Education Management Information Systems (EMIS)

4 QUALITY EDUCATION

Operational Guide
to Using EMIS to Monitor SDG 4

UNESCO
United Nations
Educational, Scientific and
Cultural Organization

UNESCO
INSTITUTE
FOR
STATISTICS

SUSTAINABLE
DEVELOPMENT
GOALS

Education Management Information Systems (EMIS)

Operational Guide to Using EMIS to Monitor SDG 4

UNESCO

The constitution of the United Nations Educational, Scientific and Cultural Organization (UNESCO) was adopted by 20 countries at the London Conference in November 1945 and entered into effect on 4 November 1946. The Organization currently has 195 Member States and 11 Associate Members.

The main objective of UNESCO is to contribute to peace and security in the world by promoting collaboration among nations through education, science, culture and communication in order to foster universal respect for justice, the rule of law, and the human rights and fundamental freedoms that are affirmed for the peoples of the world, without distinction of race, sex, language or religion, by the Charter of the United Nations.

To fulfil its mandate, UNESCO performs five principal functions: 1) prospective studies on education, science, culture and communication for tomorrow's world; 2) the advancement, transfer and sharing of knowledge through research, training and teaching activities; 3) standard-setting actions for the preparation and adoption of internal instruments and statutory recommendations; 4) expertise through technical cooperation to Member States for their development policies and projects; and 5) the exchange of specialized information.

UNESCO Institute for Statistics

The UNESCO Institute for Statistics (UIS) is the statistical office of UNESCO and is the UN depository for global statistics in the fields of education, science, technology and innovation, culture and communication.

The UIS is the official source of internationally comparable data used to monitor progress towards the Sustainable Development Goal on education and key targets related to science, culture, communication and gender equality.

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Foreword

Education is one of a nation's greatest assets as it not only leads to economic wealth and security but also improves health measures within a population. However, existing levels of illiteracy and low education achievement continue to be a challenge for many developing countries, international agencies and world-wide educational programmes.

Achieving the fourth Sustainable Development Goal (SDG 4) requires building on what has already been achieved yet monitoring this goal and a nation's progress over time is no easy feat as it encompasses a multitude of variables. For one, attaining good comparability of statistics over time is crucial and must receive more attention. *The Operational Guide to Using EMIS to Monitor SDG 4* is intended to strengthen this crucial element by providing concrete operational definitions and presenting national examples of how to measure indicators. Working with statistical offices and organizations around the world, the UNESCO Institute for Statistics (UIS) has been monitoring progress towards Education for All and the Millennium Development Goals (MDGs) before they transitioned to SDGs. Continuing our work, the UIS is setting the targets of the SDGs by creating frameworks to better monitor progress.

Ultimately, effective decision-making relies on quality data managed within efficient information systems. Information is a necessary resource produced by information systems and is a key building block of management and decision-making in education. So, what is an Education Management Information System (EMIS)? An EMIS is not only a technological solution restricted to operational processes. As an information system, it should also facilitate strategic decision-making, policy formulation and budgeting, and – if possible and relevant – routine management above the school and towards the school.

UNESCO and the Global Partnership for Education (GPE) joined forces to hold the first International Conference on EMIS at UNESCO Headquarters from 11 to 13 April, 2018. The conference led to the development of the *Efficiency and Effectiveness in Choosing and Using an EMIS – Guidelines for Data Management and Functionality in Education Management Information Systems (EMIS)*. The EMIS Guidelines list the EMIS functionality standards required to supply accurate and validated information to education sector policymakers, school managers and international organizations to whom most countries report.

The current document, the *Operational Guide to Using EMIS to Monitor SDG 4* builds on the EMIS Guidelines and aims to provide further operational guidance on how to implement data collection strategies from the viewpoint of existing global commitments related to SDG 4 indicators. The document elaborates on the processes followed by the UIS as the custodian agency of most indicators in SDG 4 to aggregate and curate the data. The Operational Guide also explores the key characteristics of existing national EMIS to illustrate the capacity of EMIS to produce administrative data. Moreover, the document proposes a set of standards to illustrate and support countries in their efforts to collect and produce better quality data.

Acronyms

ADEA	Association for the Development of Education in Africa
CAST	Special treasury allocation account to data (Burkina Faso)
CONFEMEN	Conférence des Ministres de l'Éducation des États et gouvernements de la Francophonie (Conference of the Ministers of Education of French-speaking countries)
CSpro	Census and Survey Processing System
DFAT	Department of Foreign Affairs and Trade (Australia)
DFID	Department of Foreign Affairs and Trade (United Kingdom)
DHS	Demographic and Health Surveys
DQAF	Data Quality Assessment Framework
ECE	Early Childhood Education
ECD	Early Childhood Development
EMIS	Education Management Information System(s)
EU	European Union
FPE	Fiche Primaire d'Enquête (Madagascar)
GAML	Global Alliance to Monitor Learning
GPE	Global Partnership for Education
IAEG-SDG	Interagency and Expert Groups for the SDG indicators
ID	Identification
ISCED	International Standard Classification of Education
LAC	Latin America and the Caribbean
LDCs	Least-Developed Countries
LLECE	Latin American Laboratory for Assessment of the Quality of Education
MICS	Multiple Indicator Cluster Surveys
MoE	Ministry of Education
OECD	Organisation for Economic Co-operation and Development
OOSC	Out-of-school children
PASEC	Programme d'analyse des systems éducatifs de la CONFEMEN (Programme of Analysis of Education Systems of CONFEMEN)
PIRLS	Progress in International Reading Literacy Study
PISA	Programme for International Student Assessment
SABER	Systems Approach for Better Education Results
SACMEQ	Southern and Eastern Africa Consortium for Monitoring Educational Quality
SIGERD	Sistema de Información para la Gestión Escolar De República Dominicana
SANAD	Registry of Students (Iran)
SDGs	Sustainable Development Goals
SIMS	School Information Management Systems

StatEduc	The EMIS developed by the UIS
TCG	Technical Cooperation Group for Education 2030
TIMMS	Trends in International Mathematics and Science Study
TMIS	Teacher Management Information Systems
TVET	Technical and Vocational Education and training
UDISE	Unified District Information System for Education (India)
UIS	UNESCO Institute for Statistics
UOE	UNESCO–OECD–Eurostat
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural
UNICEF	Organization United Nations Children's Fund
USAID	United States Agency for International Development
WFP	World Food Programme

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1. Introduction

UNESCO and the Global Partnership for Education (GPE) joined forces to hold the first International Conference on Education Management Information Systems (EMIS) at UNESCO Headquarters from 11 to 13 April 2018. Previously, representatives of many countries' EMIS units had frequently expressed the need for guidance from the international community on how to make decisions on improvements to their EMIS and on what technical basis to negotiate with vendors or suppliers. They sought guidance on how to better discuss their requirements with development partners looking to contribute to the development of data for education in their countries, but lacked comparative information on the capability of a modern EMIS.

Ultimately, effective decision-making relies on quality data managed within efficient information systems. Information is a necessary resource produced by information systems and is a key building block of management and decision-making in education. So, what is an EMIS? An EMIS is not only a technological solution restricted to operational processes. As an information system, it should facilitate strategic decision-making, policy formulation and budgeting, and, if possible and relevant, routine management above the school and towards the school.

The conference led to the development of the guidelines, '*Efficiency and Effectiveness in Choosing and Using an EMIS – Guidelines for Data Management and Functionality in Education Management Information Systems (EMIS)*'. The guidelines list EMIS functionality standards required

to supply accurate, valid information to education sector policymakers, school managers and international organizations to whom most countries report.[1]

This document, *Operational Guide to Using EMIS to Monitor SDG 4* aims to provide further operational guidance on how to implement data collection from the viewpoint of existing global commitments related to Sustainable Development Goal 4 (SDG 4) indicators. The document elaborates on the processes followed by the UIS as the custodian agency of most indicators in SDG 4 to aggregate and curate the data and explores the key characteristics of existing national EMIS to illustrate the capacity of EMIS to produce administrative data. Moreover, the documents proposes a set of standards to illustrate and support countries in their efforts to collect and produce better quality data.

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1   This Operational Guide serves as a companion to the UIS/GPE-produced publication entitled *Efficiency and Effectiveness in Choosing and Using an EMIS: Guidelines for Data Management and Functionality in Education Management Information Systems (EMIS)*, available here at: http://uis.unesco.org/en/document/guidelines-data-management-and-functionality-education-management-information-systems-emis. This document occasionally borrows language from its companion publication.

2. Background

At the United Nations General Assembly meeting on 25 September 2015, 193 UN member nations unanimously adopted a new development agenda 'Transforming our world: the 2030 Agenda for Sustainable Development' (the 2030 Agenda). This agenda builds upon the Millennium Development Goals and represents the work of contributors from around the world. This ambitious agenda is 'a call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity'. The agenda incorporates 17 broad and interrelated sustainable development goals (SDGs) which address 'economic development, social inclusion, environmental sustainability, and good governance.'

Around 200 indicators are used to track progress made towards achieving these goals. These indicators will encourage accountability and collaboration, identify areas for needed support as well as provide information needed to advocate for continuing reform. The indicators are segmented into global and thematic levels. As the name implies, global indicators represent public goods or goals that require global coordination to be achieved. The UN General Assembly adopted these global indicators and all signatory countries have committed to prioritizing the targets associated with them. Thematic indicators are grouped according to theme or sector, such as health or education. These themes transcend national or regional boundaries and it is hoped that grouping these indicators will help facilitate countries' learning from the development lessons of others.

SDG 4, specifically, aims to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.' Better known as the 'education goal', SDG 4 is made up of 10 targets and 11 global indicators. The indicators are used to measure progress towards the targets and this measurement requires education data.

The international education agenda is defined by SDG 4. The agenda is informed by two key documents acknowledged and agreed on by the international education community: the Incheon Declaration at the World Education Forum in May 2015 (which defined the institutional architecture) and the SDG-Education 2030 Framework for Action (i.e. the roadmap for the implementation of SDG 4), which was signed in November 2015 and includes the SDG 4 thematic monitoring framework as an annex.

The thematic monitoring of SDG 4 follows the guidelines established by the Education 2030 Framework for Action, which was adopted by 184 UNESCO Member States in 2015. The UNESCO Institute for Statistics (UIS) is the custodian agency for 9 of the 11 global indicators for SDG 4 and a partner organization for the other two global indicators.

Overall, SDG 4 monitoring is based on universal principles and emphasises a participatory framework in which all stakeholders (including civil society, business, parliament, academia and government) can recognise their shared responsibility in achieving this goal. To support policymaking, SDG 4 indicators are intended to

deliver a full picture of progress and potential setbacks. Ultimately, education systems only function effectively if their strategies, approaches and funding are built on a solid foundation of quality data managed in efficient information systems.

2.1. Monitoring SDG 4

Both the Incheon Declaration and the the SDG-Education 2030 Framework for Action recognize the importance of good data to monitor progress towards the established targets. As a custodian agency, the role of the UIS in ensuring the global public good of education data involves:

- Providing global data through its platform and specifically to around 30 global partners, most notably the Global Education Monitoring (GEM) Report and the World Bank World Development Indicators database.
- Determining and disseminating metadata, standards and guidelines.
- Working in individual countries to build institutional capacities in education statistics.
- Participating in global and regional partnerships that complement its country-focused work.
- Informing the debate on global issues while advocating constructively for developing countries and increasing action at the regional level through the use and analysis of data.
- Driving agreements based on expert consultation on novel standards and data collection methods, especially with respect to the SDG 4 monitoring framework.

Since the start of the SDG process, the UIS has taken a leadership role in education measurement by convening the Technical Advisory Group (TAG) on Post-2015 Indicators, in which the GEM Report was a member. The TAG developed a proposal of 43 global and thematic SDG 4 monitoring indicators. This work continues through the Technical Cooperation Group (TCG) on the Indicators for SDG 4 – Education 2030 for which the UIS fulfils the function of Secretariat. The TCG serves as the platform for Member States and education stakeholders to refine and develop the indicator framework while forging the consensus needed to mobilize efforts to address the measurement challenges. The latest update can be found in the TCG progress report. In the particular case of indicators related to learning outcomes, this development work is undertaken through a series of task forces under the Global Alliance to Monitor Learning (GAML), which is also led by the UIS.

Through the discussions of the TCG working groups and GAML task forces, the UIS is able to build consensus on international reporting and measurement of education indicators based on fit-for-purpose methodological approaches and practices. The TCG and GAML bear the core responsibilities to develop or approve:

- Methodologies for SDG 4 global and thematic indicators
- Reporting standards, guidelines and tools to support countries in collecting, analysing and using data.

