

Systematic sampling	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Simple and quick to use • Suitable for large samples and large populations 	<ul style="list-style-type: none"> • A sampling frame is needed • It can introduce bias if the sampling frame is not random

Stratified sampling	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Sample accurately reflects the population structure • Guarantees proportional representation of groups within a population 	<ul style="list-style-type: none"> • Population must be clearly classified into distinct strata • Selection within each stratum suffers from the same disadvantages as simple random sampling

1.3 Non-random sampling

There are two types of non-random sampling that you need to know:

- Quota sampling
- Opportunity sampling

- **In quota sampling, an interviewer or researcher selects a sample that reflects the characteristics of the whole population.**

The population is divided into groups according to a given characteristic. The size of each group determines the proportion of the sample that should have that characteristic.

As an interviewer, you would meet people, assess their group and then, after interview, allocate them into the appropriate quota.

This continues until all quotas have been filled. If a person refuses to be interviewed or the quota into which they fit is full, then you simply ignore them and move on to the next person.

- **Opportunity sampling consists of taking the sample from people who are available at the time the study is carried out and who fit the criteria you are looking for.**

Notation Opportunity sampling is sometimes called **convenience sampling**.

This could be the first 20 people you meet outside a supermarket on a Monday morning who are carrying shopping bags, for example.

There are advantages and disadvantages of each type of sampling.

Quota sampling	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Allows a small sample to still be representative of the population • No sampling frame required • Quick, easy and inexpensive • Allows for easy comparison between different groups within a population 	<ul style="list-style-type: none"> • Non-random sampling can introduce bias • Population must be divided into groups, which can be costly or inaccurate • Increasing scope of study increases number of groups, which adds time and expense • Non-responses are not recorded as such

Opportunity sampling	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Easy to carry out • Inexpensive 	<ul style="list-style-type: none"> • Unlikely to provide a representative sample • Highly dependent on individual researcher

1.4 Types of data

- **Variables or data associated with numerical observations are called quantitative variables or quantitative data.**

For example, you can give a number to shoe size so shoe size is a quantitative variable.

- **Variables or data associated with non-numerical observations are called qualitative variables or qualitative data.**

For example, you can't give a number to hair colour (blonde, red, brunette). Hair colour is a qualitative variable.

- **A variable that can take any value in a given range is a continuous variable.**

For example, time can take any value, e.g. 2 seconds, 2.1 seconds, 2.01 seconds etc.

- **A variable that can take only specific values in a given range is a discrete variable.**

For example, the number of girls in a family is a discrete variable as you can't have 2.65 girls in a family.

Large amounts of data can be displayed in a frequency table or as grouped data.

- **When data is presented in a grouped frequency table, the specific data values are not shown. The groups are more commonly known as classes.**

- **Class boundaries tell you the maximum and minimum values that belong in each class.**
- **The midpoint is the average of the class boundaries.**
- **The class width is the difference between the upper and lower class boundaries.**

Example 4

The lengths, x mm, to the nearest mm, of the forewings of a random sample of male adult butterflies are measured and shown in the table.

Length of forewing (mm)	Number of butterflies, f
30–31	2
32–33	25
34–36	30
37–39	13

- State whether length is
 - quantitative or qualitative
 - discrete or continuous.
- Write down the class boundaries, midpoint and class width for the class 34–36.

- a i Quantitative
ii Continuous
- b Class boundaries 33.5 mm, 36.5 mm
Midpoint = $\frac{1}{2}(33.5 + 36.5) = 35$ mm
Class width = $36.5 - 33.5 = 3$ mm
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Watch out Be careful when finding class boundaries for continuous data. The data values have been rounded to the nearest mm, so the upper class boundary for the 30–31 mm class is 31.5 mm.