the selection process.
5. _____ selects the sample based on specific traits needed by the study.

C. Read the case and answer the following questions:

Juan wanted to know the average score of grade five students in a science examination.

1. What was the topic of Juan's study?

   _____

2. What was the population that he wanted to study?

   _____

3. If Juan has enough time and money for the study, and if he has a list of all the students, what is the best sampling technique that he can use? Why?

   _____

4. What is the most convenient data gathering method that he can use? Why?

   _____

5. If Juan gathered the following data, what is the measure of central tendency that he can use to find the average score? Why?

_____

Respondent 1: 85	Respondent 16: 90
Respondent 2: 79	Respondent 17: 83
Respondent 3: 83	Respondent 18: 85
Respondent 4: 80	Respondent 19: 86
Respondent 5: 82	Respondent 20: 84
Respondent 6: 86	Respondent 21: 84
Respondent 7: 70	Respondent 22: 86
Respondent 8: 90	Respondent 23: 85
Respondent 9: 86	Respondent 24: 66
Respondent 10: 85	Respondent 25: 85
Respondent 11: 67	Respondent 26: 83
Respondent 12: 87	Respondent 27: 95
Respondent 13: 65	Respondent 28: 81
Respondent 14: 88	Respondent 29: 85
Respondent 15: 86	Respondent 30: 97

6. Show the solution in computing for the average.

7. What can you conclude from the analysis?

_____

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on pages 45–46.

If all your answers are correct, very good! This shows that you already know much about the topics in this module. You may still study the module to review what you already know. Who knows, you might learn a few more new things as well.

If you got a low score, don't feel bad. This means that this module is for you. It will help you understand some important concepts that you can apply in your daily life. Are you ready?

You may go now to the next page to begin Lesson 1.

Sampling

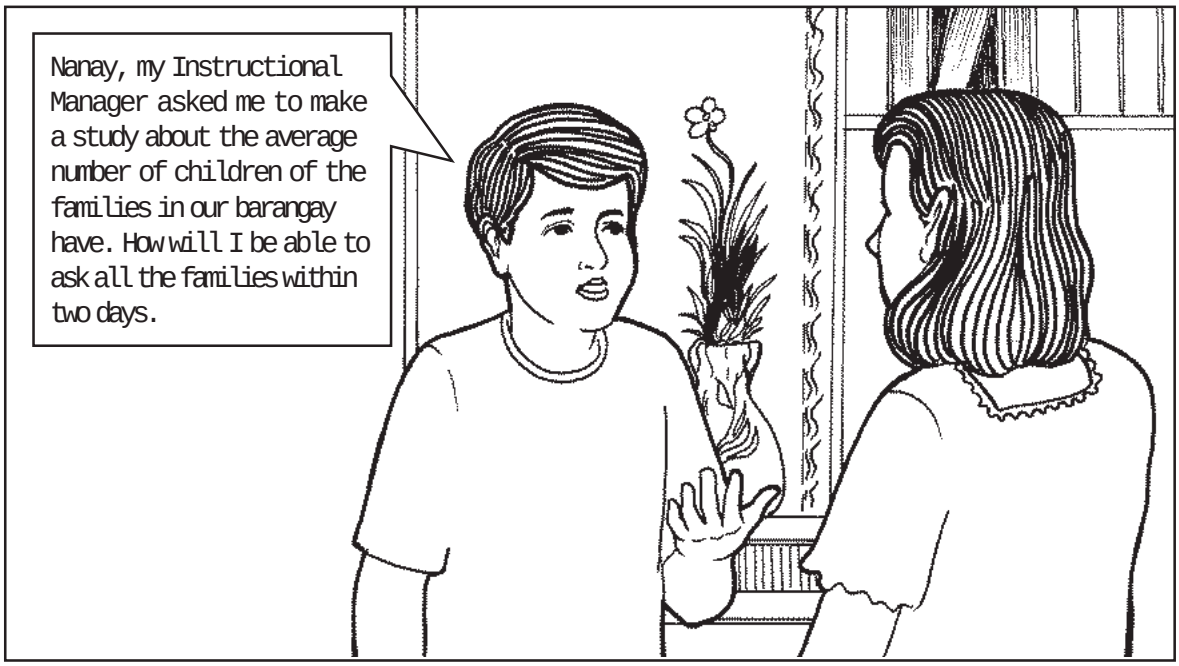
Usually, during elections, surveys are able to predict who among the candidates will win. Some people believe this, but there are others who don't easily believe this unless they know what is the sample used, how sampling is done, and what are the sampling errors.

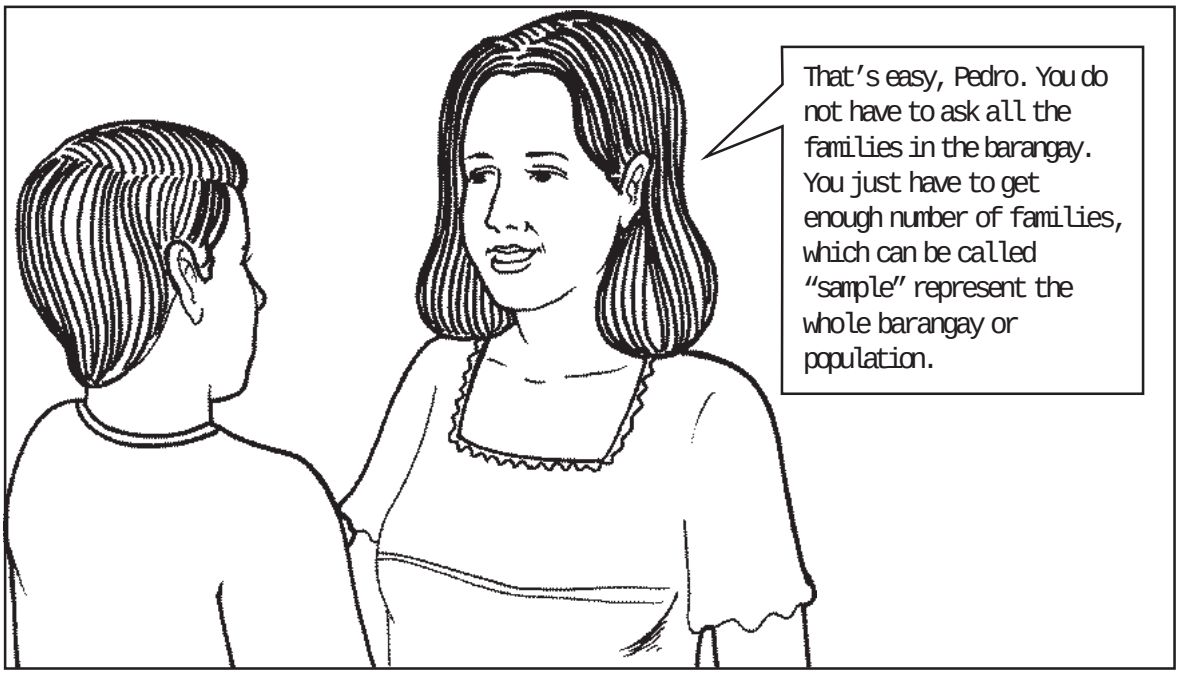
In this lesson, you will learn about terms such as sample, sampling methods or techniques and other terms, which are useful in conducting surveys. Learning these terms may help you decide whether to believe or not to believe in surveys.

After studying this module, you should be able to:

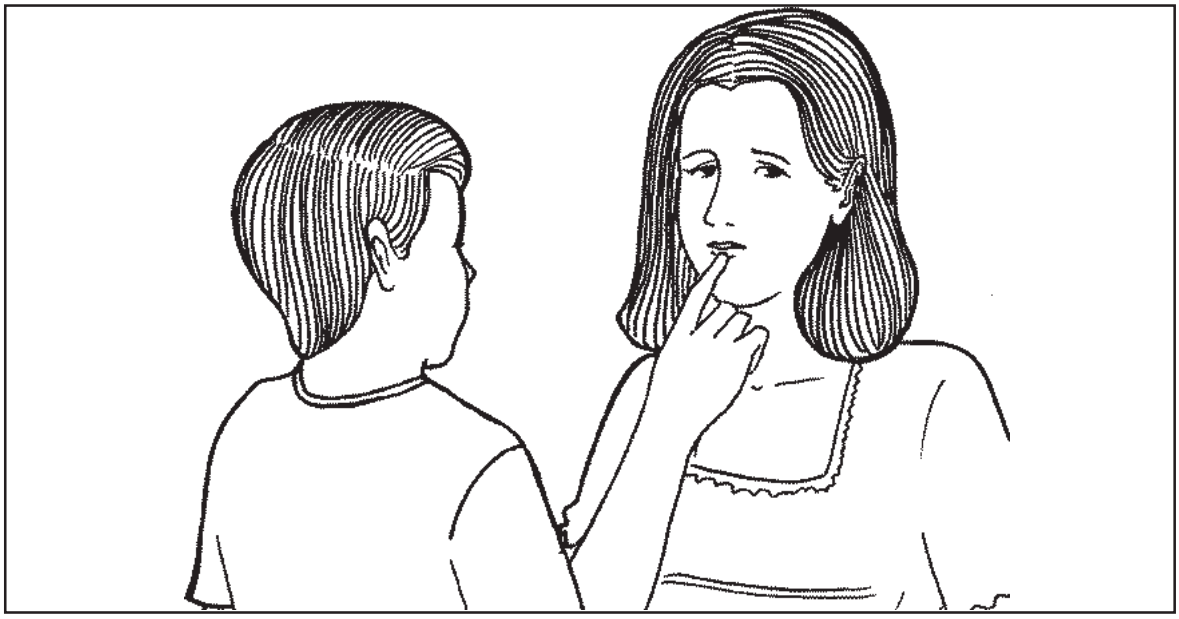
1. Distinguish between a population and a sample;
2. Determine and differentiate statistics and parameters;
3. Know what sampling is and the errors that may arise from sampling;

Let's Study and Analyze




That's easy, Pedro. You do not have to ask all the families in the barangay. You just have to get enough number of families, which can be called "sample" represent the whole barangay or population.