In June 2020, 12 global and 31 thematic indicators make up the 43 indicators of the SDG 4 monitoring framework. The global and thematic indicators were developed in 2014–2015 by the TAG and agreed upon in 2016 by the United Nations Statistical Commission (UNSC) and the TCG, respectively. Both sets of indicators were subjected to several rounds of open consultations before being finalized and reaching a consensus among countries. The UIS is the custodian agency for 10 of the 12 SDG 4 global indicators,

meaning it is responsible for their methodological development and data reporting. The Inter-agency and Expert Group on SDG indicators (IAEG-SDGs) – the custodian of the SDG global indicator framework – has established a three-tier indicator classification system. The UIS aims to bring the education indicators to Tier I status, which would denote that they have an internationally established methodology with coverage expanded to more than half of the countries in the world and for each of the regions.

The urgency to establish actions to achieve the SDGs in general and SDG 4 in particular along with the complexity of these actions requires solid data for efficient policy planning and implementation. The indicator framework has been developed and accepted but rests on countries' ability to provide adequate data and UIS capability to process the data. This represents a shared responsibility between Member States and international agencies, and should be realized through resource allocations.

3. The nuts and bolts of producing globally comparable data

There are four primary data sources used to calculate SDG 4 indicators. These include household-based survey and assessment data; census data; school-based survey and assessment data; and education management information system or administrative data. The school/individual-based administrative data can be used to produce around 50% of the indicators out of 43

thematic indicators. The thematic indicators based on administrative data are included in regional SDG 4 monitoring indicators adopted by many regional bodies in the world (UIS, 2019).

Figure 1 summarizes the key components needed to produce high-quality internationally comparable data for SDG 4. The first element involves the

Figure 1. Key components needed to produce internationally comparable data

Tool

Principles and guidelines
- Standars

Indicator methodologies
- Framing of indicators
- Harmonization

+

Capacity to deliver
- Country level
- International agencies assure data comparability
- Human resources, technology
- Funding

Objective

- Set common parameters for high-quality data
- Agree on common language and definitions
- Ensure global alignment

- Generate high-quality data
- Ensure sustainability of human and financial resources
- Shared vision at the country level

High-quality data (country and International levels)
Data use and dissemination

Source: UNESCO Institute for Statistics.

implementation of agreed-upon norms and standards that will be applied at all stages of the process. Without such norms, data from different sources cannot be compared. This is of particular importance when monitoring global progress towards international goals, which requires coordination mechanisms needed for a sustainable, participatory and informed process that will lead to the production, dissemination and application of such standards.

The second element entails the calculation of indicators. For effective policymaking and monitoring, internationally comparable education data should adhere to internationally agreed-upon definitions. To this end, the harmonization of measurement approaches is essential. Each country should make certain that the methods and processes underlying its own data production have been vetted by experts from other countries to ensure a certain degree of quality assurance (as is common practice for economic or population statistics).

The third key element is the capacity to deliver data. The production of education data at the national level depends on a range of factors related

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Box 1. The SDG monitoring framework

In resolution 70/1, the General Assembly decided that the Sustainable Development Goals (SDGs) and targets will be followed up and reviewed using a global indicator framework developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs). This is a voluntary and country-led instrument that includes an initial set of indicators to be refined annually and reviewed comprehensively by the Commission at its 51st session, to be held in 2020, and its 56th session, to be held in 2025. These will be complemented by indicators at the regional and national levels developed by Member States.

The Statistical Commission, through the IAEG-SDGs is the body that coordinates the substantive and technical work to develop international statistical standards, methods and guidelines. When necessary, this body can fully implement the global indicator framework to follow up and review the SDGs and targets; further refine and improve the global indicator framework to address coverage, alignment with targets, definition of terms and development of metadata; and facilitate its implementation, including through the periodic review of new methodologies and data as they become available.

UN agencies, such as the UIS, facilitate collaboration with national statistical systems to enhance data reporting channels and ensure the harmonization and consistency of data and statistics for the indicators used to follow up and review the SDGs and targets, given existing resources available.

UN agencies use the global review on data produced by national statistical systems and, if specific country data are not available for reliable estimation, they will consult with the countries in question to produce and validate modelled estimates prior to publication. The UN urges that communication and coordination among international organizations be enhanced to avoid duplicate reports, ensure consistency of data and reduce response burden on countries. In addition, the UN urges international organizations to provide the methodologies used to harmonize country data to ensure international comparability and produce estimates through transparent mechanisms.

All activities of the global statistical system must be conducted in full adherence to the Fundamental Principles of Official Statistics and Economic and Social Council resolution 2006/6.

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to institutions and the availability of financial and human resources.

3.1. Standards that guide SDG 4

The production of globally comparable data begins with consensus on norms and standards that will be applied at all stages of the process to ensure informed policy discussion on comparable indicators. Without such norms, data from different sources cannot be compared. This is of particular importance when monitoring global progress towards international goals. Heads of state have committed on behalf of the people they serve to a comprehensive, far-reaching and people-centred set of universal and transformative goals and targets. These came into effect on 1 January 2016 and are to be valid for the following 16 years. Members States commit among other points to implement the 2030 Agenda within 'our own countries and at the regional and global levels, taking into account different national

realities, capacities and levels of development and respecting national policies and priorities'.[2]

As one of the key tools to facilitate comparison between countries, UNESCO developed the International Standard Classification of Education (ISCED 2011) for cross-country comparisons of education statistics. The structure of national education systems differs across countries so to ensure that data on enrolment in primary education and other indicators are comparable, national data must be mapped to the ISCED first. As an example, **Figure 2** shows how data for Brazil, Chile, Norway and the Republic of Korea can be made comparable by mapping different programmes to the same classification – in this case, to identify ISCED level 1, primary education.

For many education data sources, ISCED is not uniformly applied. So, what denotes 'primary

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2   United Nations General Assembly (2015). Resolution adopted by the General Assembly on 25 September 2015. 70/1. Transforming our world: the 2030 Agenda for Sustainable Development.

Figure 2. Mapping of national education programmes to ISCED
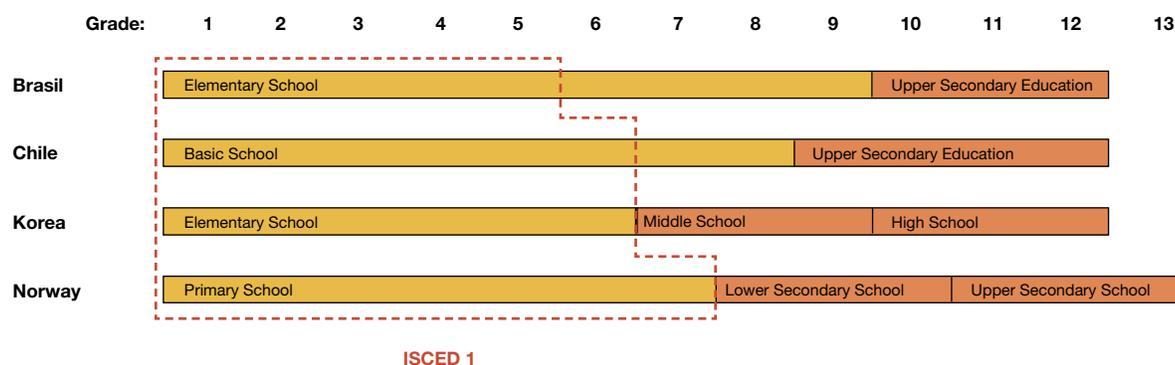
Source: UNESCO Institute for Statistics.

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education' for one country in one database is therefore not necessarily comparable to 'primary education' in another country. Thus, the data cannot be merged without additional processing and harmonization, which may require considerable effort.

Hence, it is essential to harmonize data sources and, when needed, set new standards and norms for critical areas of education. This standard-setting will lead to a new generation of cross-nationally comparable education data that countries, international organizations, civil society groups and donors can use to better direct resources and initiatives to provide quality education and effective

learning outcomes for all. The following section highlights some areas where harmonization and standard-setting can have a major impact.

3.2. How are education indicators estimated?

The generation of internationally comparable statistical data comprises the following steps as described in Figure 3:

■ **Definition of policy needs:** A cross-national monitoring need is identified. The UIS works with Member States and partners to define the indicator and justify the need. Specifications

Figure 3. Indicator development steps


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┌──────────────────────────┐
│  Definition of policy need │
│  Framework for monitoring  │
└──────────────────────────┘
          │
          └──────────▶ ┌──────────────────────────┐
                       │  Develop methodology or   │
                       │  coordinate with partners  │
                       └──────────────────────────┘
                                 │
                                 └──────────▶ ┌──────────────────────────┐
                                              │  Approve/endorse           │
                                              │  methodology with the TCG if│
                                              │  thematic Indicator and with│
                                              │  the IAEG-SDG if global     │
                                              └──────────────────────────┘
                                                        │
                                                        └──────────▶ ┌──────────────────────────┐
                                                                     │  Calculate national and   │
                                                                     │  regional indicators       │
                                                                     └──────────────────────────┘
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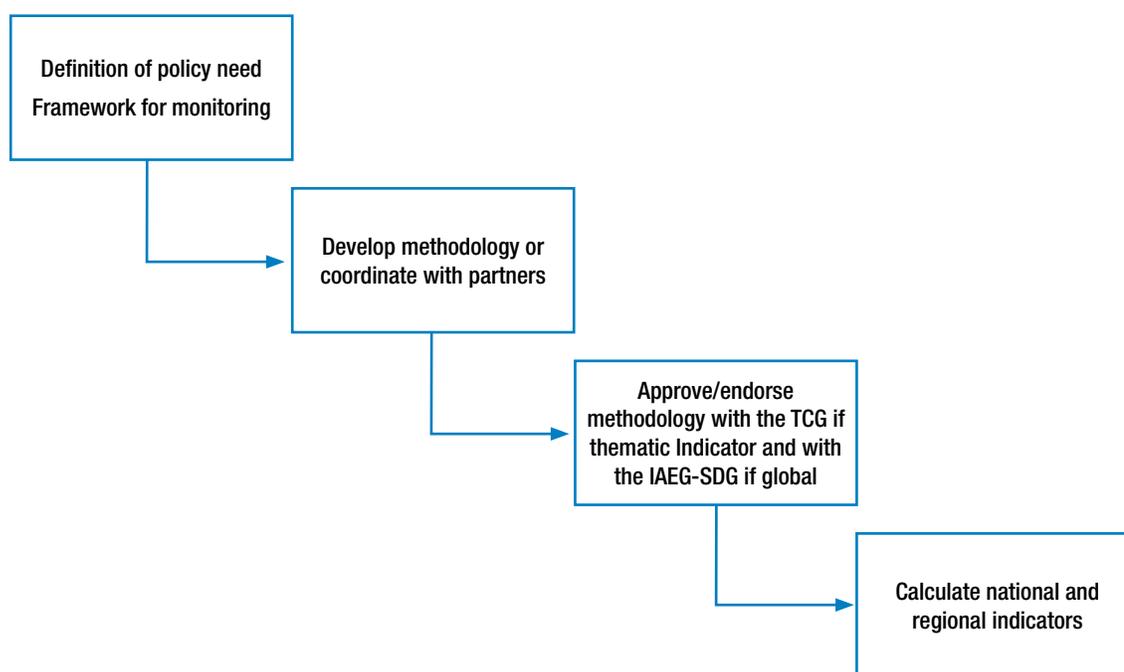
Source: UNESCO Institute for Statistics.

are noted, including the identification of existing data sources, the way data are collected (e.g. questionnaires) and recommendations on how to collect data from potential data sources. A detailed estimate of the cost of the development of the new indicator is also provided.

- **Development of the methodology:** The UIS produces the methodology that should include at a minimum the indicator metadata (e.g. concept, definition, formula, data sources, disaggregation, frequency of data collection and dissemination), the protocol for reporting with a focus on the harmonization of the different data sources to produce comparable data, and the rules for selecting one source of data when multiple sources are available. The underlying principle of those rules should be that only one data source is used for a given indicator and country.

- **Approval and endorsement of methodology:** The TCG endorses the methodology of thematic indicators while the IAEG-SDG endorses the methodology of global indicators.

- **Calculation of national and regional indicators:** A strategy for data collection, processing and dissemination is produced and implemented. The strategy must include: a) identification of data sources: international (e.g. International Association for the Evaluation of Educational Achievement (IEA); Organisation for Economic Co-operation and Development (OECD)) and national agencies and organizations; b) data collection via direct requests made by the UIS or via consultants; c) data collection instruments; d) tools to process and disseminate data; and e) application of the protocol for reporting.

The UIS produces country-level data and indicators as well as regional and global averages and totals,

which are calculated using methodologies agreed upon by the two governing bodies – the TCG and the IAEG-SDG – for both the global and thematic frameworks.

