



HOW-TO: Random Sampling of Children for an ELOM Assessment

How to randomly sample children for an ELOM assessment



Purpose of random sampling: helps to prevent bias by giving every child an equal opportunity to be part of the study, making sure your results can be generalisable beyond your study sample.

Random sampling is a method used in research and evaluation to select a group of individuals from a larger population so that each member of the population has an equal chance of being chosen for the study. The key idea is randomness—every individual has an equal chance of being included, rather than being selected because of some particular reason or attribute.

Random sampling helps to ensure that the sample of children included in an Early Learning Outcomes Measure (ELOM) study is *representative* of all children attending the same early learning programme (ELP), not only a chosen few. This helps to ensure that the outcomes of the ELOM assessments can be assumed to represent all children attending the ELP, not only those who have a particular attribute (e.g., the most capable).

Why is this important? Imagine you are trying to understand how well a new teacher training programme translates to child development outcomes. If you only select children from one specific ELP out of many, your findings might not apply to all children or ELPs. Similarly, if you let an ELP practitioner choose which children should be assessed, they may only choose their brightest children, which would not give you a fair representation of the class.

KEY STEPS IN RANDOM SAMPLING

STEP ONE: Decide on your study purpose and questions

The first and most critical step in any research or evaluation process is to decide on your study purpose and related questions. These questions will help you clarify what is most important to understand from your study and will shape the entire sampling process. The study questions are typically shaped by the overall purpose of the study - whether it is to establish programme effectiveness to show a funder, or understand areas for intervention or improvement among certain programmes or groups.

The purpose determines what needs to be measured, compared, or explained. Well-defined study questions ensure that you focus on the key issues that matter for your situation, such as demonstrating effectiveness. Once these questions are set, they guide your subsequent decisions, including which population to sample, how to group the sample, and the most appropriate sampling strategy to use. Without clear study questions, it is difficult to ensure that your sampling approach will provide relevant, actionable insights.

Examples of study questions for the purpose of programme improvement:

- What improvements can be made to the classroom environment that will enhance children's school readiness outcomes?
- How effectively are newly trained teaching strategies improving children's school readiness across different ELPs?
- What role does growth status play in children's school readiness outcomes?

Examples of study questions for the purpose of proving programme effectiveness:

- To what extent are children in our programmes school ready compared to children in similar socioeconomic backgrounds?
- How well does our curriculum prepare children for Grade R?

STEP TWO: Choosing the population that you want to study

When deciding on the population you want to study, there are several considerations which will inform your sampling process. These should be based on your study purpose and set of questions.

? Who are the children? Do you want to look at both girls and boys? How old are they?

Children in the sample should be within the following age brackets: between 50 and 69 months old for the ELOM 4&5. For the ELOM-R tools, children need to be assessed at the end of their Grade R year OR at the very beginning of their Grade 1 year. There should be at least 20 children per age grouping.

? Do we want to look at children at two points in time? (Pre-post study)

If your study purpose is to establish programme effectiveness and your questions centre on change or improvement among your sample over time, then you will need to do multiple assessments across a particular time period (e.g., one year for a pre-post study). In this situation, you need to be particularly careful about the ages of your sample. The first baseline assessment should only contain children in the lower age band of the assessment tool. For the ELOM 4&5, this is children between 50 and 59 months. This helps to ensure that children are still in an appropriate age band for the ELOM tools at endline, or follow-up. So, at the endline assessment, children should be between 60 and 69 months old for the ELOM 4&5.

? Do we want to understand differences among children?

If your study question/s are focused on children's performance in relation to their individual characteristics (e.g., gender, socioeconomic status, or growth status), you may want to group children accordingly - regardless of which programme that they attend. This allows you to assess differences at the child level to better understand how children's characteristics might influence their ELOM performance (see "stratified random sampling" below). In this case, it is important to ensure that the programmes from which you are sampling children are as similar as possible (e.g., they should be similar in terms of the quality of the programme that they deliver). This would allow you to isolate the contribution of children's characteristics to ELOM scores. However, you might be more interested in comparing children's performance at the programme level, rather than the child level - see below.

? Do we want to compare programmes?

If you are more interested in differences at the programme level, such as the quality of the programme, teacher education, or curriculum, you may want to group children according to the programme that they attend. In this case, you could use a clustered or stratified random sampling approach, depending on whether you want to sample entire groups (programmes) or subgroups within them. This strategy helps control for programme-level factors that may influence children's outcomes, allowing you to compare between different types of programmes.

STEP THREE: Decide on the sample size

A small-scale, descriptive study using the ELOM 4&5 or the ELOM-R tools requires an assessment of a sample comprising of at least 15 to 20 children to meet the requirements for basic statistical analysis. However, we recommend oversampling to account for data losses during fieldwork (e.g., if children refuse or an assessment gets interrupted) or data cleaning (see Box 1). For evaluations and larger studies, sample size requirements should be calculated based on the statistical power needed for data analyses.