How can that be? If I would not be able to ask all of them, the conclusion might be different from what it should be.



Do you think Pedro's mother is correct? What about his mother's suggestion?

Let's Read

Population vs. Sample

A *population* is a group of persons or things that will be studied. The researchers are the ones who determine how big or how small a population will be. For example, in studying monthly income, you may decide that your whole barangay is your population. That means you will be studying the average monthly income of your barangay. On the other hand, you may choose to study the average monthly income of your province which sets your whole province as the population. Can you think of other populations for this study?

A *sample* is a part of your population. The researcher is also the one who will choose the number of sample. For example, if the population is made up of all the citizens of your barangay, 30 of them may be your sample. Or you may choose more people to be your sample, like 40 or 50.

Parameter vs. Statistic

A. They are basically the same measurements for different set of cases: the mean value of a variable in a sample is a statistic; the mean value of the same variable in the population is a parameter. Usually, the researcher will not be in a position to know what the parameter is, but will be able to calculate the statistic. Normally, a parameter is fixed but unknown, a statistic is known but may vary from one sample to another.

For example, there are 10,000 households in your barangay. Based on a recent population survey conducted by NCSO (National Census and Statistic Office) the average household income in your barangay is P 5,000.00. Suppose, you do not know about the survey conducted by NCSO, and you want to find what is the average household income of your barangay.

B. You interviewed 60 household leads and you found out that the average household income is P4,000.00. This is statistic. the parameter is P5,000.00 as this based on the population.

To be able to understand better the concepts of population, sample, parameter and statistic, lets read the example below.

C. Julia is conducting a study on how to help reduce air pollution in Quezon City. One of the ways is to know the number of car owners using unleaded gasoline. From the Land Transportation Office, she was able to get the total number of cars registered in Q.C. She found out that there are 5,000 car owners in Q.C. out of this total number, she wants to find out how many are using unleaded gasoline. She decided to interview 100 drivers and based on their answers, there are 30 of them who are using unleaded gasoline.

D. In the given example, the population consists of the total car owners in Q.C. This is 2,512.
2,512 is the population

Out of 2,512 car owners, Julia interviewed 100 car owners.
100 is the sample

Out of 100 car owners, 30 are using unleaded gasoline.
30 is the statistic

In this example, the parameter is unknown.

Let's Try This

Find the population, sample, parameter and statistic.

1. Mang Ambo owns a poultry farm, and he wants to know the average number of eggs each hen lays every month. To make the study easier, he observed 50 hens in one month and found out that each hen lays an average of 20 eggs. But based on observing all the hens in the poultry, each hen lays 24 eggs.

Population _____ Sample _____

Parameter _____ Statistic _____

2. Jenny wants to find out the number of her schoolmates who likes Math. She asked 100 of her schoolmates and 70% of them said that they like Math. If all of her schoolmates were asked, she would find out that 80% of them likes Math.

   Population _____ Sample _____

   Parameter _____ Statistic _____

Have you finished answering? Compare your answers to the answers below.

1. Population: all the hens in the poultry — Parameter: average eggs laid per month – 24
   Sample: 50 hens — Statistic: average eggs laid per month – 20
2. Population: all of Jenny's schoolmates — Parameter: percentage of students who like math – 80%
   Sample: 100 of Jenny's schoolmates — Statistic: percentage of students who like math – 70%

Let's Learn

Sampling

In conducting a study, we can use a sample in place of a population. Why would we use a sample instead of a population? Using a population for a study takes a long time, and wastes resources such as money. On the other hand, by using a sample, you will be able to gather enough data to conclude for the whole population, without wasting much time, money and effort.

Sampling is a means to approximate the value of the parameter by using a sample from a population. By using enough size of sample, you will be able to draw conclusions which are representative of the whole population.

To be representative of the population, the *size* of the sample or the number of members of the sample should be 30 or more. A sample with less than or near to 30 members will only be representative of the population if the population follows a *normal distribution*. However, we will not discuss what a normal distribution is. For our purposes, we will use at least 30 members for all kinds of population.

Even though sampling is more practical, the statistic that we get from it may not be exactly the same as the parameter. For example, you found out from your 100-person sample that their monthly income is ₱ 4700, but then the parameter that of the whole barangay may be ₱ 5000. If you want the statistic to be closer to the parameter, you should increase the number of your sample. For example, if you increased your sample to 200 persons, you might get a statistic of ₱ 4900, which is closer to ₱ 5000.

Sampling Error

The difference between a statistic and a parameter is called *sampling error*. Sampling error is made up of two elements:

1. *Random Sampling Error* – This error is always committed in all studies which uses sampling, since the sample can never be the same as the population. The statistic will always be different from the parameter. The smaller the sample, the greater the sampling error.

2. *Bias* – This error happens when the researcher commits a mistake during the sampling procedure, or during the time the researcher selects the people or things that make up the sample. For example, in choosing a sample to research on the average monthly income, you will commit bias if you select mostly highly paid people. The average will be pulled up by high incomes of these people. To avoid this error, you should select proportionate number of people per income range.

Let's Try This

Read the following case and answer the questions:

Jose's research is about whether or not the citizens in a district of Quezon City are satisfied with the performance of the local government. He needs to finish the study in one week. Jose used a sample of 600 people. Each barangay in the district has almost the same number of people, yet he disproportionately selected more people in some barangays.

1. How many members are there in the sample? Is it representative of the population? Why?

   _____

   _____

2. Why do you think did Jose use a sample instead of the whole population?

   _____

   _____

3. How can Jose make the statistic from the sample be closer to the parameter? Should the sample be increased or decreased?

   _____

   _____

4. What is/are the error(s) that you see in Jose's study?

   _____

   _____

Have you finished answering? Compare your answers to the answers below.

1. There are 600 people in the sample. It is representative of the population because it has more than 30 members.
2. Jose used a sample instead of a population because he has to finish the study in one week. If he will use the whole population, he may run short of time.
3. The statistic will be closer to the parameter if Jose increases the sample. From 600, he may increase the sample to 700, 750 or even more.
4. First, he committed a random sampling error which is always present in all researches and studies that use sampling. Second, he committed bias because he chose more people in some barangays.

Let's Remember

- A population is a group of persons or things that will be studied.
- A sample is a part of the population
- A parameter is a characteristic of the population.
- A statistic is a characteristic of the sample.
- Sampling is the process of selecting a sample that is enough to represent the whole population. The statistic from the sample approximates the parameter. A sample of at least 30 members is representative of the population.
- The larger the sample, the closer the statistic to the parameter.
- Random Sampling Error occurs in all studies that use sampling. It reflects the fact that the statistic will never be equal to the parameter since the sample is not identical to the population.
- Bias occurs when the researcher makes a faulty selection or when s/he selects a sample not representative of the whole population.

Let's See What You Have Learned

A. Fill-in the blanks.

1. A _____ is a characteristic of the population.
2. The smaller the sample, the greater the _____.
3. _____ is an error that takes place when the sample is not representative of the population.
4. _____ is an error that takes place in all studies and researches that use a sample.
5. A statistic is a characteristic of a _____.

B. Determine the population, sample, parameter and statistic.

1. Helen wants to know the average height of grade six students in their school. There are 300 grade six students and she selected 100 for the study. She found out that the average height was 4 feet and 7 inches. Based on the whole population, the average height is 4 feet and 5 inches.

   Population _____ Sample _____

   Parameter _____ Statistic _____

2. A group of students want to know whether voters in Marikina City base their votes on popularity of the candidate or on educational and professional background. They had 2000 respondents for the study, and they found out that 60 % of the respondents based their votes on popularity. Based on the population, 70% base their votes on popularity.

   Population _____ Sample _____

   Parameter _____ Statistic _____

C. Read the following case and answer the questions:

A barangay captain wanted to know if the fertilizers given by the Department of Agriculture increased the crop yield of farmers in their area even though the barangay does not have enough money for the study. He interviewed 150 farmers, but 140 of these farmers are farming in a more fertile land.

1. How many members does the sample have? Is it representative of the population? Why?

   _____

   _____

2. Why did the barangay captain use a sample instead of the population?

   _____

   _____

3. How can the barangay captain make the result of the study closer to the parameter?

   _____

   _____

4. What are/is the sampling error(s) that you can see in the case?

   _____

   _____

Have you finished answering? Compare your answers to the *Answer Key* on page 46.

Sampling Techniques

In Lesson 1, you learned about the terms population, parameter, sample and statistic. You also learned about sampling error such as random sampling error and bias.