Based on the methodological definition, the data specification needs and best sources are defined as well as an evaluation of the need to obtain data from other sources, such as learning assessments, household surveys or special surveys. The next stage is to calculate and test the indicator and methodology for the set of available countries and years.[3]

The metadata represent the main methodological reference for data users. They contain definitions of indicators, describe calculation methods and data requirements, and offer information on interpretation and delineate the limitations of the indicators. The UIS glossary (http://uis.unesco.org/en/glossary) serves as a quick, abridged source of metadata for users. Additional information is also available in a regularly updated UIS document with Frequently Asked Questions (FAQs) on Education Statistics (http://uis.unesco.org/en/methodology),which includes meta-data for October 2016.

For key indicators and data, in particular those needed for the monitoring of international goals, the UIS also calculates regional and global values when relevant and possible. In addition, when needed, the UIS uses a variety of methods to impute missing data.

3.2.1. Sources of data

To produce internationally comparable education indicators, the UIS uses several main sources of data as listed below. These data sources differ in their coverage as well as the timing and way in which they are collected.

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3   This section follows UIS (2017b).

- **Administrative data** are based on information collected in the management of the education system. These are usually available from EMIS and used by Ministries of Education for management and planning purposes, and are typically updated on an annual basis. EMIS should typically cover many types of educational paths and levels, including Early Childhood Education (ECE), higher education, and Technical and Vocational Education and Training (TVET). Most of the international monitoring of previous global development agendas (Education For All and the Millennium Development Goals) was based on administrative data produced by countries and compiled by international organizations on school EMIS, which has since been expanded. Although some administrative data, such as school feeding programmes and teachers' salaries, are usually available from non-EMIS sources in Education Ministries, these should ideally be linked to EMIS.
- **Household surveys** are an important source of data on access, participation and educational attainment. Surveys differ in terms of coverage, frequency, objectives and questionnaire design. In contrast to administrative data, they are collected less frequently, and by a variety of organizations and countries. Household survey data are usually available from non-EMIS sources outside of Ministries but again should ideally be linked to EMIS.
- **Learning assessments** include national school-based assessments designed to measure specific learning outcomes at a particular age or grade that are considered relevant for national policymakers. They also encompass cross-national initiatives (either regional or global) that are based on a common, agreed-upon framework and follow similar procedures to yield comparable data

on learning outcomes. Assessment data can also be collected from households. The data are usually available from non-EMIS sources outside the Ministries but should also ideally be linked to EMIS.
- **Financial and expenditure data** contain information on different sources of income and expenditure, including government spending on education. This source commonly encompasses data on the construction and maintenance of schools, teacher salaries and household spending on education, including supplies, transport and other costs. Some administrative data are typically available from non-EMIS sources within Ministries but should ideally be linked to EMIS (e.g. school feeding programmes and teachers' salaries), depending on how the country organizes the data.
- **Population censuses** are important as a source of population estimates (the number of persons by age and sex in a country). The UIS uses population estimates from the United Nations Population Division, which are based on a single, reliable methodology that is internationally accepted. Some of the administrative data are usually available from non-EMIS sources outside the Ministries and again should ideally be linked to EMIS.

Figure 4 presents the UIS database and dissemination cycle that illustrates the centralized collection of data that originate from different sources.

As the official statistical agency of UNESCO, the UIS produces a wide range of state-of-the-art databases to fuel the policies and investments needed to transform lives and propel the world towards its development goals. The UIS provides free access to data for all UNESCO countries and

Figure 4. UIS database production and dissemination cycle
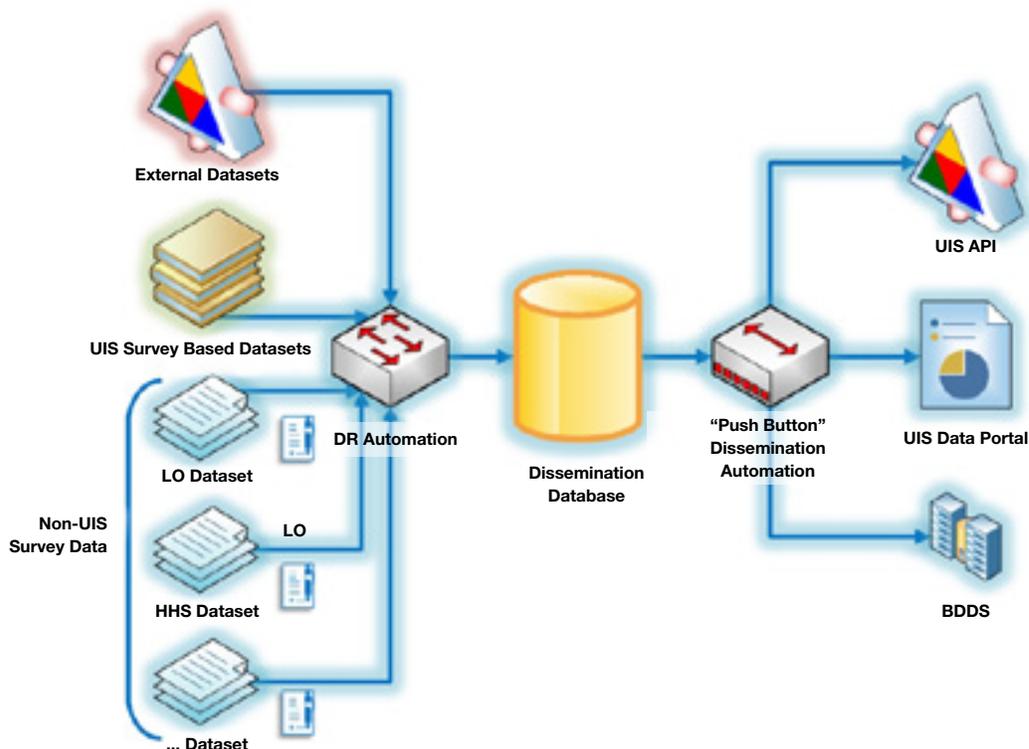
Source: UNESCO Institute for Statistics. **Note**: LO = learning outcomes; HHS = household surveys; DR = data release

regional groupings from 1970 to the most recent year available.

In addition, the UIS encourages developers and researchers to build websites and applications that make rich use of UIS dissemination data, which can be obtained from the:

- UIS Global Education Database that houses internationally comparable data on all levels of education for more than 200 countries and territories.
- UIS Data API, which provides programmatic access to UIS data and metadata to allow developers and researchers to pull data directly from the source.

- Bulk data download service (BDDS), which enables access to all databases that can be downloaded in comma-separated values (CSV) format.

UIS data are typically used to produce almost every flagship UN report, including the *Human Development Report* (UNDP), the *World Development Report* (World Bank), and the *State of the World's Children* (UNICEF), to name a few. In addition, many global indices, such as the Human Development Index and the World Competitiveness Index, could not be calculated without UIS data. The UIS also contributes data and analysis to major UNESCO initiatives and flagship reports, such as the *Global Education Monitoring Report*, the

UNESCO Science Report and the *UNESCO World Report on Cultural Diversity*.

3.3. UIS data collection strategy and process for administrative data

As a global standard-setting agency, the UIS collects and disseminates data annually in UNESCO's areas of competence using different survey instruments that are sent to Member States. In the field of education, the UIS collects administrative data using two types of questionnaires: the standard UIS questionnaires

that are sent to about 160 countries and the more complex joint UNESCO-OECD-Eurostat (UOE) questionnaires that are sent to around 50 high-income or middle–income countries.

The UIS data collection mechanism encompasses all types of students at every age group: children (including those with special needs), young people and adults enrolled in programmes that fall into the various levels of ISCED. Programmes specifically designated as 'adult education' or 'continuing education' are included only if they are formal. The annual UIS education survey instruments and data collection strategy are presented in Figure 5.

Figure 5. UIS education survey data collection
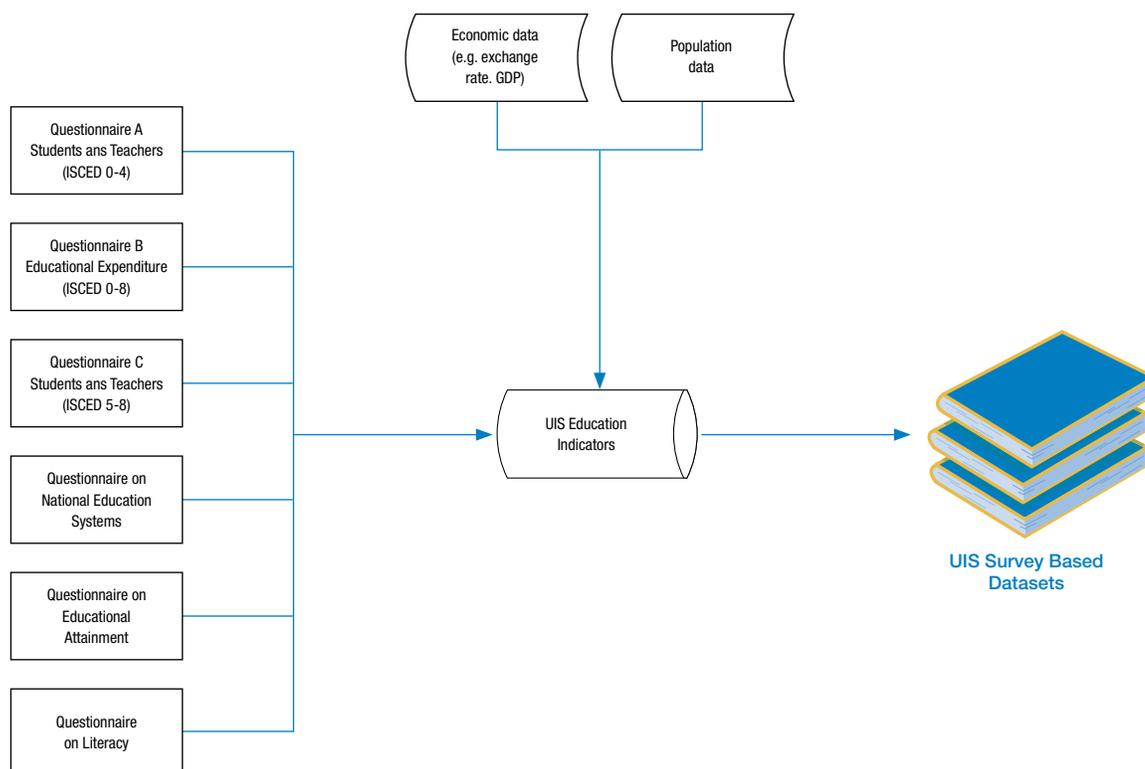
Source: UNESCO Institute for Statistics.

The following list of questionnaires used by the UIS denotes what data are collected by each one.

Questionnaire A: Students and Teachers (ISCED 0 to 4) collects:

■ Number of students by ISCED level, sex, age, grade, by type of institution from early childhood education to post-secondary, non-tertiary education (ISCED 0 to 4)

■ Number of repeaters and graduates for primary and secondary education (ISCED 1 to 3)

■ Number of students by programme orientation (ISCED 3 and 4)

■ Number of classroom teachers by sex, level of education, type of institution, training and qualification status; intensity of work (head counts, full-time equivalent (FTE)); and statutory salary

■ Number of educational institutions with information and communications technology (ICT) services (electricity, computers, Internet), basic water and hygiene facilities, adapted infrastructure for special needs students and the provision of life skills–based HIV and sexuality education.

Questionnaire B: Educational Expenditure (ISCED 0 to 8) collects:

■ Expenditure on educational core services from government, private and international sources (i.e. all expenditure that is directly related to instruction and education, such as teachers, school buildings, teaching materials and books)

■ Expenditure on educational services other than instruction (e.g. administration, policy formulation, curriculum development, school feeding and supervision)

■ Actual rather than budgeted expenditure

■ Expenditure that occurs within the borders of the country (i.e. national schools abroad not

included and financial aid to students studying abroad is identified separately).

Questionnaire C: Students and Teachers (ISCED 5 to 8) collects:

■ Number of students by level of education (ISCED 5 to 8), by sex, age and type of institution

■ Number of students by field of education

■ Number of new entrants

■ Number of graduates by field of education

■ Number of internationally mobile students

■ Number of academic staff.

Questionnaire on National Education Systems collects:

■ Information on national education programmes and their classifications according to the 2011 revision of the ISCED 2011.

■ Information used to ensure the production of internationally comparable data and indicators that are gathered through the UIS education questionnaires to produce ISCED mappings, which are essential tools for comparing national education systems.

■ Information on the provision of free and compulsory education as per national legislation and/or educational laws.

Questionnaire on Educational Attainment collects:

■ Population data by age group, sex, location and by the highest levels of education completed, as defined in the ISCED, from primary education to doctoral degrees.

Questionnaire on Literacy collects:

■ Population data by age group, sex, location and by literate/illiterate self-declaration.

The UIS questionnaires and manuals are available at: http://uis.unesco.org/uis-questionnaires.