BOX 1: Data cleaning considerations

Any study using the ELOM tools requires a data cleaning process, in which children's ELOM assessments are checked against a number of criteria that determine whether they should be included in the final sample for analysis. In most studies, one or more assessments are removed during this process to increase the reliability of the results. Because of this, it is always recommended to oversample by including additional children in the sample.

The criteria we use to exclude ELOM data includes:

- The child is not within the appropriate age band
- The assessment language is not appropriate for the child
- The child failed the World Health Organisation disability screening
- The child scored zero for two or more ELOM domain scores
- The child was assessed more than once within a four-month period (the first assessment will be used and subsequent assessments excluded)
- The assessor indicated a problem with the assessment conditions (including noise)
- The child did not complete the assessment

Larger samples provide more statistical certainty. However, they cost more and require far more work. There are several potential ways to decide upon the size of your sample, but one of the simplest ways involves using a formula with your desired **confidence interval**, estimated size of the population you are working with, and the **standard deviation** of whatever you want to measure in your population. A confidence interval specifies the range of values that you expect your results to fall within. The most common confidence interval is 0.95 (or 95%). A confidence interval of 0.95 means that you are 95% confident that a result will fall between specific values. Standard deviation is the average amount of variability in your sample (i.e., how far each value lies from the average).

Since you may not know the standard deviation of the population you are studying, you should choose a number high enough to account for a variety of possibilities (such as 0.5). You can then use a sample size calculator, such as **G*Power**, to estimate the necessary sample size using these metrics.

If you are unsure of this process, we suggest the following generic sample sizes based on your type of study:

- Single ELOM assessment at one point in time ('dipstick'): 25 - 50 children
- Baseline and endline ELOM assessments ('pre-post study'): 40 - 100 children

If you are planning a research study or evaluation in which you are performing inferential statistical analyses that you want to generalise broadly, we recommend sampling 100+ children.

STEP FOUR: Decide on a sampling strategy

A sampling strategy is the method used to choose the children who will form part of your sample. It is important to note that the choice of sampling strategy depends on your specific research objectives, the characteristics of the population (such as location or age), and practical considerations (such as budget or number of ELOM assessors available). Each strategy has its strengths and limitations, and you need to carefully select the one that best suits your study design and research or evaluation aims.



Simple random sampling

This is the most straightforward method where every child has an equal chance of being selected, but it can be time consuming if you have a large population. This typically involves using a random number generator or drawing names from a hat.



Systematic random sampling

Children are selected at regular intervals from a list after a random start. For example, every fifth child on a list could be selected after a random starting point. This may be quicker and easier to implement compared to the 'lottery' methods of simple random sampling, but it may introduce bias if the list has been ordered in a particular way (e.g., children are listed according to age, grades or previous scores). You would choose simple random sampling when you want complete randomness without any concern about patterns. Systematic random sampling is useful when something more efficient is needed, but you must first ensure that there are no hidden patterns in your population list that could skew results.



Stratified random sampling

Your child population is divided into subgroups (or 'strata') based on certain characteristics (like age, gender, quintile or programme quality). Then, random samples are taken from each subgroup proportionally to its presence in the population. This ensures representation from all subgroups. This is an important strategy for use in ELOM fieldwork to ensure that your child sample is age-appropriate and both genders are equally represented.



Clustered random sampling

Children are divided into groups (clusters) based on some criteria (e.g., a specific location or programme). Random clusters are then selected, and all individuals within those clusters are included in the sample.



Multi-stage random sampling

This involves a combination of two or more of the above strategies. For example, you might use stratified sampling to create subgroups and then use simple random sampling within each subgroup.

Remember that the key to a good random sample is that every child in the larger group should have an equal chance of being selected. Whatever method you choose, it should be free from bias and ensure randomness to make your sample representative of the entire group.

STEP FIVE: Randomly select your sample

You may wish to pre-select your sample before your ELOM fieldwork begins, using class lists obtained from the early learning programmes. Alternatively, the random selection of children can take place in the field by ELOM assessors. A guide for in-field sampling is available [here](#).

Below are generic steps for stratified random sampling for ELOM 4&5 assessments:

- 1** Obtain a list of all age-eligible children in the class for whom you have consent. Ensure the list has not been ordered, or that children are not ranked for a particular reason.
- 2** Exclude in advance all children known to have obvious disabilities (cannot see, hear, move or comprehend instruction).
- 3** Break the list into 2 groups: (1) 50 – 59 months old and (2) 60 – 69 months old.
- 4** Further break each list into another two subgroups of boys and girls.
- 5** Count down the list, choosing every second or third child (systematic random sampling).
- 6** If the child refuses, take the next child on the list.
- 7** If there is an insufficient number of children, you may have to include all the age-eligible children available. This would be a type of non-random sampling that may result in your study being less valid than with random sampling. It may be worth considering increasing your sample size, or sampling at a higher level than the classroom where possible.