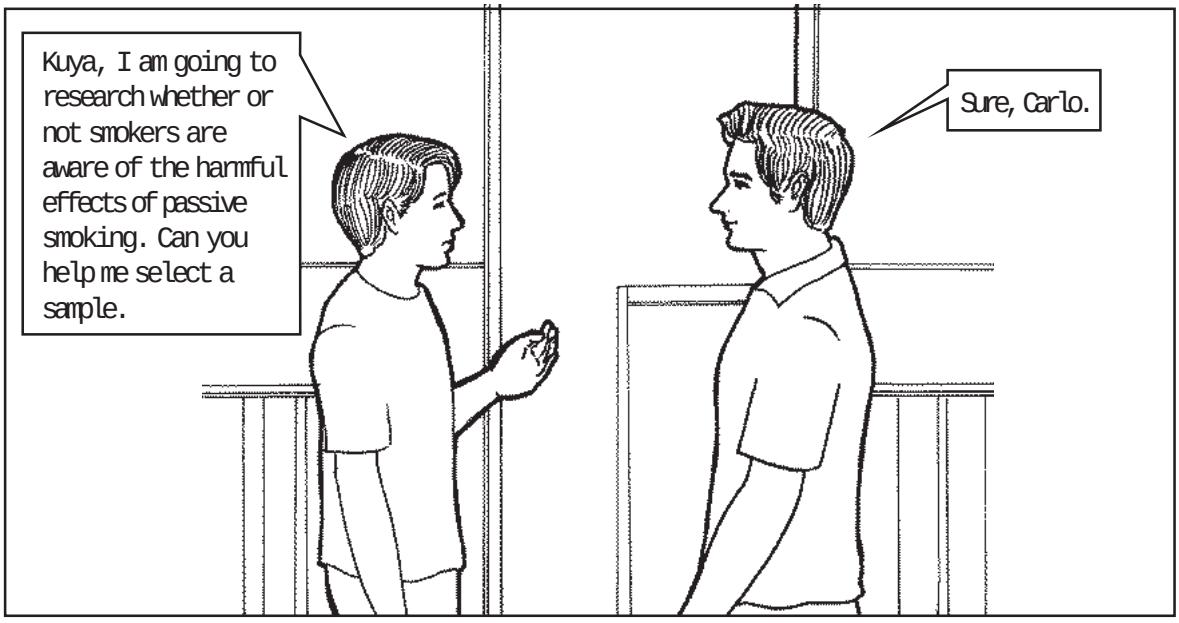
In this lesson, you will be introduced to the different sampling techniques and the kinds of surveys on which they apply.

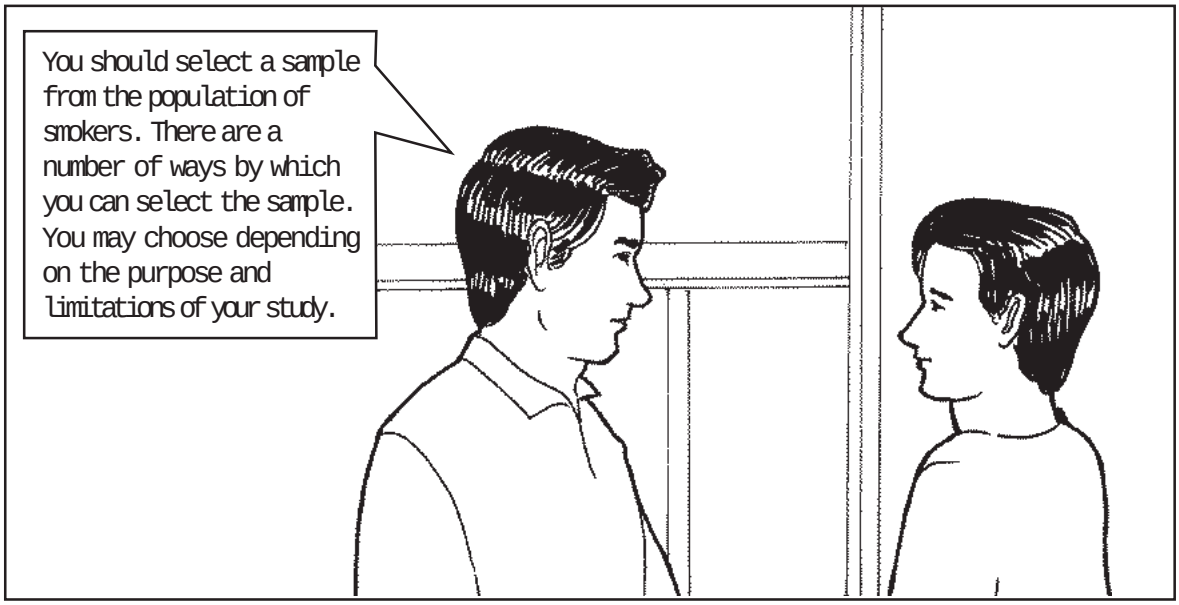
After reading this lesson, you are expected to:

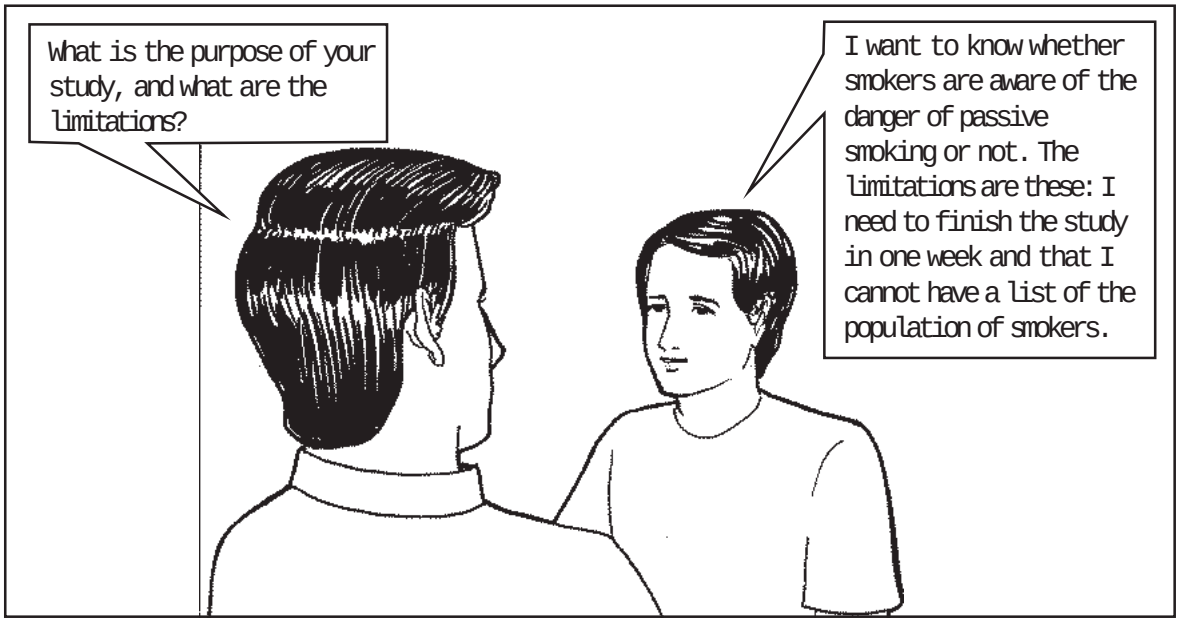
- describe and differentiate among the types of sampling techniques; and
- conduct a simple survey sampling techniques.

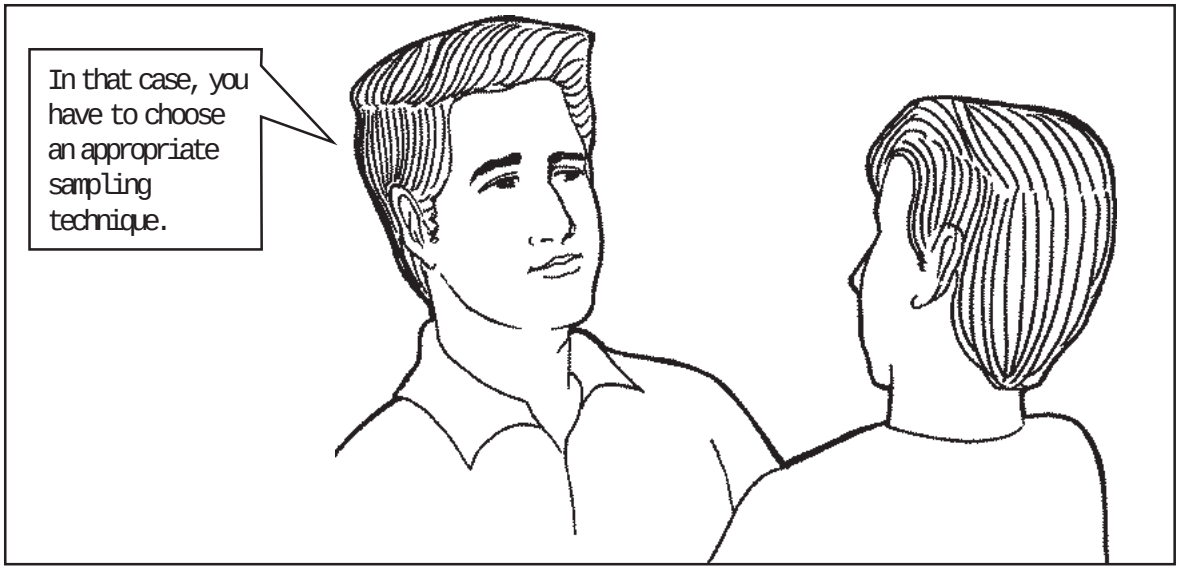
Let's Read

Scene 1: Carlo and his brother are talking to each other




You should select a sample from the population of smokers. There are a number of ways by which you can select the sample. You may choose depending on the purpose and limitations of your study.