3.3.1 How administrative data is reported to the UIS

The UIS does not collect data directly from EMIS. The countries administer annual statistical censuses, which gather data on different aggregates for statistical purposes. Some of the countries have added a feature in EMIS that generates the information required for the UIS questionnaire, especially for Questionnaire A (ISCED 0 to 4) and Questionnaire C (ISCED 5 to 8). The data related to household surveys (education attainment and literacy) are produced by national statistical agencies and are not typically included in more traditional EMIS. The education expenditure data are derived from the budget book of the ministries of finance and other sources. The data are often reduced to the variables collected for administrative purposes as part of the EMIS in a traditional version. Figure 6 illustrates the process currently in place as the UIS questionnaires have since been slightly adapted to include some questions related to SDG 4.

Figure 6. UIS surveys on national monitoring indicators
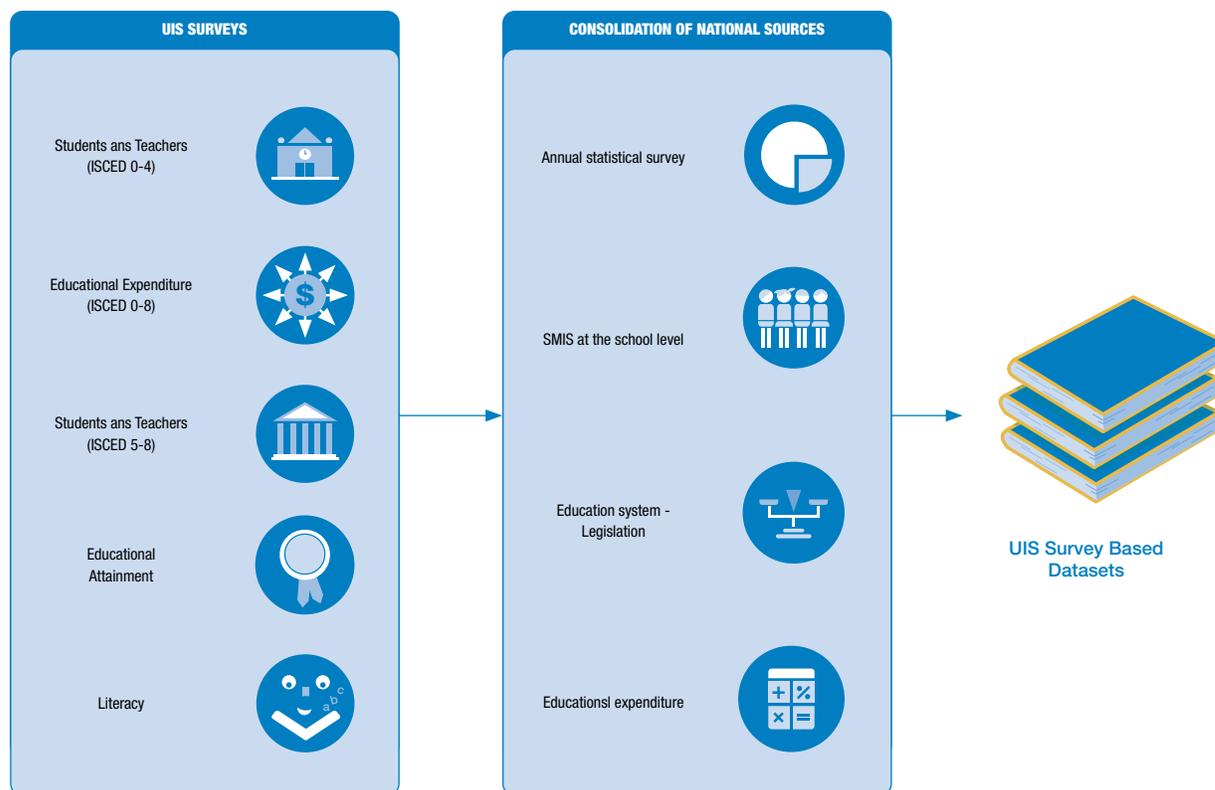
Source: UNESCO Institute for Statistics (UIS), 2020.

3.4. Key characteristics of data availability in each region

An analysis of the key SDG 4 variables related to students, teachers and infrastructure, gathered from a sample of countries and available through EMIS – either at the individual or aggregate level –

shows that more data are available on students and teachers than on infrastructure.[4]

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4   The UIS collected information on SDG 4 data sources in 2018 for 69 countries distributed as follows: Africa (Northern) 4; Africa (sub-Saharan) 27; Asia (Central and Southern) 3; Asia (Western) 9; and Latin America and the Caribbean 26.

Figure 7. Availability of variables in EMIS (% of countries)

STUDENTS

TEACHERS

INFRASTRUCTURE
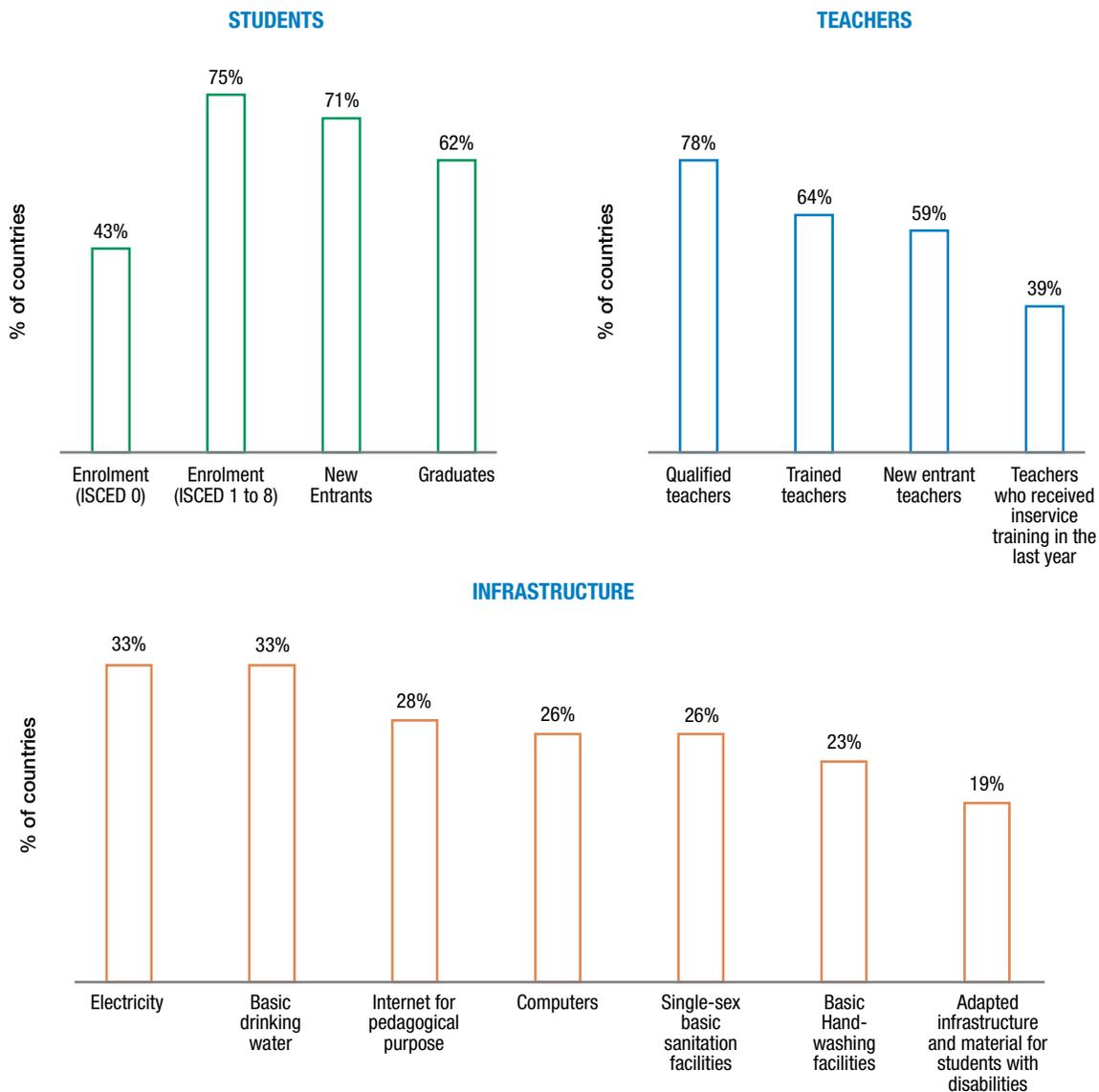
Source: UNESCO Institute for Statistics (UIS) 2018.

As shown in **Figure 7**, the availability of data on students ranges from 43% for enrolment at ISCED 0 to 75% for enrolment at ISCED 1 to 8, with intermediate values for new entrants (71%) and graduates (62%). The availability of data on teachers ranges from qualified teachers (78%) and trained teachers (64%) to new entrants (59%) and teachers who received in-service training in the last year (39%). The availability of infrastructure data ranges from adapted infrastructure and material for students with disabilities (19%) to electricity and basic drinking water (33%).

Figure 8 shows that Latin America and the Caribbean fares better on student data, Western Asia has more data available on teacher data, and sub-Saharan Africa on infrastructure data.

The low availability of data though EMIS does not mean that data are not being produced as it is possible to use other sources of data (e.g. education statistical survey).

Figure 8. Availability of data by region (% of countries)

STUDENTS
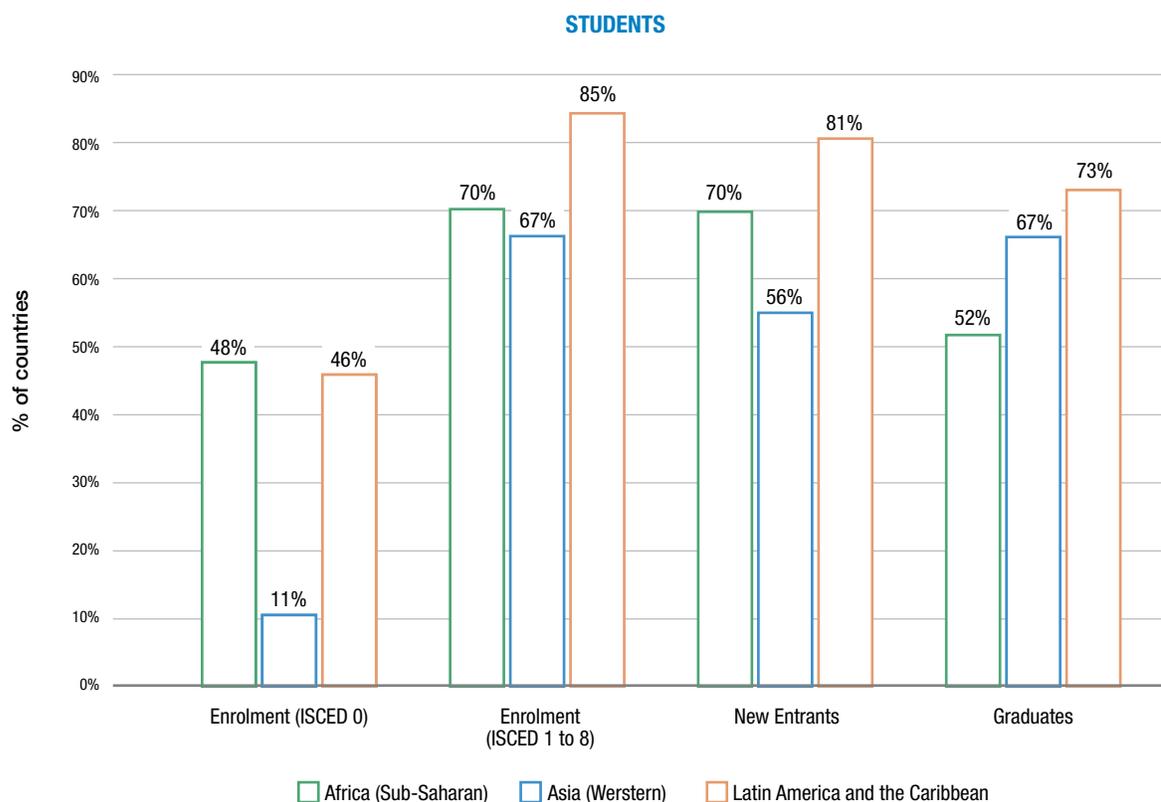
Source: UNESCO Institute for Statistics (UIS) 2018.

