

Sampling Framework

**COVID-19: Monitoring Impacts on Learning Outcomes
(MILO)**

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The ACER Centre for Global Education Monitoring supports the monitoring of educational outcomes worldwide, holding the view that the systematic and strategic collection of data on education outcomes, and factors related to those outcomes, is required to inform high quality policy aimed at improving educational progress for all learners.

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Glossary

ACER	Australian Council for Educational Research
DTP	Defined Target Population
ENR	Enrolment
ISCED	International Standard Classification of Education
MOS	Measure of Size
NC	National Centre
NPM	National Project Manager
NTP	National Target Population
COVID-19 MILO	COVID-19: Monitoring Impacts on Learning Outcomes
UIS	UNESCO Institute for Statistics

Framework Overview

Introduction

The COVID-19: Monitoring Impacts on Learning Outcomes (MILO) project aims to measure learning outcomes in six countries in Africa, in order to analyse the long-term impact of COVID-19 on learning and to evaluate the effectiveness of distance learning mechanisms utilised during school closures. In addition, this project will develop the capacity of countries to monitor learning after the crisis.

The COVID-19 MILO Sampling Framework is designed to provide a template for the design and conduct of the survey. It aims to meet the objectives of obtaining accurate estimates of learning outcomes for students who are in the grade corresponding to the final year of primary school (in line with SDG indicator 4.1.1(b)).

This framework sets out the standards of participation with respect to sampling, which are aimed at maximising the comparability of survey outcomes across countries before and after the onset of the COVID-19 pandemic. An account of each country's participation measured against these standards will be a component of survey reporting. The framework outlines the key roles and responsibilities with respect to sampling and survey design for the NC (National Centre), ACER (Australian Council for Educational Research) and the UIS (UNESCO Institute for Statistics).

Defining COVID-19 MILO Target Population

The target population for COVID-19 MILO is as follows:

All students enrolled in the grade that corresponds to the final year of primary school where the language of instruction is English or French.

The grade that corresponds to the final grade of primary schooling within the country will be determined with reference to the structural definition without each country, aligned with international standards (ISCED) and with reference to grade levels that have previously been used to report against SDG 4.1.1(b).

All students enrolled in the target grade in each participating country are included in the target population. This includes students from schools across all educational sub-systems and types within a country where the language of instruction is English or French.

Coverage and Exclusions

The aim of COVID-19 MILO is to provide complete coverage of the target population. However a small number of exclusions at school or student level are sometimes necessary, and in rare cases there may be reductions in coverage (for example a region recently affected by a major natural disaster). For each participant country, exclusions and reductions in coverage will be documented and quantified and will form part of the project reporting.

A 5% threshold has been adopted as the upper limit for the exclusion of members of the survey population, either as a result of excluding schools or excluding individual students within schools. The objective is to minimise exclusions as much as possible.

School-level exclusions

Schools may be excluded from the survey, mainly for practical reasons, such as increased survey costs or difficult survey conditions. Some examples of school-level exclusions include:

- very remote locations (inaccessibility)
- very small schools (less than 5 students in the target grade)
- international schools (offering a curriculum other than the prescribed national curriculum)
- schools catering exclusively to students who would be student-level exclusions.

Student-level exclusions

While the aim of COVID-19 MILO is to be as inclusive of as many students as possible, some students from sampled schools may be unable to access the assessment and will therefore need to be excluded. The following are the categories for student-level exclusions.

- Students with functional disabilities—these are students who have physical disabilities in such a way that they cannot take the COVID-19 MILO test. Functionally disabled students are those with a moderate to severe permanent disability. Students with functional disabilities who can perform the assessment should be accommodated in the test situation, within reason, rather than excluded.
- Students with intellectual disabilities—these are students who have a cognitive, behavioural, or emotional disability confirmed by qualified staff, such that they are unable to take the COVID-19 MILO test. These are students who are cognitively, behaviourally or emotionally unable to follow even the general instructions of the test. Students should not be excluded solely because of poor academic performance or normal disciplinary problems. It should be noted that students with dyslexia, or other such learning disabilities, should be accommodated in the test situation, within reason, rather than excluded.
- Students with insufficient assessment language experience—these are students who are unable to read or speak the language(s) of the test and would be unable to overcome the language barrier in the test. Such students meet **ALL** the following three criteria:
 - they are not native speakers of the assessment language(s),
 - they have limited proficiency in the assessment language(s), and
 - they have received less than one year of instruction in the assessment language(s).