What is the purpose of your study, and what are the limitations?
I want to know whether smokers are aware of the danger of passive smoking or not. The limitations are these: I need to finish the study in one week and that I cannot have a list of the population of smokers.


In that case, you have to choose an appropriate sampling technique.

Let's Learn

There are two main types of sampling technique —non-probability and probability sampling. We will discuss probability sampling and its subtypes, first.

Probability Sampling

Probability sampling is a type of sampling where the members of a sample are chosen through random selection. *Random selection* means that you choose them based on probability or on how often they occur or appear in the population.

Below are the subtypes of probability sampling:

1. *Simple random sampling* is a type of sampling where each member of the population has an equal chance of being included in the sample.

Advantages	Disadvantages
♦ Works through limited time in a small sample.	♦ Does not represent groups of people proportionately.

EXAMPLE: If your population consists of children between 5 to 10 years old in your barangay and you need 20 members in the sample, you may select the sample through draw lots. This means that you will write the names of the members of the population in pieces of paper, put these in a box, and pick 20 pieces. These 20 will make up the sample. The method used in picking 20 samples is simple random sampling because all of the children have equal chances of being picked.

2. *Systematic random sampling* is a type of sampling where a number is used to systematically choose members of the sample. It is the same as simple random sampling, except for the number used to select members of the sample.

   Systematic random sampling is better to use in larger populations than simple random sampling. For example, you have a 1000-member population, and you use draw lots in getting the sample, the pieces of paper might not be shuffled well, so some members have a greater chance of being selected. On the other hand, systematic random sampling evens out the chance of each member to be selected, by running through each member of the population.

   EXAMPLE: You want to conduct a survey on average monthly income of each family in your barangay. Suppose there are 150 families in your barangay and you want to choose only 30 families for your study. You can use systematic random sampling, by following the given steps on the next page:

STEP 1 Divide the total number of families by the number of families you want to include in the sample.

$$150 \div 30 = 5$$

5 is the number that you will use to systematically choose the sample.

STEP 2 Make a list of 150 families. List the family names in alphabetical order.

STEP 3 Starting from the first name on the list, count one to five. The fifth name becomes the first member of your sample.

STEP 4 Continue counting from five to ten, then ten to fifteen, and so on. The families lying on the multiples of 5 are included in the sample. The tenth, fifteenth, twentieth up to the one-hundred fiftieth families are included in the sample. There should be 30 families in all, since you decided to have 30 members in the sample.

Advantages	Disadvantages
♦ Systematic random sampling gives equal chances to all members of a big population	♦ Needs more time for selecting sample ♦ Does not represent groups of people proportionately

3. *Stratified random sampling* is a type of sampling where the population is divided into subgroups or strata. Each stratum has a common and unique trait. A sample is selected from each stratum through random sampling.

Unlike simple and systematic random sampling, stratified random sampling ensures that proportionate numbers of members from different groups of people are chosen.

Advantages	Disadvantages
♦ Represents groups of people proportionately	♦ Needs more time for grouping and selecting sample

EXAMPLE: If a health organization wants to make a study on the effect of air pollution to the people in Pasig and they need 1,000 members in the sample, follow the steps in order to perform stratified random sampling.

STEP 1 Stratify or divide the population into subgroups. You may choose to group them according to age range: 0 – 18 years old, 19 – 40 years old, and more than 40 years old.

STEP 2 Determine the percentage of each subgroup in the population. For example, 0 – 18 year olds compose 40% of the population, 19 – 40 year olds, 35% and more than 40 year olds, 25%.

STEP 3 Determine the number of sample from each stratum by multiplying the sample size by the percentage. The sample should be proportionate to the percentages of each stratum.

Strata	computation	sample size in every strata
0 – 18	40% x 1000	= 400
19 – 40	35% x 1000	= 350
more than 40	25% x 1000	= 250

STEP 4 Select the sample using simple random samplings through draw lots or the systematic random sampling methods as discussed earlier to draw sample for each situation.

5. *Cluster sampling* is a type of sampling where the population is divided into subgroups. Unlike in stratified sampling the members of each subgroup or cluster in this sampling do not have common traits. But a cluster has almost the same characteristics as another cluster. So instead of randomly choosing individuals, you choose among clusters.

Advantages	Disadvantages
♦ Makes sampling for a large population easier by choosing in groups	♦ Does not represent groups of people proportionately

EXAMPLE: If the local government of Manila wants to hold an opinion survey on the most popular government official, they might divide the city (population) into barangays (clusters). Notice that people in each barangay do not have common characteristics. Each barangay is almost the same as other barangays. After forming clusters, barangays are chosen randomly and included in the sample.

Let's Study and Analyze

We already know the different types of probability sampling. Now, let's try to think about the best probability sampling technique that applies to a specific study.

EXAMPLE 1: Suppose, you want to study if people in your barangay are sensitive to gender equality. What sampling technique is most appropriate?

The first question that you have to ask yourself is if there are there are strata that may significantly affect the outcome of the study. We can assume that men and women may have different views on gender equality. Because of this, each group might affect the outcome of the study significantly. To avoid being biased to one group, we should select a sampling technique that can represent these two groups proportionately.

The only sampling technique that can do that is stratified random sampling.

EXAMPLE 2: Suppose you want to study the effect of television on children below 5 years old in your city. What sampling technique will you see.

Since there are no groups that can significantly affect the outcome of the study, you can take stratified sampling out of your choices. *The next question that you have to answer is if you have the list of the population.* If you do not have the list, you cannot choose simple random sampling and systematic random sampling. The only choice you have is cluster sampling, which will make sampling of a big population easier because you choose among groups.

Let's Try This

A. Write **T** if the statement is true and **F** if the statement is false.

1. _____ Probability sampling bases the selection of sample on chance of occurrence.
2. _____ Stratified random sampling chooses sample among groups, and the members of each have different characteristics.
3. _____ Systematic random sampling uses a number to systematically choose members of the sample.
4. _____ Cluster sampling is the most suited technique if some groups in the population can affect the research results significantly.
5. _____ Draw lots is an example of simple random sampling.

B. Read the cases and answer the following questions:

1. Randy wants to know the favorite color of his classmates. There are about 45 students in their class, and he wants to have a sample of only 30. Randy wants to conclude the study within three hours.

   a. Are there any groups which may affect the outcome significantly?

   _____

   b. Is the population big? Is there a list of the population?

   _____

c. What is the best sampling technique that Randy can use and why?

_____

_____

2. Your barangay captain wants to know the average kilos of pork produced in your barangay everyday. There are two types of hog-raisers in your barangay: the large-piggery owners, and the backyard hog-raisers.

   a. Are there any groups which may affect the outcome significantly?

   _____

   b. Is the population big? Is there a list of the population?

   _____

   c. What is the best sampling technique that your barangay captain can use and why?

   _____

Have you finished answering? Compare your answers to the answers below.

A. 1. **T**
   2. **F**
   3. **T**
   4. **F**
   5. **T**

B. 1. a. none
      b. The population is not big. There are only 42 students in the class and Randy has a list of the population.
      c. The best technique that Randy can use is simple random sampling. Since there is no group that can significantly affect the outcome, there is no need for stratified random sampling. The small number of students in the population ensures that simple random sampling will be able to give equal chances for each student to get into the sample.

   2. a. Yes, the large-piggery owners and the backyard hog-raisers. The large-piggery owners produce many kilos of pork per day, so a large proportion of these hog-raisers will increase the average significantly.
      b. The population is big, but it is possible for the barangay captain to have a list of hog-raisers.
      c. The best technique that your barangay captain can use is stratified random sampling, because there are strata that can significantly affect the outcome.

Let's Learn

Non-probability Sampling

Non-probability sampling is a type of sampling that is usually used for convenience or economic reasons and for the purpose of the study. The sample selected in this type of sampling is not based on probability or on how often or seldom their traits occur. Below are the subtypes of non-probability sampling with their applications.

1. *Accidental or incidental sampling* is a type of sampling where the members of the sample are chosen directly from the population based on convenience and accessibility.

   EXAMPLE 1: If you want to make a study on monthly income, you might choose your neighbors to be your sample because they live nearer to your home.

   EXAMPLE 2: If you want to know the brand of soap most frequently used by the people in your barangay, you might choose to get the data from nearby sari-sari stores because it is more convenient.

Advantages	Disadvantages
♦ Compared to other non-probability sampling techniques, it works better through limited time and resources	♦ Does not represent groups of people proportionately

2. *Quota sampling* is a type of sampling where the population is divided into subgroups or strata. Like in stratified sampling, each subgroup in this sampling has a unique trait. The only difference of quota from stratified sampling is the way the sample is chosen. In quota sampling, the selection of the sample is based on convenience and accessibility.

   EXAMPLE: If you want to make a study on the opinion of your barangay on family planning, and you need 100 members in the sample, follow the following steps:

   STEP 1 Divide the population into subgroups. You may divide it into two subgroups – males and females.

   STEP 2 Know the percentage of each group in the population. For example, you learned that 55% of your barangay consists of males, while 45% is made up of females.