Figure 8. Availability of data by region (% of countries)

TEACHERS

	Qualified teachers	Trained teachers	New entrant teachers	Teachers who received inservice training in the last year
Africa (Sub-Saharan)	74%	67%	59%	44%
Asia (Werstern)	89%	56%	78%	44%
Latin America and the Caribbean	73%	58%	46%	27%

■ Africa (Sub-Saharan) ■ Asia (Werstern) ■ Latin America and the Caribbean

INFRASTRUCTURE

	Electricity	Basic drinking water	Internet for pedagogical purpose	Computers	Single-sex basic sanitation facilities	Basic Hand-washing facilities	Adapted infrastructure and material for students with disabilities
Africa (Sub-Saharan)	44%	41%	33%	30%	33%	26%	26%
Asia (Werstern)	19%	33%	33%	33%	22%	33%	22%
Latin America and the Caribbean	33%	23%	19%	19%	15%	15%	8%

■ Africa (Sub-Saharan) ■ Asia (Werstern) ■ Latin America and the Caribbean

Source: UNESCO Institute for Statistics (UIS) 2018.

4. SDG 4 global data needs

There are four primary data sources used to calculate the SDG 4 indicators: household-based survey and assessment data; census data; school-based survey and assessment data; and Education Management Information System (EMIS) or administrative data. School/individual-based administrative data can be used to produce around 50% of the 43 thematic indicators. These thematic indicators based on administrative sources are included in regional SDG 4 monitoring indicators that have been adopted by many regional bodies in the world (UIS, 2018).

This section begins by proposing a sequence on how to link SDG 4 indicators and data collection with a focus on administrative data. The section then reviews the sources of data for reporting on different indicators, provides some conceptual definitions needed to frame data sources and finally, offers a preliminary definition of the indicators and variables to be collected.

4.1. How to embed data specification needs in EMIS

Education Management Information Systems (EMIS) play a pivotal role in informing efforts to achieve SDG 4. This section outlines how to make this reporting more consistent with the SDG 4 process, while recognizing that the primary need is the country's own management of the data. With that aim, the list of SDG 4 indicators is first reviewed to define specifically what variables need to be collected for each of the indicators.

Then, each indicator and how they are framed are analysed to provide examples of how the questions are framed.

Ideally, a mapping of SDG 4 data needs should be done early in the process as shown in **Figure 9** to guide users to design EMIS survey questionnaires by identifying the required variable(s) to calculate the indicators and type of disaggregation needed. The type of disaggregation depends on a specific country's context. Many countries disaggregate the indicators by sex, types of disability, location and ethnicity. This is helpful when the indicators are eventually used to inform targeted policy interventions. The types of disaggregation of the indicators depend on the interest and needs of each government.

The ideal cycle departs from the SDG 4 indicator framing that defines the data needs (variable from different sources to be used to report on indicators). These data needs (data specifications) should then be transformed into variables in a country's school EMIS and in the student, teacher and school management information system (SMIS). This step is key to the successful monitoring and tracking of different education aggregates to ensure that the needed specifications are embedded in the EMIS, including the student, school and teacher's registrations forms. This will help ensure data availability to report on the indicators, should the country aim to report on them. The type of process described here could be extended to the analysis of regional and national frameworks as well.

Figure 9. From EMIS to SDG indicators
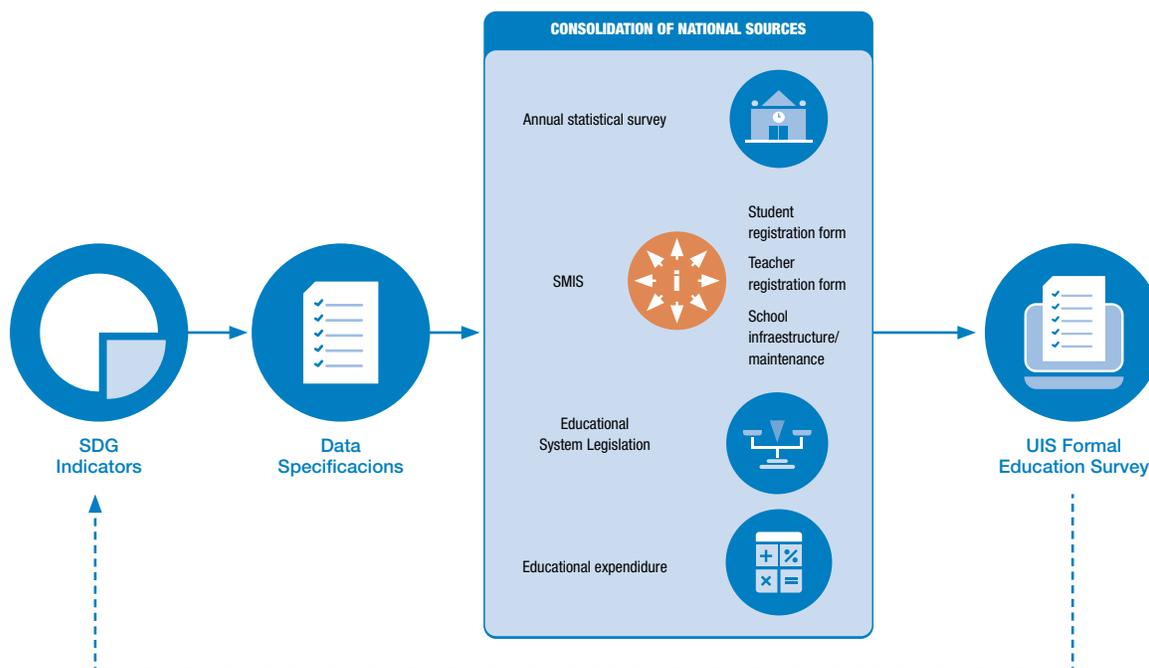
Source: UNESCO Institute for Statistics.

4.2. Data sources by indicator

Table 1 lists the data sources of SDG 4 indicators. This table indicates the domain; targets; indicator number and description; global vs thematic indicators; and also identifies which indicators can be estimated from more than one source of data.

4.3. Education system definitions in the operationalization of SDG 4 indicators

The ISCED is designed to serve as a framework to classify educational activities as defined in programmes and the resulting qualifications into internationally agreed upon categories. The basic concepts and definitions of ISCED are therefore intended to be internationally valid and comprehensively represent the full range of education systems.

The application of ISCED facilitates the transformation of detailed national education statistics on participants, providers and sponsors of education, compiled on the basis of national concepts and definitions, into aggregate categories that can be compared and interpreted internationally.

Some basic concepts and definitions are embedded in the estimation of SDG indicators (e.g. educational level definition) along with what they include and do not include for each level as well as other relevant concepts deemed necessary for the operationalization of educational indicators on a globally comparable basis.

Table 1. SDG 4 data sources

Indicator		System data	School census/ Administrative data/EMIS	Multi-purpose survey	Labour force survey	Literacy survey	School survey	Learning assessment	Special source	Public budget
4.1.1	Learning Reading/Math			GLOBAL				GLOBAL		
4.1.2	Completion rate		GLOBAL	GLOBAL	GLOBAL					
4.1.3	Gross intake ratio		THEMATIC							
4.1.4	Out-of-school		THEMATIC	THEMATIC						
4.1.5	Children over age		THEMATIC	THEMATIC				THEMATIC		
4.1.6	Admin. of learning assessments							THEMATIC		
4.1.7	Years free & compulsory primary & secondary education	THEMATIC								
4.2.1	Children developmentally on track			GLOBAL						
4.2.2	Participation before primary		GLOBAL	GLOBAL						
4.2.3	Home learning environment			THEMATIC						
4.2.4	GER early childhood		THEMATIC	THEMATIC						
4.2.5	Years free & compulsory pre-primary education	THEMATIC								
4.3.1	Youth/adults in education & training		GLOBAL	GLOBAL	GLOBAL					
4.3.2	GER in tertiary education		THEMATIC	THEMATIC	THEMATIC					
4.3.3	Participation in T/V programmes		THEMATIC	THEMATIC	THEMATIC					
4.4.1	ICT skills			GLOBAL					GLOBAL	
4.4.2	Digital literacy skills							THEMATIC		
4.4.3	Attainment rates			THEMATIC	THEMATIC					
4.5.1	Parity indices		GLOBAL	GLOBAL	GLOBAL	GLOBAL		GLOBAL	GLOBAL	
4.5.2	First/home language		THEMATIC	THEMATIC				THEMATIC		
4.5.3	Reallocation educational resources	THEMATIC								THEMATIC
4.5.4	Expenditure per student	THEMATIC		THEMATIC					THEMATIC	THEMATIC
4.5.5	Aid to education in LDCs								THEMATIC	
4.6.1	Functional literacy and numeracy skills			GLOBAL		GLOBAL		GLOBAL		
4.6.2	Literacy rates			THEMATIC	THEMATIC	THEMATIC				
4.6.3	Illiterates in literacy programmes		THEMATIC	THEMATIC	THEMATIC	THEMATIC				

Legend: GLOBAL (orange), THEMATIC (blue)

Indicator		System data	School census/Administrative data/EMIS	Multi-purpose survey	Labour force survey	Literacy survey	School survey	Learning assessment	Special source	Public budget
	● GLOBAL ● THEMATIC									
4.7.1	Mainstreaming of GCE & ESD	●						●	●	
4.7.2	Schools w/HIV and sex education		●							
4.7.3	Human rights education	●							●	
4.7.4	Global citizenship and sustainability understanding							●		
4.7.5	Environmental science and geoscience							●		
4.7.6	Breadth of skills									
4.a.1	Schools w/ basic services		●				●			
4.a.2	Experience of bullying						●			
4.a.3	Attacks on students, personnel & institutions								●	
4.b.1	Assistance for scholarships								●	
4.c.1	Teachers w/ min. qualifications		●							
4.c.2	Pupil-trained teachers		●							
4.c.3	Qualified teachers		●							
4.c.4	Pupil-qualified teacher ratio		●							
4.c.5	Average teacher salary		●		●					
4.c.6	Teacher attrition rate		●							
4.c.7	Teachers w/ in-service training		●				●			

Note: T/V = technical/vocational; GCE = global citizenship education; ESD = education for sustainable development.

Source: UNESCO Institute for Statistics.

ISCED is comprised of three main classifications, levels of education (ISCED-P), educational attainment (ISCED-A) and education and training (ISCED-F). The first edition of ISCED was adopted in 1976 with revisions made in 1997 and 2011. ISCED-F was revised in 2013. Statistical classifications of these types tend to remain in use for at least a decade before further revision is considered.

4.3.1. Education levels in ISCED 2011

Levels of education is one of the main concepts addressed by ISCED 2011 by proposing an ordered set grouping of education programmes in relation to gradations of learning experiences, along with the knowledge, skills and competencies that each programme is designed to impart. The ISCED level reflects the degree of complexity and specialization of the content of an education programme, from

Table 2. Description of ISCED levels

Level	ISCED 2011	Description
0	Early childhood (01 Early childhood educational development)	Education designed to support early development in preparation for participation in school and society. Programmes designed for children below the age of 3.
	Early childhood (02 Pre-primary)	Education designed to support early development in preparation for participation in school and society. Programmes designed for children from age 3 to the start of primary education.
1	Primary education	Programmes typically designed to provide students with fundamental skills in reading, writing and mathematics and to establish a solid foundation for learning.
2	Lower secondary education	First stage of secondary education, building on primary education, typically with a more subject-oriented curriculum.
3	Upper secondary education	Second/final stage of secondary education preparing for tertiary education and/or providing skills relevant to employment. Usually with an increased range of subject options and streams.
4	Post-secondary non-tertiary education	Programmes providing learning experiences that build on secondary education and prepare for labour market entry and/or tertiary education. The content is broader than secondary but not as complex as tertiary education.
5	Short-cycle tertiary education	Short-cycle tertiary programmes are typically practically based, occupation-specific and prepare for labour market entry. These programmes may also provide a pathway to other tertiary programmes.
6	Bachelor or equivalent	Programmes designed to provide intermediate academic and/or professional knowledge, skills and competencies leading to a first tertiary degree or equivalent qualification.
7	Master or equivalent	Programmes designed to provide advanced academic and/or professional knowledge, skills and competencies leading to a second tertiary degree or equivalent qualification.
8	Doctoral or equivalent	Programmes designed primarily to lead to an advanced research qualification, usually concluding with the submission and defence of a substantive dissertation of publishable quality based on original research.

Source: UNESCO Institute for Statistics.

foundational to complex. **Table 2** summarizes each ISCED level definition.

4.3.2. Other definitions within ISCED

Formal education

Formal education is institutionalized, intentional and planned through public organizations and recognized private bodies, and – in their totality – constitute the formal education system of a country. Formal education programmes are thus recognized as such by the relevant national education or equivalent authorities (i.e. any other institution working in cooperation with national or subnational education authorities). Formal education consists mostly of initial education. Vocational education, special needs education and some parts of adult education are often recognized as part of the

formal education system. Qualifications from formal education are by definition recognized and, therefore, fall within the scope of ISCED. Institutionalized education occurs when an organization provides structured educational arrangements, such as student–teacher relationships and/or interactions that are specially designed for education and learning.