Sampling and Participation Standards

ACER will work with participating countries to produce a sampling plan that addresses the needs and requirements of the survey and takes account of local contexts and conditions.

The goal of the survey is to produce high quality outcomes across all participating countries. To meet these objectives, certain standards with respect to matters such as sample size and the extent of exclusions, are specified below and referenced to the COVID-19 MILO Technical Standards.

Standard 1.1

The UIS and the key stakeholders will work together to identify the population to which inferences will be made. This population is referred to as the Desired Target Population.

The target population for the study is all students in the final grade of primary school where the language of instruction is English or French.

All students enrolled in the final year of primary school in recognised schools where the language of instruction is either English or French belong to the National Target Population (NTP). In simple terms, the NTP is intended to provide full coverage of all eligible students in the education systems of participating countries of Africa. Any deviation from the full national coverage must be described and quantified in advance.

Standard 1.2

The Defined Target Population (DTP) covers 95% or more of the NTP. The UIS and the key stakeholders will work together to identify schools and students that are impractical to assess. These exclusions are referred to as school-level exclusions and within-school exclusions. The total of the combined school-level exclusions and student level exclusions will be no greater than 5% of the NTP.

Standard 1.3

Only students eligible within the DTP participate in the assessment.

Standard 1.4

The school sample will be drawn using established and professionally recognised principles of scientific sampling.

The sampling design for the assessment is a two-stage stratified sample design. The first-stage sampling units consist of individual schools having students in the grade corresponding to the final year of primary school. Schools are sampled systematically from a school sampling frame, with probabilities that are proportional to a measure of size. The measure of size is a function of the estimated number of the assessment-eligible students enrolled in the school for the corresponding grade. This is referred to as

systematic Probability Proportional to Size (PPS) sampling. Sampling procedures are based on these principles.

Standard 1.5

The second-stage sampling units consist of students belonging to the schools selected in the first-stage sampling. The second stage of sampling is conducted in cases where the number of students in selected schools belonging to the target populations exceeds the target cluster size. In all other cases, all students in the selected schools that belong to the target populations are selected in the sample.

A sampling tool or method specified by ACER will be used to scientifically draw random samples from lists of students in each sampled school.

Standard 1.6

ACER will work with the key stakeholders to set the sample size to achieve a level of precision in the sample estimates for each country equivalent to a 95% confidence interval of 5 percentage points for estimates of percentages, or 0.1 of the population standard deviation in student achievement for estimates of mean scores.

Standard 1.7

The school sample size needs to result in a minimum of 150 participating schools. For each sampled school, two substitute schools will be selected where possible, using a systematic method, to ensure a proper level of school response as indicated in Standard 1.9.

Standard 1.8

The student sample size is a minimum of 5,000 assessed students. The minimum acceptable sample size in each school is 34 students per school, and all students in schools with fewer than 34 students enrolled at the target grade.

Standard 1.9

The school response rate must be at least 85% of sampled schools. If the response rate from sampled schools does not reach this level, then substitute schools may be used to reach an acceptable response rate.

Standard 1.10

The student response rate is at least 80% of all sampled students across responding schools. This response rate includes students from substitute schools.

Standard 1.11

Absent sampled students cannot be substituted with non-sampled students.

Standard 1.12

Sample weights will be calculated to reflect the contribution of each participating student to the survey estimates, taking into account the sample design and adjustments for non-response.

Roles and Responsibilities

Each National Centre (NC), National Project Manager (NPM) and ACER carry responsibilities at different stages of the sampling process.

Documenting the sampling plan

Several aspects of each country's sampling plan, such as the structure of schooling, coverage and exclusions, and stratification will be documented and recorded. ACER will provide forms for the systematic recording of this information, the *COVID-19 MILO Sampling Forms*. Each NPM is responsible for providing this information to ACER.

Preparing the sampling frame

ACER will specify a template for the database of schools, which will become the sampling frame. This is required for selecting the school sample. The NPM will obtain a list of all schools in the country with students that fit within the population definition and will provide this to ACER in the specified template.