STEP 3 Determine the percentage of each subgroup in the population. The number from each group should be proportionate to their percentages in the population.

strata	computation		sample size per strata
Females	100 × 45%	=	45
Males	100 × 55%	=	55

STEP 4 Select the number of members that you need from each group based on convenience and accessibility.

Advantages	Disadvantages
♦ Needs more time for grouping and selecting sample	♦ Represents groups of people proportionately

3. *Purposive sampling* is a type of sampling where the members of the sample are chosen based on their traits and characteristics needed in your study. You choose a sample based on your *selection criterion.*

You may use purposive sampling even if resources do not limit you. The limitation in using purposive sampling is that some members of the population do not have the traits needed by the study.

EXAMPLE 1: If you want to study the effect of rock music on the youth, you choose a sample that listens to rock music. That is the selection criterion. If a person does not listen to rock music, then s/he cannot be a member of the sample.

Advantages	Disadvantages
♦ Selects the right people for the study	♦ Has a tendency to be biased if mistakenly chosen for a study

Let's Study and Analyze

We have already finished the non-probability sampling techniques. Always remember that before using non-probability sampling techniques, there should be economic limitations on the study like time and money constraints or on the traits needed by the study. Now let's learn the instances when to use non-probability sampling techniques.

EXAMPLE 1: Ian wants to conduct a study on the eating habits of his schoolmates. However, he does not have a list of his schoolmates. He also has a small budget for the study. What do you think is the best non-probability sampling technique that Ian can use?

The first question that you should ask yourself is if the study requires specific traits of a group of people for the study. Since Ian's study does not require a specific group of people, then, purposive sampling is out.

The next question is if there are groups of people that can significantly affect the outcome of the study. Since there are no such groups, quota sampling is also out.

The only non-probability technique left is accidental or incidental sampling.

Let's Try This

A. Fill-in the blanks.

1. _____ is a non-probability sampling that selects members of a sample based on their traits needed for the study.
2. _____ is a non-probability sampling that divides the population into subgroups, and selects a sample based on convenience and accessibility.
3. _____ is a non-probability sampling that selects a sample directly from the population, which makes a disproportionate representation of groups in the population.
4. Quota sampling is the same as _____ except for the selection process of samples from subgroups.
5. Unlike probability sampling, _____ bases the selection of a sample on accessibility and convenience.

B. Read the case and answer the following questions:

Tina wants to know the reasons that her neighbors use the internet. Only 20% in their neighborhood has computers and 40% has Internet access.

a. Does the study require specific traits of the sample?

_____

b. Are there groups of people, which can significantly affect the outcome of the study?

_____

c. What is the best sampling technique that Tina can use for her study, and why?

_____

_____

Have you finished answering? Compare your answers to the answers below.

A. 1. Purposive
2. Quota
3. Accidental or incidental
4. stratified random sampling
5. non-probability sampling

B. a. Yes, the study require members that use the internet or have used the internet.

b. There are no groups of people that can significantly affect the outcome of the study.

c. The best technique that Tina can use is purposive sampling because the study requires that the sample has used or uses the internet.

Let's Study and Analyze

Now, let's put probability and non-probability sampling together in our choices of sampling techniques.

EXAMPLE 1: An environmental organization wants to know if people of Metro Manila are aware of the depletion of forests. However, the organization does not have enough money and time for a comprehensive study.

QUESTION 1: Is the study limited by economic resources? Or does the study require specific traits of a group in the population?

Yes, the study is limited by time and money constraints. This means that the organization has to use non-probability sampling. But the study does not require specific traits of a group of population, so purposive sampling is out of the choices.

Since you already know the general type of sampling technique to use, follow the guide questions given for non-probability sampling.

QUESTION 2: Are there groups of people which can significantly affect the outcome of the study?

There are no groups of people which can significantly affect the outcome of the study, so quota sampling is out of the choices.

Then the only one left among the choices, and the best sampling technique for the study is accidental or incidental sampling.

EXAMPLE 2: Louie wants to know how often his neighbors eat vegetables. There are only about 50 people in his neighborhood. He wants to include only 30 people in the sample. He has enough budget and time for the study.

QUESTION 1: Is the study limited by economic resources? Or does the study require specific traits of a group in the population?

Louie's study is not limited by economic resources, so he can use probability sampling. The study neither requires specific traits of a group of population, so purposive sampling is out of the choices.

Since you already know that you will use probability sampling, follow the guide questions given for probability sampling.

QUESTION 2: Are there any strata that can significantly affect the outcome of the study?

There are no strata that can significantly affect the outcome of the study, so stratified random sampling is out of the choices.

QUESTION 3: How big is the population? Is it possible to make a list of the population?

Yes, since there are only 50 members, it is possible to have a list of the population.

QUESTION 4: What is the best sampling technique that Louie can use for the study?

The best technique that Louie can use is simple random sampling.

Let's Try This

Read the following case and answer the following question:

A governor wants to hold an evaluation of his administration of the province. He has 10 municipalities, each having 30 districts. Before the planning of the study, he raised enough money for the project. The study is not prioritized for the mean time, although he wants to begin the study now.

What is the best sampling technique for the study? Why?

Have you finished answering? Compare your answer to the answer below.

Since there are no economic limitations, probability sampling can be used. The study does not require specific traits of a group of people so purposive sampling is out of the choices. There are no strata that can significantly affect the outcome so stratified random sampling is out of the choices. Since the population is very large and it is impossible to have a list of the population, the best technique suited for the study is cluster sampling.

Let's Remember

Here is a list of the main types of sampling and their subtypes. You should not only know the definitions of each, you should also know when to use them.

I. Probability sampling – a type of sampling that bases the selection of a sample on chance of occurrence or probability

   1. Simple random sampling – gives the members of the population equal chances of being in the sample
   2. Stratified random sampling – divides the population into strata, and from these, members of the sample are randomly chosen
   3. Systematic random sampling – uses a number to systematically select members of the sample
   4. Cluster sampling – selects samples among clusters, the members of each have no common and unique characteristics

II. Non-probability sampling – a type of sampling that bases the selection of a sample on convenience and accessibility

   1. Accidental or incidental sampling – selects a sample directly from the population and it does not need a list of the population
   2. Quota sampling – divides the population into strata, and from these, the members of the sample are selected based on convenience and accessibility
   3. Purposive sampling – selects the sample based on specific traits needed by the study

Let's See What You Have Learned

A. Write T if the statement is true and F if the statement is false.

1. ____ Probability sampling is used when there are economic limitations
2. ____ Purposive sampling is used when the study requires specific traits of a group of people.
3. ____ Quota sampling is a type of probability sampling that divides the population into strata.
4. ____ Accidental or incidental sampling chooses a sample directly from the population.
5. ____ Cluster sampling is a sampling that divides the population into different clusters, and from each cluster, a sample is chosen.

B. Fill-in the blanks.

1. _____ sampling bases the selection of a sample on convenience and accessibility.
2. If there are economic limitations and if there are some groups in the population that can significantly affect the outcome of the study, the best sampling technique is _____.
3. Systematic random sampling uses a _____ to systematically choose a sample.
4. A _____ is a group of people with common characteristics.
5. A _____ is a group with different characteristics, but it has the chance of being selected to be in the sample as a group.

C. Read the case and answer the following questions:

1. Anthony wants to know the opinion of his neighbors on the possibility of human cloning. He has prepared enough money and time for the study, but he worries that some of his neighbors might not be aware of human cloning.

   a. Is the study restricted by economic limitations? Does the study require specific traits of a group of people?

   _____

   _____

   b. What is the best sampling technique that Anthony can use? Why?

   _____

   _____

D. Read the cases and determine the best sampling technique for each. Explain your answers.

1. You want to know the average kilos of rice produced by each farmer in your barangay. However, there are farmers who own more than 2 hectares of land, and there are farmers who own less than 1 hectare. You have to finish the study in one week, and you only have a small budget for it.

   _____

   _____

   _____

2. Julie will conduct a study about the favorite sports of grade five students in San Isidro Elementary School. She prepared enough money for it, and she has more than one month to complete the study. She has access on the list of the 400 students in the population.

   _____

   _____

   _____

LESSON 3

Conducting a Survey

In this lesson, you will learn how to make a simple survey of your own. You will be able to apply the things you have learned from the past lessons.

You can perform a survey on anything that interests you. For example, you can conduct a survey on Filipino traditions practiced by your barangay, on the number of children below 5 years old in your district, or even on the favorite food of your neighbors.

In this lesson, you should already know how to get the measures of central tendency and variability. You are also required to know the type of sampling technique to be applied in particular studies.

Let's Learn

Survey vs. Census

Before we start the lesson, we should understand first what a survey is. A *survey* is a research or study that uses a sample. On the other hand, a *census* is a research or study that uses a population.

What do you think are the steps in conducting a survey? Below are the summarized steps in conducting a survey:

1. Conceptualization and planning
2. Data gathering
3. Analysis
4. Conclusion

Conceptualization and Planning

In conceptualization and planning, the first thing that you have to think about is the specific topic you want to research on. Here are a few examples of the topics:

Most popular senator in your barangay
Common problems that teenagers face
Average number of hours spent by students in studying at home
How often children use *po* and *opo* nowadays
Whether or not people agree on the way women dress up today

What are the other topics you think of?

