Part 3: Non Sampling Errors

There are two possible reasons that an estimate from a sample and the true value of the population parameter (eg: proportion, mean, median) might be different. The first reason is because we have taken a sample, which isn't going to be exactly the same as the population. This is called **sampling error**, and we will look at this later when we look at margins of error.

The second reason is because of **non-sampling errors**. Non-sampling errors have the potential to cause bias in surveys or samples as they make the sample non-representative. There are many different types of non-sampling errors, and the names used for each of them can vary, but the names below are fairly well recognized as being acceptable.

Non-sampling errors can be much larger than sampling errors and we try and reduce them as much as possible when we design the poll or survey. It is often impossible to correct for them after the survey is completed and virtually impossible to determine how badly they will affect the result. Good surveys will try to minimize non-sampling errors in the design of the survey, often this is done by doing a pilot survey of a small group first.

Non-Sampling Error	Description	Example
Selection Bias	The sampling process is such that a specific group is excluded or under-represented in the sample, deliberately or inadvertently. If the excluded or under-represented group is different, with respect to survey issues, then bias will occur.	If the target population is adults in New Zealand, and the survey is done by phoning people, there are going to be people missed as not all adults in New Zealand have a phone.
Self-Selection Bias	The sampling process allows individuals to select themselves. Individuals with strong opinions about the survey issues or those with substantial knowledge will tend to be over-represented, creating bias.	With polls on the internet normally only people who are interested in a particular topic will respond. This usually results in only people with strong opinions one way or another responding, and not giving a representative sample.
Behavioural Considerations	Answers given by respondents do not always reflect their true beliefs because they may feel under social pressure not to give an unpopular or socially undesirable answer.	For example in a survey about using cell phones when driving, people are less likely to be honest, as they know it is illegal to use a cell phone when driving.
Interviewer Effects	Answers given by respondents may be influenced by the desire to impress an interviewer. The sex, race, religion and manner of the interviewer can all influence how people respond to a particular question.	If the interviewer was a Catholic priest or a leader of a mosque, the way people may respond might be quite different if the interviewer didn't have any obvious religious affiliation.
Transfer of Findings	Taking the data from one population and transferring the results to another can lead to incorrect conclusions being made.	A survey done in Wellington may not be able to be applied to people all around New Zealand.

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Non-Sampling Error	Description	Example
Non-Response Bias	If people who refuse to answer are different, with respect to survey issues, from those who respond then bias will occur. This can also happen with people who are never contacted and people who have yet to make up their mind. Also, if the response rate (the proportion of the sample that takes part in a survey) is low, bias can occur because respondents may tend consistently to have views that are more extreme than those of the population in general.	In an survey about working hours, those that do not respond are likely to be those who work long hours as they don't have time to respond.
Question Effects	The wording of questions can influence survey results. Even small changes can make big differences in results.	On 18 August 1980 New York Times/CBS News ran a Poll and asked two questions as part of a longer survey: • "Do you think there should be an amendment to the constitution prohibiting abortions?" Yes 29% No 62% • "Do you think there should be an amendment to the constitution protecting the life of the unborn child?" Yes 50% No 39% We can see while the questions are asking opinions on the same topic, the results are very different.
Survey Format Effects	The order in which questions are asked, how the survey is conducted (in person, online, via the phone), and the number and type of options offered can influence survey results.	If this question was asked: "To what extent do you think teenagers are affected by peer pressure when drinking alcohol ?" Followed by: "Name the top 5 peer pressures you think teenagers face today." It is likely to result in skewed answers to the second question. (see video here for a great example) Long surveys are also likely to get people rushing through and not thinking carefully about their answers.

For Achieved in this standard you need to be able to identify the non-sampling errors. For Merit and Excellence you are expected to identify and describe the non-sampling errors in context.