Selection of schools

ACER will check each country's sampling frame to ensure that the frame is suitable for sampling – for example that national school IDs are unique and that values for each stratification variable are present. ACER will also check that proposed exclusions are clearly defined, justified, and kept to a minimum. Using these materials, ACER will work with the NPM to finalise the sampling plan. Unless otherwise agreed, ACER will select the school samples for each country.

Calculating outcome statistics and standard errors

Following data collection ACER will calculate various sampling outcome statistics – for example exclusion and participation rates for publication in reporting.

Sample Precision and Sample Size

Sample Size

Standard 1.7 states that a minimum of 150 schools are expected to participate from each country, or all schools if there are fewer than 150 schools in the target population.

Standard 1.7 is the minimum sample size only. A key criterion in determining the final sample size for each participating country will be the precision of the major estimates for the survey, as indicated by the size of the standard errors and the widths of the 95% confidence intervals around those estimates (Standard 1.6).

Standard 1.6 notes that participating countries should aim for a sample size that achieves 95% confidence interval widths within $\pm 5\%$ for student percentage estimates, and within 0.1 of a standard deviation around an estimated mean. The sample size required to achieve this precision will be estimated using evidence of design effects from previously conducted surveys, where such evidence is available. A key component of the design effect is the intra-class correlation, a statistic that measures the degree to which a group of students within a school are more similar with respect to the major outcome measures of the survey, compared to students selected randomly from the entire population. Where the design effects for a country are unclear, the intra-class correlation of 0.3 will normally be assumed.

With 150 participating schools, an average cluster size of approximately 34 students and an intra-class correlation of 0.3, confidence interval widths are expected to be within the precision standard specified in Standard 1.6.

Stratification

Stratification falls into two categories, explicit and implicit stratification. Explicit stratification partitions the sampling frame into mutually exclusive parts according to specified variables. Independent samples are then drawn from each part of the sampling frame.

Explicit stratification is usually used to implement different sample designs for different segments of the population. For example, the sample drawn for COVID-19 MILO may sample provinces, states, or regions of a country equally without regard to the proportion to the country population. This may be done where estimates are required for sub-national units.

Implicit stratification consists of sorting the school sampling frame by a set of variables, then systematically sampling from the sorted list. It is a simple method for ensuring a proportional allocation of schools across all implicit strata.

Stratification can lead to improved reliability of estimates, provided that the implicit stratification variables are related to the major survey outcomes.

As part of the preparation for each country's sample design, a stratification structure will be discussed and agreed using the *COVID-19 MILO Sampling Forms*.

The Sampling Frame

The sampling frame will be prepared following the completion of discussions regarding the sample design. The sampling frame is prepared at the local level and then sent to ACER for sample selection.

The sampling frame should provide complete coverage of the defined target population, without containing duplicate entries or entries that refer to elements that are not part of the defined target population.

Each entry in the frame is a school, and each entry should include:

- a unique national school ID
- school contact information, such as name, physical address, phone number, and email address
- all stratification variables, with a value for each school
- a suitable school measure of size, for example the total enrolment at the target grade

For further information on how to prepare the sampling frame refer to the *School Sampling Preparation Guide* and a sampling frame template can be found with the *COVID-19 MILO Sampling Forms*.

The Drawn School Sample

The school sample will be drawn by ACER according to Standard 1.4 and a list of sampled schools will be provided to the NPM. Once sampling has been completed, no additional schools may be selected to participate.

Substitute Schools

Every effort should be made to obtain participation from as many of the sampled schools as possible. However, it may not always be possible to obtain school participation. To minimise the potential for non-response bias arising from the non-participation of sampled schools, a mechanism to identify 'replacement' or substitute schools for the sampled schools may be used. Each sampled school will be assigned up to two substitute schools.

The Student Sample

The student sample will be drawn by countries using software provided by ACER. Students will be selected from lists of students enrolled in the target grade at each sampled school according to Standard 1.5. There may be occasions where it is not possible to draw the student sample from across the entire grade, in such a case it may be preferable to sample an in-tact class from the grade and all students within that class would participate. This option may be taken after negotiation and confirmation with ACER. Absent sampled students may not be substituted according to Standard 1.11.