After choosing a topic, determine the population and sample. For example, you want to study about the most common problems that teenagers face. Your population for this is composed of teenagers. From the population, the sample is determined by using the sample techniques that we learned earlier. What do you think is the sampling applicable to this study if you are limited by time or money? What is the representative sample size?

You're right! It is best to use incidental or accidental sampling. You should get 30 or more members from the population, to make sure that the sample is representative of the population.

Let's Try This

Determine the population members, sampling technique and sample size for the other sample topics, assuming that you are economically limited.

1. Most popular senator in your barangay

   Population:
   Sampling technique:
   Sample size:

2. Average number of hours spent by students in studying at home.

   Population:
   Sampling technique:
   Sample size:

3. How often children 3 to 10 years old use *po* and *opo* nowadays.

   Population:
   Sampling technique:
   Sample size:

4. Whether or not people in your barangay agree on the way women dress up today.

   Population:
   Sampling technique:
   Sample size:

Have you finished answering? Compare your answers to the answers below.

1. Population: people in your barangay
   Sampling technique: incidental and accidental sampling
   Sample size: 30 or more

2. Population: students
   Sampling technique: quota sampling (strata are assigned based on year level, college students spend relatively more time in studying)
   Sample size: 30 or more

3. Population: children 3 to 10 years old
   Sampling technique: incidental or accidental sampling

   Sample size: 30 or more

4. Population: people in your barangay
   Sampling technique: quota sampling (strata are assigned based on gender)
   Sample size: 30 or more

Let's Learn

Data Gathering

In conducting a survey, you should have at least one question to ask to the members of your sample or to your *respondents*, or one query that you will observe in your sample if the sample is not composed of people. Using these questions or queries, you will be able to gather answers that will make up your data.

After you have listed your questions, you can either have an *interview* or a *questionnaire*. An interview means that you will ask your sample directly, and you will take note of their answers. Using a questionnaire means that you will give them the set of questions written in a paper, and they will write their answers on that paper, and then you will collect these questionnaires from them.

You are the one who will decide whether to have interviews or to distribute questionnaires. If you are willing to interview a sample of 30 people, you may do so as long as you will finish the study on time. But what if you have a sample of 100 people, is it practical to hold interviews? A questionnaire is more practical to use if you have a large sample and many questions, and if you have limited time for the study.

Look at the data on the next page. This is the data that Roni gathered from interviews. He took note of the answers of the respondents on a sheet of paper.

Topic: Average Monthly Income of the Residents in Barangay Mapayapa
Question: What is your monthly income?

Respondent 1: 10, 500	Respondent 16: 7,500
Respondent 2: 11,000	Respondent 17: 15,000
Respondent 3: 7,500	Respondent 18: 9,500
Respondent 4: 8,000	Respondent 19: 14,000
Respondent 5: 14,000	Respondent 20: 9,000
Respondent 6: 13,500	Respondent 21: 5,000
Respondent 7: 15,500	Respondent 22: 7,000
Respondent 8: 9,000	Respondent 23: 6,500
Respondent 9: 10,000	Respondent 24: 6,500
Respondent 10: 7,000	Respondent 25: 8,500
Respondent 11: 6,500	Respondent 26: 7,500
Respondent 12: 12,500	Respondent 27: 9,000
Respondent 13: 13,000	Respondent 28: 10,000
Respondent 14: 10,000	Respondent 29: 7,500
Respondent 15: 11,500	Respondent 30: 18,000

There are also surveys that are done only through *observation or experimentation*. In observation, queries are answered by simply observing the sample while in experimentation, the sample is observed and controlled at the same time. The most common examples of surveys that use observation and experimentation are studies on plants, animals, and non-living things.

For example, you want to know if the fertilizer used by farmers in your district is effective, you experiment by using it in different types of plants and soil. Another example is a survey on the average number of houses in every barangay in Region III. In this example, you do not need to experiment to arrive at a conclusion. All you have to do is to observe by counting the number of houses in each barangay included in the sample.

Analysis of Data

In the analysis of data, you will use statistical measures to support your conclusions. These measures include the measures of central tendency: mean, median and mode; and the measures of variability: range, variance and standard deviation. But to make our analysis easier, we will use only the range as a measure of variability. You may want to review these concepts before continuing. You can read the manual: “mean, median, mode and range.

Let's Study and Analyze

Let's try to analyze the data gathered by Roni, given in the earlier section.

Roni wants to know the average monthly income of the residents in Barangay Mapayapa. What do you think should Roni use as a measure of central tendency? To answer this, let's find out the variability or the range of the data.

range = highest monthly income – lowest monthly income
= 18,000 – 5,000
= 3,000

A range of 3,000 means that the data have large differences. Because of this, we should use a measure of central tendency in which the extreme data such as 18,000 or 5,000 will not pull up or pull down the average.

The only measure of central tendency that makes this possible is the *median*.

Do you still remember how to compute for the median? What is the median? You're right! The median is 9,000.

Once you find the answer, you can conclude that the average monthly income of the residents in Barangay Mapayapa is 9,000 pesos.

Let's Learn

You already know that we use the median when the data has a high range. When will we use the mean and the mode?

The *mean* is used when the data has a small variability or range.

The *mode* is used when some *numerical data* (data represented by numbers) composes the majority of the data. For example, if 25 of Roni's respondents said that their monthly income is 10,000, and the other 5 respondents has higher and lower monthly incomes, you may use the mode. Since the majority of the respondents have a monthly income of 10,000, you can safely say that 10,000 is the average monthly income.

The mode is also used for *categorical data* or data which are not represented by numbers. For example, you want to know if your neighbors agree with the curfew set by barangay officials. The only answers or data that you can gather in this study are *yes* and *no*. How can you measure the central tendency of yes and no data? You will find the central tendency using the mode. If you have a sample of 55 people, 20 of which answered yes, and 35 answered no, the mode is no.

Let's Study and Analyze

Let's analyze some survey data by using the mean and the mode.

EXAMPLE 1: Joey conducted a survey on the average grade in Math of grade six students in their school. Joey used a 30-person sample, and gathered the following data:

Respondent 1: 86	Respondent 16: 86
Respondent 2: 87	Respondent 17: 87
Respondent 3: 83	Respondent 18: 85
Respondent 4: 85	Respondent 19: 88
Respondent 5: 88	Respondent 20: 87
Respondent 6: 84	Respondent 21: 87
Respondent 7: 83	Respondent 22: 89
Respondent 8: 89	Respondent 23: 88
Respondent 9: 90	Respondent 24: 87
Respondent 10: 87	Respondent 25: 87
Respondent 11: 86	Respondent 26: 88
Respondent 12: 86	Respondent 27: 85
Respondent 13: 83	Respondent 28: 84
Respondent 14: 85	Respondent 29: 83
Respondent 15: 84	Respondent 30: 83

STEP 1 Get the variability of the data.

Range = highest grade – lowest grade
= 90 – 83
= 7

STEP 2 Determine what measure of central tendency to use.

A range of 7 is relatively low. The best measure of central tendency to use is the mean.

STEP 3 Compute for the mean of the data.

The mean is equal to the sum of all the grades divided by 30.

The mean is equal to 86.

STEP 4 Conclusion: The average grade of grade six students in Math is 86.

EXAMPLE 2: Gabriel wanted to know if the people in their barangay participate in barangay projects. He used a 40-person sample. The data he gathered are shown below.

Respondent 1: yes	Respondent 21: no
Respondent 2: yes	Respondent 22: yes
Respondent 3: no	Respondent 23: no
Respondent 4: yes	Respondent 24: yes
Respondent 5: no	Respondent 20: no
Respondent 6: no	Respondent 25: no
Respondent 7: yes	Respondent 26: yes
Respondent 8: yes	Respondent 27: yes

Respondent 9: no
Respondent 10: no
Respondent 11: no
Respondent 12: yes
Respondent 13: no
Respondent 14: yes
Respondent 15: yes
Respondent 16: no
Respondent 17: no
Respondent 18: yes
Respondent 19: no
Respondent 20: no
Respondent 28: no
Respondent 29: yes
Respondent 30: no
Respondent 31: no
Respondent 32: yes
Respondent 33: yes
Respondent 34: yes
Respondent 35: no
Respondent 36: no
Respondent 37: yes
Respondent 39: no
Respondent 40: no

The data given above are categorical. The best measure of central tendency for this data is the mode.

To get the mode of the data, find the number of times that yes and no were answered.

Yes = 18

No = 22

The mode is No. You can conclude that residents of the barangay do not participate in barangay projects.

Let's Try This

Analyze the following data by using the measures of variability and central tendency, and then draw a conclusion from the analysis. Follow the steps given in the examples above.

1. Karla wanted to know the favorite subject of elementary students in their neighborhood. She used a 40-person sample. Below are the data that she gathered.

Respondent 1: Math
Respondent 2: Science
Respondent 3: Social Studies
Respondent 4: Science
Respondent 5: Math
Respondent 6: Math
Respondent 7: Science
Respondent 8: Social Studies
Respondent 9: English
Respondent 10: Social Studies
Respondent 11: Math
Respondent 12: Filipino
Respondent 13: Math
Respondent 14: Science
Respondent 15: English
Respondent 21: Math
Respondent 22: Math
Respondent 23: Science
Respondent 24: Social Studies
Respondent 20: Science
Respondent 25: Math
Respondent 26: Math
Respondent 27: Filipino
Respondent 28: Social Studies
Respondent 29: English
Respondent 30: Filipino
Respondent 31: Science
Respondent 32: Math
Respondent 33: Math
Respondent 34: Science

Respondent 16: Math
Respondent 17: Math
Respondent 18: Science
Respondent 19: Filipino
Respondent 20: Social Studies
Respondent 35: Social Studies
Respondent 36: Math
Respondent 37: Math
Respondent 39: Science
Respondent 40: Science

2. Joey wants to know how long a mongo plant grows to 12 cm. He gathered data by planting a sample of 30 mongo seeds, and then he waited for a few days until the mongo plant grows to 12 cm. Below are the data he gathered.