Formal education typically takes place in educational institutions created to provide full-time education for students in a system designed as a continuous educational pathway. This is referred to as initial education and is defined as the formal education of individuals before their first entrance to the labour market (i.e. typical ages at which they will normally be in full-time education).

Formal education also includes education for all age groups with programme content and qualifications equivalent to those of initial education. Programmes that take place partly in the workplace may also be considered formal education if they lead to a qualification that is recognized by national education authorities (or the equivalent). These programmes (e.g. apprenticeships) are often provided in cooperation between educational institutions and employers.

Non-formal education
Like formal education yet unlike informal, incidental or random learning, *non-formal education* is education that is institutionalized, intentional and planned by an education provider. The defining characteristic of non-formal education is that it is an addition, alternative and/or complement to formal education within the process of lifelong learning for individuals. It is often provided to guarantee the right of access to education for all. It caters to people of all ages but does not necessarily follow a continuous pathway structure – it may be short

in duration and/or low-intensity, and it is typically provided in the form of short courses, workshops or seminars. Non-formal education mainly leads to qualifications that are not recognized as formal or equivalent to formal qualifications by the relevant national or subnational education authorities, or sometimes, to no qualifications at all. Nevertheless, formal, recognized qualifications may be obtained through exclusive participation in specific non-formal education programmes. This often happens when the non-formal programme completes the competencies obtained in another context.

Depending on the national context, non-formal education can cover programmes contributing to adult and youth literacy and education for out-of-school children, as well as programmes on life skills, work skills, and social or cultural development. It can include training in a workplace to improve or adapt existing qualifications and skills, training for unemployed or inactive persons, as well as alternative educational pathways to formal education and training in some cases. The successful completion of a non-formal education programme and/or a non-formal educational qualification does not normally afford access to a higher level of education, unless it is appropriately validated in the formal education system and recognized by the relevant national or subnational education authorities (or equivalent).

Type of programme
Vocational education is defined as education programmes that are designed for learners to acquire the knowledge, skills and competencies specific to a particular occupation, trade or class of occupation or trade. Such programmes may have work-based components (e.g. apprenticeships, dual-system education programmes). Successful completion of such programmes leads to labour market–relevant vocational qualifications acknowledged

as occupation-oriented by the relevant national authorities and/or the labour market.

Public and private institutions

A *public institution* is one that is controlled and managed directly by a public education authority or agency of the country where it is located or directly by a government agency or a governing body (e.g. council, committee), most of whose members are either appointed by a public authority of the country where it is located or elected by public franchise. They may or may not receive private fees, depending on the level, country as well as other determining factors.

A *private institution* is one that is controlled and managed by a non-governmental organization (e.g. a church, trade union, business enterprise or foreign or international agency), or one that has a governing board comprised mostly of members who have not been selected by a public agency. They may or may not receive public funds, depending on the level, country as well as other determining factors.

4.4. What variables need to be collected in EMIS to produce SDG 4 indicators?

In the more traditional view as discussed in section 4.1, EMIS are prepared to report on indicators referred to as administrative data. Many of the indicators reported on using other sources, such as learning assessments and household surveys, are not usually embedded in a traditional EMIS.

This section focuses on the more traditional system of information that needs to be collected. Tables 3 and 4 provide information on the high-level aggregate definition of the SDG 4 indicators and the variables needed for the estimation of these

indicators. Not all indicators can be reported at the school level (e.g. location) and they cannot be disaggregated. It is necessary to collect specific variable(s) from schools to calculate indicators and some of the indicators based on administrative data require age-specific population data other than those collected from schools.

EMIS could act as a valuable source of information to inform equity and complement other data sources, such as household surveys and learning assessments. To date, this potential has been not fully explored as more guidance is needed. For instance, it is vital to understand all sources of inequality prior to using an EMIS in this manner. Evidence shows that pupils disadvantaged in socio-economic terms typically attend lower performing schools and schools that are less effective, and yet are also affected by greater uncertainty in school performance. Improving equity in this case will entail focusing more attention and resources on the disadvantaged, including focusing on pure inequality or a lack of 'standards', such as the mastery of a (realistic) curriculum or the quality and appropriateness of teaching and books – rather than using gender, location or income as proxies. Understanding how the various factors interact and how they affect the most disadvantaged in terms of cognitive skills is likely to be the most productive approach to improving equity.

The variable mapping of the indicators does not include system-level indicators, such as compulsory years of schooling nor indicators that require school- or student-based surveys and assessments (e.g. attacks on school and minimum proficiency levels). The variables are mapped according to school-based data collected through EMIS that cover all SDG 4 thematic indicators and include regional monitoring indicators proposed by the regional bodies.

Table 3. Mapping SDG 4 indicators to EMIS data

Legend for "Other data sources required" and "school level" columns: ●(green) = available / yes, ●(red) = not available / no. ● = purple marker.

SDG 4 Indicators	Unit of data collection	Variable	Earlier childhood (01)	Pre-primary (02)	Primary (1)	Lower secondary (2)	Upper secondary (3)	Post-secondary non-tertiary (4)	Short-cycle tertiary (5)	Bachelor or equivalent (6)	Master or equivalent (7)	Doctoral or equivalent (8)	Formal	Non-formal	Literacy programmes	Age/age-range	Grade	Technical/vocational	Sex	Type of institution	Population	Educational expenditure	Can the indicator be reported at the school level?
4.1.2 Completion rate	Individual student / Level	Graduates from an education level			●	●	●												●		●(red)	●(red)	●(green)
4.1.2 Completion rate	Individual student / Level	New entrant students to an education level			●	●	●												●				
4.1.3 Gross intake ratio	Individual student / Grade	New entrant students to the last grade of each education level				●	●										●		●		●(green)	●(red)	●(red)
4.1.4 Out-of-school	Individual student / Level / Age	Enrolment			●	●	●									●			●		●(green)	●(red)	●(red)
4.1.5 Children over age	Individual student / Grade / Age	Enrolment			●	●										●	●		●		●(red)	●(red)	
4.2.2 Participation before primary	Individual student / Level / Age	Enrolment	●	●	●											●			●		●(green)	●(red)	●(red)
4.2.4 GER early childhood	Individual student / Level	Enrolment	●	●															●		●(green)	●(red)	●(red)
4.3.1 Youth/adults in education & training	Individual student / Level / Age	Participation of youth and adults in formal and non-formal education and training											●	●		●			●		●(green)	●(red)	●(red)
4.3.2 GER in tertiary education	Individual student / Level	Enrolment							●	●	●	●							●		●(green)	●(red)	●(red)
4.3.3 Participation in technical & vocational programmes	Individual student / Orientation / Age	Participation of youth in technical and vocational education and training				●	●	●	●							●		●	●		●(green)	●(red)	●(red)
4.5.2 First/home language	Individual student / Level	Enrolment			●														●		●(red)	●(red)	●(green)
4.5.2 First/home language	Individual student / Level	Enrolment by first or home language			●														●				
4.5.4 Expenditure per student	Individual student / Level	Enrolment	●	●	●	●	●	●	●	●	●	●							●	●	●(red)	●(green)	●(red)
4.6.3 Youth/adults in literacy programmes	Individual student / Level / Age	Participation of youth and adults in literacy programmes													●	●			●		●(green)	●(red)	●(green)

SDG 4 Indicators	Unit of data collection	Variable	Earlier childhood (01)	Pre-primary (02)	Primary (1)	Lower secondary (2)	Upper secondary (3)	Post-secondary non-tertiary (4)	Short-cycle tertiary (5)	Bachelor or equivalent (6)	Master or equivalent (7)	Doctoral or equivalent (8)	Formal	Non-formal	Literacy programmes	Age/age-range	Grade	Technical/ vocational	Sex	Type of institution	Population	Educational expenditure	Can the indicator be reported at the school level?
4.7.2 Schools w/ HIV sexuality education	Individual schools / Level	Schools			●	●	●														●	●	●
	Individual schools / Level	Schools providing life skills-based HIV and sexuality education			●	●	●																
4.a.1 Schools w/ basic services	Individual schools / Level	Schools			●	●	●	●												●	●	●	●
	Individual schools / Level	Schools with and without access to the given facilities			●	●	●	●												●			
4.c.1 Teachers w/ min. qualifications	Individual teachers / Level	Teachers		●	●	●	●	●											●		●	●	●
	Individual teachers / Level	Teachers with the minimum required qualifications		●	●	●	●	●											●				
4.c.2 Pupil-trained teachers	Individual teachers / Level	Trained teachers		●	●	●	●	●											●		●	●	●
	Individual student / Level	Enrolment		●	●	●	●	●											●				
4.c.3 Qualified teachers	Individual teachers / Level	Teachers		●	●	●	●	●											●		●	●	●
	Individual teachers / Level	Qualified teachers		●	●	●	●	●											●				
4.c.4 Pupil-qualified teacher ratio	Individual student / Level	Enrolment		●	●	●	●	●											●		●	●	●
	Individual teachers / Level	Qualified teachers		●	●	●	●	●											●				
4.c.5 Average teachers salary	Individual teachers / Level	Annual gross statutory starting salary for a qualified teacher			●	●	●														●	●	●
4.c.6 Teacher attrition rate	Individual teachers / Level	Teachers		●	●	●	●	●											●		●	●	●
	Individual teachers / Level	New entrant teachers		●	●	●	●	●											●				
4.c.7 Teachers w/ in-service training	Individual teachers / Level	Teachers		●	●	●	●	●											●		●	●	●
	Individual teachers / Level	Teachers who received in-service training of each type in the last year		●	●	●	●	●											●				

Source: UNESCO Institute for Statistics (UIS)

Note: GER = gross enrolment ratio

Table 4. Mapping of variables from EMIS to SDG 4 indicators

Variable	SDG 4 Indicators																			
	4.1.2	4.1.3	4.1.4	4.1.5	4.2.2	4.2.4	4.3.1	4.3.2	4.3.3	4.5.2	4.5.4	4.6.3	4.7.2	4.a.1	4.c.1	4.c.2	4.c.3	4.c.4	4.c.6	4.c.7
	Completion rate	Gross intake ratio	Out-of-school	Children over-age	Part. b/f primary	GER early childhood	Youth/adults educ./training	GER tertiary	Participation in T/V progr.	First/home language	Expenditure per student	Youth/ad. in literacy progr.	Schools w/ HIV sex educ	Schools w/ basic services	Teachers w/ min qual.	Pupil-trained teacher	Qualified teachers	Pupil-qualified teacher	Teacher attrition rate	Teacher in-service training
Enrolment			●	●	●	●		●		●	●					●		●		
Graduates	●																			
New entrants students to an education level	●																			
New entrant students to the last grade of each education level		●																		
Participation of youth and adults in formal and non-formal education and training							●													
Participation of youth in technical and vocational education training									●											
Participation of youth and adults in literacy programmes												●								
Schools													●	●						
Schools providing life skills-based HIV and sexuality education													●							
Schools with and without access to the given facilities														●						
Teachers															●		●		●	●
Qualified teachers																	●	●		
Teachers with the minimum required qualifications															●					
Trained teachers																●				
Teachers who received in-service training in the last year																				●
New entrant teachers																		●		

5. The nuts and bolts of EMIS

The EMIS are a vital element of an education system that enables policymakers to implement critical modifications to affect the kind of changes needed in education policies and institutions. All countries across the globe collect data from schools largely on an annual basis. Some countries use paper, some use spreadsheets while the majority collect administrative data from schools online and offline. In most cases, countries collect data on enrolment, new entrances, repeaters and graduates from schools – all requirements to calculate SDG 4 thematic indicators (UIS, 2018).

The main objective of this document is to provide general guidance on how to produce a robust toolkit to support EMIS users and this section will focus on ways to improve the recording of disaggregated information in EMIS. The section discusses the different aspects an EMIS should ideally cover and focuses on a few areas that are key to an effective EMIS: the components of a comprehensive EMIS, the school MIS (SMIS) and unique ID numbers as well the recording of disaggregation.

5.1. Components of a modern EMIS

EMIS are meant to facilitate the collection, processing, analysis and dissemination of education data and information to support the monitoring and performance evaluation of an education system. They are generally considered very helpful tools to manage education systems. Overall, EMIS have been experiencing a shift in paradigm due in part to the increasing availability of technology that allows for the combination and integration of databases and in part to the policy needs associated with a changing agenda that needs to be informed by data from diverse sources.

