

Describe Random, Stratified Sampling, Bias & Primary & Secondary Data HD3

Who to ask?

A **population** is the group being studied. A **sample** is a part of this group and is the people who you ask. If the sample is large enough and taken without bias, then the sample is likely to be a good representation of the whole population. Remember **increasing** the **sample size** usually means the sample will **better reflect the population** as a whole.

Example

The students in a school could be a **population**. A sample could just be the first 10 students you see but these might be a group of friends with similar opinions. A better sample might be 1 student from each class (assuming there are 10 classes in this school). By asking students from different classes you ensure that students of different ages and not just friends of the original group are represented!!

The results of your survey will probably be even better if you were to increase the number of students you ask to say 50, say 5 from each class. The more students you ask the more likely your survey will represent the school as a whole.

Examination Hint:

Some exam questions ask you for a reason why a particular survey is not good.

Look to see **which people are being asked** and if they do not represent the population as a whole then simply say, 'The people asked (probably) do not represent the population being studied.'

Example

John, a restaurant owner, gives his family a questionnaire about his restaurant. What might be wrong with this and suggest something better.

Solution

John's family probably do not represent his customers very well. John could give every 10th customer he has his questionnaire.

Primary and Secondary Data

Primary data is collected by the person analysing and using the data, usually through an experiment or by a survey. **Secondary data** is already collected, for example data in books, newspapers and the national census.

Bias

Bias is introduced i) in questionnaires by asking **leading questions**, "You like baked beans, don't you?" ii) in samples where the sample is **not representative** of the group, e.g. Data for opinions about school dinners by asking the **first** 5 people in a dinner queue! iii) in samples where sample size is **too small**.

Your Turn!!

- Learn the meaning of the terms '**Primary Data**' and '**Secondary Data**'
- What might a **leading question** do to the results of a questionnaire?

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Sampling Methods

In **Random Sampling** each member of the population has an **equal chance** of being selected. This can be achieved by giving each member of the population a number and selecting the numbers randomly from a hat or by using a random feature like RAN on the calculator.

A **Stratified Sample** divides the population into groups called **strata**. The number of people taken from each group for the sample is always in proportion to the original number of people in each group. Usually the members chosen from each group are chosen in a random way, using **random sampling**. This increases the likelihood that the sample from each group reflects that group fairly.

Extra

Selective or **systematic sampling** is for example where the population is numbered 1 to say 200 and you select say every 12th item.

Example

From the following table calculate the number of students from each year group when a stratified sample of 20 students is taken.


Year Group	Number of Students
9	100
10	110
11	135

Solution

Total number of students is $100 + 110 + 135 = 345$

Year Group	Number of Students	Number of Students required for a sample of 20	Rounding sensibly to get 20	So take 6 students from year groups 9 and 10 and take 8 students from year 11.
9	100	$20 \times \frac{100}{345} = 5.80$ to 2 d.p.	$5.79 \rightarrow 6$	
10	110	$20 \times \frac{110}{345} = 6.38$ to 2 d.p.	$6.38 \rightarrow 6$	
11	135	$20 \times \frac{135}{345} = 7.83$ to 2 d.p.	$7.83 \rightarrow 8$	

Your Turn!!

- Calculate the number of people required from each village for a stratified sample of 120. 
- Describe the key characteristic of Random Sampling.
- Describe the key characteristic of Stratified Sampling.
- Describe how to collect a random sample of 10 people from a room of 100 people.

Village	Number of People
Axbridge	25,000
Backwell	20,000
Congresbury	4,000

RAPID 'ACID' TEST – Blank out the page above before answering these!

- Calculate the number of people from each village required for a stratified sample of 400. ↓
- What sampling method does 'each member has an equal chance of being selected' describe?
- There is one way which is always likely to improve the results for any sampling method. What is it?
- What is secondary data?
 - Explain one way in which bias may be introduced in questionnaires.

Village	Number of People
Dumpy-lumpy	30,000
Eep-hill	10,000
Freddie's Den	5,000