   Number of days a mongo plant grows to 12 cm:

Plant 1: 7
Plant 2: 6
Plant 3: 7
Plant 4: 7
Plant 5: 9
Plant 6: 6
Plant 7: 7
Plant 8: 8
Plant 9: 6
Plant 10: 7
Plant 11: 6
Plant 12: 8
Plant 13: 9
Plant 14: 9
Plant 15: 7
Plant 16: 6
Plant 17: 7
Plant 18: 7
Plant 19: 8
Plant 20: 6
Plant 21: 7
Plant 22: 6
Plant 23: 9
Plant 24: 6
Plant 25: 7
Plant 26: 6
Plant 27: 7
Plant 28: 7
Plant 29: 6
Plant 30: 6

3. Anton made a study on the sacks of rice produced every harvest season by farmers in Barangay San Pedro. He used stratified sampling to select the sample because some of the farmers yield extremely high amount of rice. Below are the data that he gathered.

   Sacks of rice produced:

Respondent 1: 120
Respondent 2: 100
Respondent 3: 150
Respondent 4: 130
Respondent 5: 190
Respondent 6: 200
Respondent 7: 150
Respondent 8: 130
Respondent 9: 160
Respondent 10: 180
Respondent 11: 170
Respondent 12: 140
Respondent 13: 130
Respondent 14: 120
Respondent 15: 100
Respondent 16: 90
Respondent 17: 100
Respondent 18: 80
Respondent 19: 160
Respondent 20: 150
Respondent 21: 110
Respondent 22: 130
Respondent 23: 120
Respondent 24: 350
Respondent 25: 140
Respondent 26: 130
Respondent 27: 400
Respondent 28: 130
Respondent 29: 110
Respondent 30: 500

Have you finished answering? Compare your answers to the answers below.

1. Since the data are categorical, the measure of central tendency that should be used is the mode.

   Number of times each subject was answered:

   Math = 15
   Science = 11
   Social Studies = 7
   Filipino = 4
   English = 3

   The mode is math. We can conclude that the favorite subject of elementary students in the school is math.

2. **STEP 1** Get the variability.

   Range = 9 – 6
   = 3

   STEP 2 Determine the measure of central tendency that should be used.

   3 is a low range. The best measure that we can use is the mean.

   STEP 3 Get the mean.

   To get the mean, we add all the days and divide the sum by the number of sample.

   The mean is 7.

   STEP 4 Conclude: It takes 7 days for a mongo seed to grow.

3. **STEP 1** Get the variability.

   Range = 500 – 80
   = 420

   STEP 2 Determine the measure of central tendency that should be used.

   A range of 420 is very big. To avoid the effect of variability, we should use the median to get the measure of central tendency.

   STEP 3 Get the median.

   To get the median, we list the data from lowest to highest, and get the average of the 15^{th} and 16^{th} data. The median is 130.

   STEP 4 Conclude: Farmers of Barangay San Pedro produce 130 sacks of rice.

Let's Review

A. The steps in conducting a survey are given below. Which are done first? Write 1 to 8 on the blanks.

a. ____ Write the questions or queries that you want to be answered by your sample.

b. ____ Determine the population that you will study.

c. ____ Decide on the topic that you want to research on.

d. ____ Select the sample.

e. ____ Select a method of data gathering.

f. ____ Analyze the data using the measures of variability and central tendency.

g. ____ Gather data.

h. ____ Conclude.

B. Read the case and answer the following questions:

Glennda wants to know the average grade of her classmates in Science.

1. What was Glennda's topic?

_____

2. What is the population that she will study?

_____

3. What is the best sampling technique that she can use to get a sample of 30? Why?

_____

4. What is the question that she wants to be answered by her classmates?

_____

5. What is the most convenient data gathering method that she can use? Why?

_____

6. If Glennda got the following data, what is the measure of central tendency that she can use to find the average grade of her classmates? Why?

_____

Respondent 1: 85	Respondent 16: 90
Respondent 2: 79	Respondent 17: 83
Respondent 3: 83	Respondent 18: 85
Respondent 4: 84	Respondent 19: 86
Respondent 5: 82	Respondent 20: 87
Respondent 6: 86	Respondent 21: 84
Respondent 7: 70	Respondent 22: 86
Respondent 8: 90	Respondent 23: 85
Respondent 9: 86	Respondent 24: 66
Respondent 10: 85	Respondent 25: 85
Respondent 11: 88	Respondent 26: 83
Respondent 12: 87	Respondent 27: 82
Respondent 13: 65	Respondent 28: 81
Respondent 14: 88	Respondent 29: 85
Respondent 15: 86	Respondent 30: 86

7. Show the solution in computing for the average.

8. What can you conclude from the analysis?

_____

C. Make a study using the following topics. Write a report in paragraph form about your research on each topic. Divide the report into 4 sections: I. Conceptualization and Planning; II. Data Gathering; III. Analysis; and IV. Conclusion.

1. Make a study on whether or not residents in your barangay agree on divorce.

2. Make a study on the average number of children each family in your barangay has.

Have you finished answering? Compare your answers to the *Answer Key* on pages 47–49.

Let's Remember

- Survey – a study that uses a sample
- Census – a study that uses a population
- Steps in conducting a survey:

I. Conceptualization and Planning

   A. Select a topic to research on.
   B. Determine the population that you will study.
   C. Select the best sampling technique that you will use to select the sample.
   D. Determine the sample size, and select the sample.

II. Data Gathering

   A. Write down your questions and queries.
   B. Determine the method of data gathering that you will use.

      1. Interview
      2. Questionnaire
      3. Observation
      4. Experimentation

   C. Gather data.

III. Analysis

   A. Get the variability (Range)
   B. Determine the measure of central tendency that you will use.
   C. Get the central tendency.

IV. Conclude.

Let's See What You Have Learned

A. Write T if the statement is true or F if the statement is false.

1. ____ A survey is a study that uses a population.
2. ____ Experimentation is a method of data gathering that controls and observes the sample.
3. ____ The mode is used only on categorical data.
4. ____ If the data has a high variability, it is best to use the median.
5. ____ In using the mean, the lowest and the highest data affects the central tendency greatly.

B. Read the case and answer the following questions:

Cristina wanted to know how many of the residents in their barangay can recite *Panatang Makabayan* completely. She does not have enough time and money for the study, and she does not have a list of the residents.

1. What was Cristina's topic?

   _____

2. What is the population that she will study?

   _____

3. What is the best sampling technique that she can use to get a sample of 30? Why?

   _____

4. What is the question that she wants to be answered by the members of the sample?

   _____

5. What is the most convenient data gathering method that she can use? Why?

   _____

6. If Cristina got the following data, what is the measure of central tendency that she can use to find the number of people that knows how to recite the *Panatang Makabayan* completely? Why?

   _____

A **4** means that the respondent can recite the *Panatang Makabayan* completely. A **8** means that the respondent cannot to recite the *Panatang Makabayan* completely.

Respondent 1: **4**
Respondent 2: **4**
Respondent 3: **4**
Respondent 4: **8**
Respondent 5: **8**
Respondent 6: **4**
Respondent 7: **8**
Respondent 8: **8**
Respondent 9: **4**
Respondent 10: **4**
Respondent 11: **8**
Respondent 12: **4**
Respondent 13: **8**
Respondent 14: **8**
Respondent 15: **8**
Respondent 16: **4**
Respondent 17: **8**
Respondent 18: **4**
Respondent 19: **4**
Respondent 20: **8**
Respondent 21: **8**
Respondent 22: **4**
Respondent 23: **4**
Respondent 24: **4**
Respondent 25: **8**
Respondent 26: **8**
Respondent 27: **4**
Respondent 28: **4**
Respondent 29: **4**
Respondent 30: **8**

7. Show the solution in computing for the average.

8. What can you conclude from the analysis?

_____

C. Make a study using the following topics. Write a report in paragraph form about your research on each topic. Divide the report into 4 sections: I. Conceptualization and Planning; II. Data Gathering; III. Analysis; and IV. Conclusion.

1. Find the average budget allocated to food by the residents in your barangay.
2. Find the average price of rice per kilo in your barangay.

Have you finished answering? Compare your answers to the *Answer Key* on page 49.

Let's Remember

We have already finished the module. Now let's review what you learned.

- A population is a group of persons or things that will be studied, while a sample is only a part of the population.
- A parameter is a characteristic of a population while a statistic is a characteristic of the sample.
- Sampling is the process of selecting a sample to represent the whole population.
- The two kinds of errors are random sampling error and bias.
- Probability sampling bases the selection of a sample on chance of occurrence or probability.

  Subtypes:

  1. Simple random sampling
  2. Stratified random sampling
  3. Systematic random sampling
  4. Cluster sampling

- Non-probability sampling bases the selection of a sample on convenience and accessibility.