Traditionally, EMIS have been used to collect school-level data at every educational level (from pre-primary and ECD upwards) and by each administrative jurisdiction (school, district, province and national, as appropriate for a given country), including:

- Enrolment (e.g. by grade, gender, age and subject)
- Repetition (by grade and gender)
- Learner demographics
- Teachers (e.g. experience, qualification, gender, placement and appointment)
- Schools (e.g. physical facilities, general information, location and classrooms)
- Infrastructure

These components are represented in **Figure 10** below in the first box labelled 'Traditional EMIS'. However, the problem with traditional EMIS is that they are not optimally designed and mandated to produce all the datasets needed to meet the requirements of the education sector. There are two types of missing sources. The first ones are databases on other components within the education sector that are important for evidence-based decision-making – some managed by the Ministry of Education (MoE) and some by other ministries. These data, reflected in the second box labelled 'Other MoE Units' data' might include, depending on the country:

- Learning materials (e.g. textbooks)
- Learning outcomes (examinations and learner assessments)

Figure 10. EMIS in a nutshell
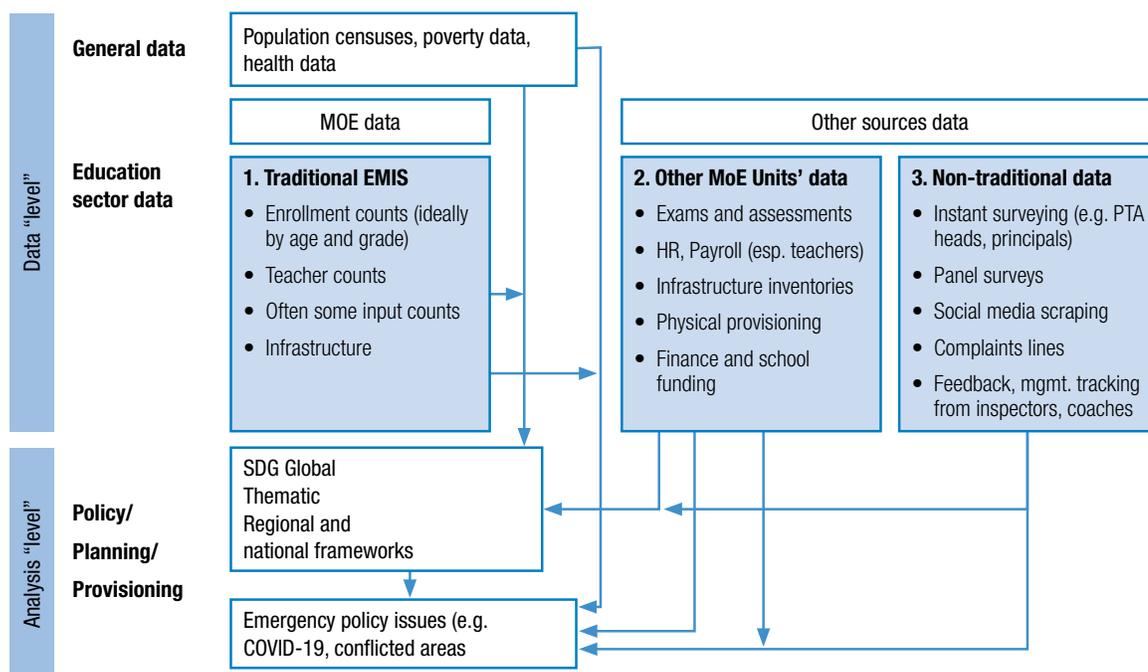
Source: UNESCO Institute for Statistics adapted from UIS and GPE (2020).   **Note**: PTA = parent-teacher association

- Teacher qualifications and salaries (links to both human resources and payroll)
- School funding (in many countries schools receive direct funds for certain expenses) and budget
- School feeding programmes (where applicable)
- Library and archive services
- Learner health.

One interesting and relevant component to ensure the proper recording of various dimensions of management and equity is related to infrastructure that apply to both the 1st and 2nd box. There are two aspects of infrastructure captured – one is *stock* and the other is *flow* – that are handled differently and by different units in governments and follow a different periodicity for capture. The first aspect – the inventory

(or stock) – is not, generally, captured annually. Some countries administer an infrastructure survey only once every few years, and do not do it via the EMIS as this would fill the EMIS with information that does not change substantially. Thus, a specific infrastructure survey or administrative record is used and only a few aspects (i.e. classrooms, toilets and computers) are capture by the first box in Figure 10, the 'Traditional EMIS'. The second component, *flow* recorded in general by the MoE, is 'physical provisioning' where items, such as books and paper are physically provided, in kind. In some countries, these items are provided by the MoE. In other countries, schools receive funding to buy these materials. Both situations need to be accounted for, so that it doesn't appear that schools are not receiving materials because they are buying these themselves instead of getting them

from the Ministry. This information will more likely be provided by the school rather than the provisioning section of the Ministry.

5.2. Key issues that impact effective SDG 4 reporting using EMIS

SDG 4 places much emphasis on equity and for this purpose, there is a higher demand for more disaggregated data. Realizing the need and with the advancement of technology and methodologies, many of the countries have moved or developed individual student-based EMIS to collect individual data on students and teachers. The system helped authorities at the school, local and national levels to track student progress, achievement and risk of dropping out in a disaggregated manner to better inform and develop appropriate policies and ultimately, plan to overcome the issues and challenges.

5.2.1. School Management Information Systems are key to good reporting

Schools record and manage different information, including that on students, teachers, infrastructure, resources and learning achievements through establishing School Information Management Systems (SMIS). SMIS is a computerized system that encompasses the collection, compilation, analysis and reporting of school-level data, such as students and their background, teachers and their teaching subjects, attendance, participation, school resources and finance.

The SMIS provide data to school leaders, managers and stakeholders to inform the necessary decision making that affects the improvement of schools as well as teaching and learning practices, and school planning. At the same time, SMIS prepare data to be shared with the national and provincial EMIS. The information collected by SMIS is listed in Table 5 below.

Table 5. Components of SMIS

Area	Data/information
School physical facilities	Building condition, furniture, toilets, WASH information, library, etc.
Students	Personal and family characteristics, previous educational experience, current grade, attendance, performance, behavior, achievements, outcomes
Teachers	Personal characteristics, qualification, teacher training received, years of service, subject specialization, class/subject taught, teaching load, special skills, attendance, performance, achievements
Finance	School budget and income by source, expenditure by type
Teaching/learning materials	Quantity and conditions by type of material, new acquisitions, rate of utilization, ICT equipment, computers, etc.
Learning achievement and outcomes	Results of tests, examinations and assessments
Extra-curricular and co-curricular activities	Extra-curricular and co-curricular activities
School and community interactions	School management, board meetings, parent-teacher association, school-and-community activities

Source: UNESCO Institute for Statistics (UIS). **Note**: WASH = water, sanitation and hygiene

5.2.1. Transferring data from schools to EMIS based on unique ID

Developing individual student-based EMIS entails the creation of unique identity documents (IDs) for each student and teacher. School data from SMIS is linked to EMIS using appropriate computer technologies. The IDs help link the data for individual students from SMIS and other databases if they use the same IDs. Generally, schools can transfer data throughout the year in real time. However, for statistical processes, specific date(s) are chosen for the recording of data from schools in EMIS to support the statistical production of indicators/information.

Individual student-based EMIS can enable a country to undertake the full tracking of individual pupils and ensure a national registry of each student's academic record and performance aligned with background data, such as the student's biodata and socio-economic factors. An example of this type of system is implemented in Mongolia[5] and Fiji[6]. This system shown in Figure 11 enables the recording of individual student achievements, awards, attendance and financial allocations. This in turn provides much greater capacity to analyse data to inform the monitoring, evaluation and planning of policy makers and planners as it captures student attendance and achievement and helps delineate and distinguish between many factors, including a student's location, gender and disability.

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5   UNICEF (2019), EMIS Review.

6   World Bank (2017), SABER evaluation of EMIS in Fiji.

Figure 11. Proposed flow of data/information in individual-based EMIS
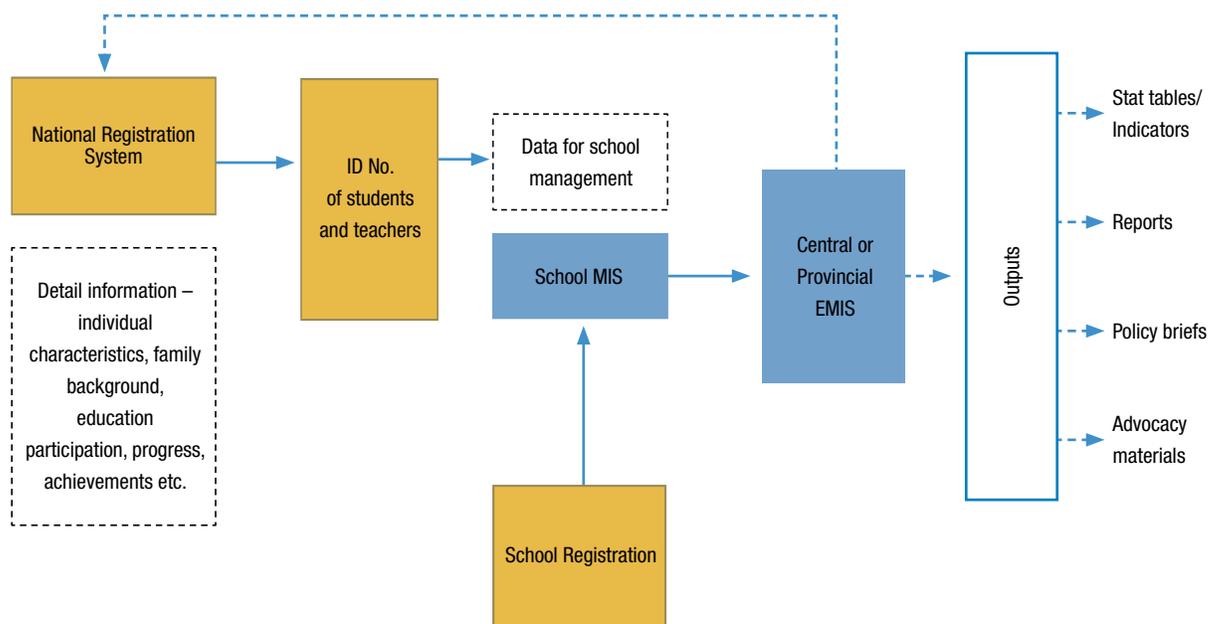
Source: UIS (2020).

5.2.2. Provision of identifiers

School ID

A unique school ID is a single, non-duplicated number that is assigned to and remains with a school throughout its existence. Most countries use an 8- to 11-digit school ID based on the size and number of their subnational administrative division. The number includes the first and second digit to denote the administrative level of the country (e.g. province or state/district) and then to indicate the management (public vs private) of the school.

Teacher ID

Individual teacher-level data facilitate planning for recruitment, training and other professional development of teachers. Individual teacher data are equally important for decision-making at the school level. For instance, based on teacher data, a head teacher can gauge the competencies of their teaching staff and subsequently enrol staff in training programmes to bridge competency gaps. At the same time, teachers can track their training history through EMIS, allowing them to extract information that they can use to justify the need for professional development in their career.

Student ID

The individual student-based EMIS uses unique IDs to identify students individually. The IDs are maintained throughout a student's schooling life and can be applied as soon as an individual is in ECE through to post-doctoral programmes. The unique ID is provided when students first enrol in school. Information on students, including their characteristics, performances and test scores can be recorded using the ID. The use of IDs also avoids the duplication of entering data for the same student in a different period of schooling. Such unique IDs should be generated and managed by the central government (MoE) and made available to the schools to input in their SMIS.

Students IDs can be created in two ways: a) assignment of a national ID number and b) generated at the MoE. Using a national registration number is more sustainable and easier to link to other databases, such as health and labour. The second type of ID are ministry-generated numbers, where the necessary data on students are collected during school enrolment. The IDs, which are unique to each student, allows the MoE to track each students' progress as well as their transfer to another school. However, these MoE-generated IDs afford less capacity to link data with other databases not related to education and multiple IDs may even be generated in the MoE.

Use of National Civil Registration Number

Some countries practice diligent civil registration through their national birth registration system, where children are registered with unique IDs from birth. If the country has a robust national registration system, students can be registered with the same ID number in EMIS. Using a national registration number is more sustainable and easier to link to other databases, such as health and labour, as they also use the same ID numbers across all sectors. Mongolia, for instance, adopted a one citizen–one registration policy in 2018 with the main goal of enhancing an integrated system of state registration and transferring electronic forms to provide a prompt delivery of public services (see National Example 1). Therefore, the same ID is used across all sectors, including health and education.