  Subtypes:

  1. Accidental or incidental sampling
  2. Quota sampling
  3. Purposive sampling

- A survey is a study that uses a sample while a census is a study that uses a population.
- Steps in conducting a survey.

  1. Conceptualization and planning
     - selection of topic, population and sample
  2. Data gathering
  3. Analysis
     - computations using statistical measures
  4. Conclusion

What Have You Learned?

A. Fill in the blanks.

1. _____ occurs when the researcher makes a faulty selection of the sample.
2. A _____ is a characteristic of the population.
3. A _____ is a group of persons or things that will be studied.
4. A _____ is the process of selecting a sample.
5. A _____ is a part of the population

B. Choose among the answers listed in the box. Write the letter of the correct answer.

1. _____ gives the members of a population equal chances of being selected and it works well in a small population
2. _____ uses a number to systematically select members of the sample.
3. _____ bases the selection of the sample on convenience and accessibility.
4. _____ divides the population into strata, and selects a sample from these based on convenience and accessibility.
5. _____ selects the sample based on specific traits needed by the study.

a.	simple random sampling	f.	stratified random sampling
b.	probability sampling	g.	systematic random sampling
c.	cluster sampling	h.	non-probability sampling
d.	accidental sampling	i.	quota sampling
e.	purposive sampling		

C. Read the case and answer the following questions.

Alex wanted to know the brand of soap used by most of the residents of their barangay.

1. What is Alex's topic?

_____.

2. What is the population that he will study?

_____.

3. If he does not have enough money and time for the study, what is the best sampling technique that he can use to get a sample of 30? Why?

_____.

4. What is the question that he wants to be answered by the members of the sample?

_____.

5. What is the most convenient data gathering method that he can use? Why?

_____.

6. If Alex got the following data, what is the measure of central tendency that he can use to find the brand of soap used by most of the residents?

_____.

Respondent 1: Brand A	Respondent 16: Brand A
Respondent 2: Brand A	Respondent 17: Brand A
Respondent 3: Brand D	Respondent 18: Brand C
Respondent 4: Brand C	Respondent 19: Brand A
Respondent 5: Brand C	Respondent 20: Brand D
Respondent 6: Brand A	Respondent 21: Brand A
Respondent 7: Brand B	Respondent 22: Brand D
Respondent 8: Brand D	Respondent 23: Brand C
Respondent 9: Brand A	Respondent 24: Brand B
Respondent 10: Brand A	Respondent 25: Brand A
Respondent 11: Brand A	Respondent 26: Brand A
Respondent 12: Brand B	Respondent 27: Brand C
Respondent 13: Brand C	Respondent 28: Brand A
Respondent 14: Brand A	Respondent 29: Brand A
Respondent 15: Brand D	Respondent 30: Brand A

7. Show the solution in computing for the average.

8. What can you conclude from the analysis?

_____.

Answer Key

A. Let's See What You Already Know *(pages 2–3)*

A. 1. **F**
2. **T**
3. **F**
4. **T**
5. **T**

B. 1. Probability sampling
2. Stratified random sampling
3. Cluster sampling
4. Accidental or incidental sampling
5. Purposive sampling

C. 1. Juan's topic is about the about the average score of grade five students in a science examination.
2. The population that he wanted to study was the grade five students.
3. Since he is not limited by time or money, Juan can choose among probability sampling techniques. The best sampling technique that he can use is systematic random sampling since he has a list of all the students; there are no groups in the population that can significantly affect the outcome; and it works best in a big population.
4. The best data gathering method that he can use is an interview since he only has one question to ask, and since the sample is small.
5. The measure of central tendency that he should use is the median since the data has high variability. The range of the data is 95 – 65 = 30.
6. List all the data from the lowest to the highest.

65	85
66	85
67	85
70	85
79	86
80	86
81	86
82	86
83	86
83	87
83	88
84	90
84	90
85	95
85	97

Select the middle data. The median is 85

7. The average score of grade five students in the science examination is 85.

B. Lesson 1

Let's See What You Have Learned (paged 11–12)

A. 1. parameter
2. sampling error
3. bias
4. random sampling error
5. sample

B. 1. Population: grade six students

Parameter: average height – 4 feet and 5 inches
Sample:100 grade six students
Statistic: average height – 4 feet and 7 inches

2. Population: voters in Marikina city

Parameter: percentage of voters who based voting on popularity – 70%

Sample: 2000 of the voters in Marikina city

Statistic: percentage of voters who based voting on popularity – 60%

C. 1. The sample has 150 members. It is representative of the population because it has more than 30 members.

2. The barangay captain used a sample because the barangay does not have enough money to make a study on the whole population.

3. The barangay captain can make the result closer to the parameter if he will increase the sample size.

4. The barangay captain committed random sampling error, which is present in all studies that use sampling. He also committed bias because he chose more farmers who farm in a more fertile land.

C. Lesson 2

Let's See What You Have Learned (pages 26–17)

A. 1. **F**
2. **T**
3. **F**
4. **T**
5. **T**

B. 1. Non-probability
2. quota sampling
3. number
4. strata
5. cluster

C. 1. a. The study is not restricted by economic limitations but the study requires specific traits of a group of people.

b. The best sampling technique that Anthony can use is purposive sampling because the study requires specific traits of a group of people.

D. 1. The best sampling technique that you can use is stratified random sampling since some farmers can significantly affect the outcome. Since your foremost concern is the quality of the result, you should still use stratified random sampling even if you have only a small budget for it.

2. Since Julie has enough time and money for the study, she can select among probability sampling techniques. The best sampling technique that she can use is systematic random sampling because the population is big and because she has a list of all the students.

Let's Review (pages 37–38)

A. a. 4
b. 2
c. 1
d. 3
e. 5
f. 7
g. 6
h. 8

B. 1. Glennda's topic is about the average grade of her classmates in science.

2. The population that she will study is her classmates.

3. The best sampling technique that she can use is simple random sampling since the population is small.

4. She will ask the members of the sample their grades in science.

5. The most convenient data gathering method is an interview since the sample is small.

6. The best measure of central tendency that she can use is the median since the data has a high variability. The range is 90 – 65 = 25.

7. List the data from the lowest to the highest.

65	85
66	85
70	85
79	86
81	86
82	86
82	86
83	86
83	86
83	87
84	87
84	88
85	88
85	90
85	90

The median is 85.

8. The average grade of the class is 85.

C. The following answers are sample answers to numbers 1 and 2.

I. Conceptualization

The topic that I researched on is about whether or not residents of our barangay agree on divorce. From the population of the all the residents in the barangay, I chose 30 residents using accidental or incidental sampling because I do not have enough time and money for the study.

II. Data Gathering

I asked each of the members of the sample whether or not they agree on divorce. The data gathering method that I used is an interview because there are only a few members in the sample.

Below are the data that I gathered.

Respondent 1: yes	Respondent 16: yes
Respondent 2: no	Respondent 17: no
Respondent 3: no	Respondent 18: no
Respondent 4: yes	Respondent 19: no
Respondent 5: no	Respondent 20: yes
Respondent 6: yes	Respondent 21: no
Respondent 7: no	Respondent 22: yes
Respondent 8: yes	Respondent 23: yes
Respondent 9: no	Respondent 24: no
Respondent 10: no	Respondent 25: no
Respondent 11: no	Respondent 26: no
Respondent 12: no	Respondent 27: yes
Respondent 13: yes	Respondent 28: yes

Respondent 14: no
Respondent 15: yes
Respondent 29: no
Respondent 30: no

III. Analysis

Since the data is categorical, I used the mode to measure the central tendency of the data. There are 12 people who agreed on divorce and 18 who did not.

IV. Conclusion

Most of the residents in the barangay does not agree on divorce.

Let's See What You Have Learned (pages 39–41)

A. 1. **F**
2. **T**
3. **F**
4. **T**
5. **T**

B. 1. Cristina's topic is about the number of the residents in their barangay who can recite *Panatang Makabayan* completely.

2. The population that she will study is the residents in their barangay.

3. The best sampling technique that she can use is accidental or incidental sampling since she is limited by time and money, and because she does not have a list of the residents.

4. The most convenient data gathering that she can use is an interview because the sample only has a few members.

5. Since the data is categorical, the best measure of central tendency that she can use is the mode.

6. Write how many residents can recite *Panatang Makabayan* completely and how many can not.

4 = 16

8 = 14

The mode is **4**.

7. Most of the residents in their barangay can recite Panatang Makabayan completely.

C. There are no answers provided. See the sample answer for the Let's Review answer key, part C.

D. What Have You Learned *(pages 43–44)*

A. 1. Bias
2. Parameter
3. Population
4. Sampling
5. Sample

B. 1. a.
2. g.
3. h.
4. i.
5. e.

C. 1. Alex's topic is about the brand of soap used by most of the residents of their barangay.

2. The population that he will study is the residents of their barangay.

3. The best sampling technique that he can use is accidental or incidental sampling because he does not have enough money and time for the study, and because the population is big.

4. He wants to ask each resident the brand of soap that he/she uses.

5. The most convenient data gathering method that he can use is an interview because the sample is small.

6. Since the data is categorical, the measure of central tendency that he can use is the mode.

7. Write how many times each brand of soap was answered.

Brand A = 16
Brand B = 3
Brand C = 6
Brand D = 5

The mode is Brand A

8. Most of the residents in the barangay use Brand A.