Use of Education Ministry–generated numbers

Lacking a national registration system, a ministry can choose to generate student IDs provided when the student first registers at school. In this scenario, all the necessary data on the student are collected during school enrolment. The unique IDs assigned to each students allows the MoE to track each student's progress as well as their transfer to

National Example 1. National ID system and use in education – Mongolia

Birth and death registration
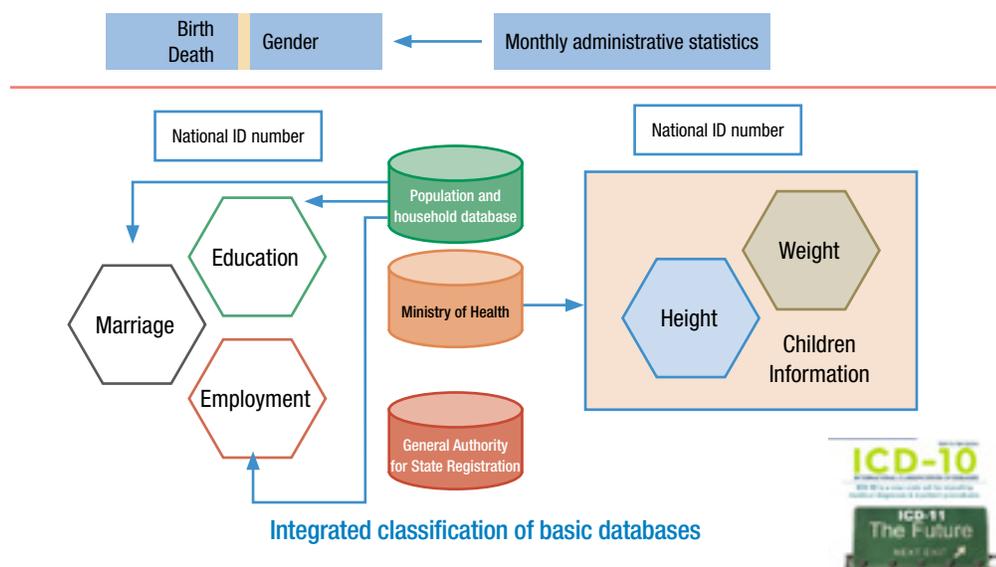
Source: AMARBAL Avirmed, NSO, Mongolia.

Presentation in 2nd Meeting of the Regional Steering Group on Population and Social Statistics in Asia and the Pacific, 17–19 July 2019, Bangkok.

another school. However, these MoE-generated IDs afford less capacity to link data with other databases. In this scenario, the MoE should try to use such IDs through the sector so that at the very least data sharing can be done within the Ministry itself. National Example 2 presents the student progress tracking form used in Timor-Leste by the Ministry to create student IDs for their EMIS. It has also embedded the student tracking form into the annual school survey. So, the EMIS can collect individual data on the students and use student IDs to track an individual student's progress, repetition, drop out or transfer.

Recommendations on the use of unique IDs

While establishing an individual-based EMIS, there are certain things that should be carefully considered:

- In each country, there should be specific laws and policies that guide population registration. A careful review of laws and policies to ensure that data specification needs are pre-defined and common across systems is needed to harmonize data management.

- Once the student IDs are provided, it should remain with the student at least until the end of school life (if the IDs are not provided through the national registration system) and all the information on the student should be recorded and linked to the ID. A student's socio-economic characteristics, including their location, should be updated as they move along the education pathways.

- For teachers and non-teaching staff, characteristics and other information should

National Example 2. Annual student progress tracking form – Timor-Leste

Source: EMIS, MoE, Timor-Leste.

be captured and updated along their career pathways.

■ Appropriate measures should be taken to safeguard the teachers' and students' private information.

5.2.3. Recording finance data

Data on daily financial transactions are recorded in detailed school ledgers. These provide a complete record of financial transactions over the life of the school. The ledger holds account information needed to prepare financial statements and includes accounts for assets, liabilities, owners' equity, revenues and expenses.[7] Such school ledgers may however be too detailed to be used

directly for monitoring and decision-making. Based on the financial rules, monthly, term and yearly financial summaries of school income and expenditure can be produced and used by school management. A good school management information system (SMIS) collects and generates financial summaries that provide information on the flow of a school's financial resources, both into the school (income or revenue) and out of the school (expenditure) (see Table 6 for an example).

The school manager and school management committee use the financial summaries to monitor, verify and control the financial position of the school. These summaries are also used to report on the EMIS annual census. The financial data collection in EMIS generally depends on a country's interest in monitoring the aspects of school financing.

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7   PCR Educator (n.d.). Ledgers.

Table 6: Financial summary data records in SMIS

Period: ………………………to…………………………

REVENUE BY SOURCE	
Source of funds	**Amount**
1. Government	
a. Central government	
b. Provincial government	
c. District government	
d. Local government	
2. Non-governmental	
a. Local community	
b. Local business	
c. NGOs	
3. School revenue	
a. School fees	
b. Other fees	
c. Renting out facilities	
d. Product/services	
e. Donations	
4. Other revenue	
a.Interest earned	

EXPENDITURE BY TYPE	
Type of expenditure	**Amount**
• Capital expenditure	
a. Construction	
b. Major repairs	
c. Equipment	
d. Bulk purchase of books	
e. Other capital exp.	
• Current expenditure	
a. Teacher salaries	
b. Staff salaries	
c. Rental premises	
d. Purchase of supplies	
e. Scholarships	
f. School meals	
g. Contracted services	
h. Maintenance	
i. Transportation	
j. Electricity	
k. Water	

Source: UNESCO (2011).

There might be hesitation for schools to provide all the financial data due to privacy issues. Such issues should be considered while designing EMIS data collection tools for school finance. It would be advisable to conduct a prior consultation with schools on possible financial data collection through EMIS (see National Example 3).

5.2.4. Recording Learning outcomes and examination results

SDG 4 focusses strongly on monitoring learning outcomes apart from access to and participation in learning opportunities. It is necessary to evaluate which learning outcome data can and cannot be embedded into EMIS. Sample-based learning outcome data are difficult to embed in EMIS whereas population-based assessment data, including national and district examination data, can be embedded. While collecting data on student learning outcomes and examination results, the following items can be included:

■ Number of students who sat for the test in different subjects
■ Number of students who passed the test in different subjects

Data can be included for key stages such as Grade 2/3; Grade 5 and Grade 9. National Example 4 illustrates how this is recorded in Myanmar.

National Example 3. Recording finance data in EMIS – Cambodia

Type	in Riel	in US$	in Other Currency
Money from Government for PB (2012)			
Money from Government for Construction (2012)			
Income from school produce			
Donations from local community and festive activities			
Donations from individuals abroad			
Donations from International and Non-Governmental Organizations			

Source: SMIS form Cambodia.

National Example 4. Recording learning outcomes and examinations in EMIS – Myanmar

2 (A) Grade 5

Subject	M			F			T		
	No. Sat (Appeared)	No. Passed	Average Grade Result (%) (Pass Rate)	No. Sat (Appeared)	No. Passed	Average Grade Result (%) (Pass Rate)	No. Sat (Appeared)	No. Passed	Average Grade Result (%) (Pass Rate)
Myanmar									
English									
Mathematics									
Social									
Science									

2 (B) Grade 9

Subject	M			F			T		
	No. Sat (Appeared)	No. Passed	Average Grade Result (%) (Pass Rate)	No. Sat (Appeared)	No. Passed	Average Grade Result (%) (Pass Rate)	No. Sat (Appeared)	No. Passed	Average Grade Result (%) (Pass Rate)
Myanmar									
English									
Mathematics									
Geography									
History									
Science									

Source: SMIS Form Myanmar.

National Example 5. Sex-disaggregated data – The Gambia

IV.4: Enrolment by Shift, Grade & Gender														
Shift	Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Grade 6		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	**M**	**F**
Morning														
Afternoon														
Total														

Source: EMIS form – The Gambia.

5.3. Addressing equity in EMIS

The monitoring of the SDG agenda considerably increases the demands on EMIS for disaggregated data. Much information currently produced through national EMIS would be more useful if recorded in a harmonized way to facilitate classification, comparability and use over time. This section presents definitions and recommendations for recording disaggregated information based on existing standards or best practices. It mainly covers the disaggregation dimensions used for monitoring SDG indicator 4.5.1, considering information that can be easily collected from the student or that is directly observable by the teacher or the school administrator[8].

5.3.1. Sex (female/male)

The sex of a person denotes the biological difference between male and female, which is typically assigned at birth. Data disaggregation by sex is essential for education-related gender statistics as it provides the context for

most analyses of the social and demographic characteristics of a population.

Ideally, information on sex should be recorded individually for each statistical unit, where applicable (e.g. student, repeaters, graduates and teaching staff). Generally, data by sex are collected alongside other characteristics, such as age and grade as shown in **National Example 5**.

5.3.2. Age

The age of a person is the interval of time between their date of birth and the reference date of the data collection, expressed in completed solar years.

For the purpose of precision, recording the date of birth (year, month and day) helps establish age accurately, especially when EMIS data collection occurs more than once during the same school or academic year. Where national data collection systems allow and in the interest of maintaining international comparability, the date of the data collection should occur as close as possible to the beginning of the reference school or academic year.

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8   This section is based on UIS (2020b) work in progress.

National Example 6. Disaggregated data by age – Afghanistan

Total number of female estudents by age and grade who are included in the attendande sheet at the starting of 1392 academic year																	
Class	6 years	7 years	8 years	9 years	10 years	11 years	12 years	13 years	14 years	15 years	16 years	17 years	18 years	19 years	20 years	21 years	22 years
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
Total																	

Source: SMIS form – Afghanistan.

Similar to sex, age data must be recorded individually for each statistical unit (e.g. student, new entrants, repeaters, graduates and teaching staff). Data disaggregation by single age (and grade) is essential for education-related age statistics as it provides the context for most analyses of the social and demographic characteristics of the population. National Example 6 shows the disaggregated data captured in Afghanistan.

5.3.3. Location (urban/rural)

Currently, there is no international standard definition for 'urban' and 'rural'. So, records in EMIS of information by location should be aligned with national definitions. National definitions of 'urban' and 'rural' are usually established by the relevant government agency, such as the ministry of interior, urbanization, territorial administration or infrastructure. These definitions are used by the national statistical office during demographic population censuses and household surveys.

Information on school location recorded in EMIS must remain consistent with the latest national definition of urban and rural used in the country at the time of data collection. The national definition is based on the school address or setting. It should

National Example 7. Definition of location for two areas – Nepal

5) School Area (Location)	Rural	= =	Urban	=== === ===	Email Address	============ ============ ======

Source: SMIS form – Nepal.

be possible for teachers and school administrators to determine and record the location of each school. See National Example 7 for how this is recorded in Nepal.

5.3.4. Disability status

Student with disabilities can be defined as: *'persons who are at greater risk than the general population for experiencing restrictions in performing specific tasks or participating in role activities. This would include persons who experience limitations in basic activity functioning, such as walking or hearing, even if such limitations were ameliorated by the use of assistive devices, a supportive environment or plentiful resources. Such persons may not experience limitations in specifically measured tasks, such as bathing or dressing, or participation activities, such as working or going to church or shopping, because the necessary adaptations have been made at the personal or environmental levels. These persons would still, however, be considered to be at greater risk of restrictions in activities or participation than the general population because of the presence of limitations in basic activity functioning, and because the absence of necessary accommodations would jeopardize their current levels of participation.'* – UNSD, 2017.

Currently, the data available in many EMIS are limited for students with disabilities in education institutions. Data on disability status should ideally be collected for each individual student but are currently aggregated by grade at the school level in most cases.

It is possible to collect more complex data. For example, UNICEF (2016) recommends (in Tables 2a, 2b, 2c, 3a and 3b) seven areas of functioning that constitute a comprehensive measure of

disability: vision; hearing; gross motor (e.g. walking or climbing steps); fine motor (e.g. writing or fastening clothes); intellectual; communication (understanding and being understood by others); and behaviour and socialization.

National Examples 8 and 9 show two examples of countries that collect disability data using different means of disaggregation. Currently, even collecting data that are aggregated is a good first step towards recording disability data.

5.3.5. Wealth

Wealth is a characteristic typically related to adults or households. It is determined using two main models: the income model and, mostly in developing countries, the assets model. Information required from the respondent to determine wealth through these two models is both complex and sensitive. There is not enough information in general collected through the EMIS to accurately define the wealth status of a student. This is done in general using National Statistical Office information and household surveys.

One of the simplest ways to record data related to wealth is to record a proxy variable such as level of education or occupation of the parents; or record some variable that is associated to social programmes and utilized by a given country to identify populations with socioeconomic needs. These options are very rough proxies and do not allow for the elaboration of some measure of inequity. National Example 10 illustrates the use of a predefined social category in India.

5.3.6. Migrant status

There are two types of migration status that could be of interest to collect using EMIS at the school

National Example 8. Recording disability in EMIS by gender and grade – The Gambia

IV.6: Special Needs Children														
Special Needs Categories	Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Grade 6		Total	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Vision														
Hearing														
Speaking														
Physical														
Mental														
Other														
Multiple Impairments														
Total														

National Example 9. Recording students with disabilities – Afghanistan

Province ( ) District ( ) Village ( ) School Name ( ) School Code ( )

Class	Number of sections (Shoba)			Number of registered students in attendance sheet		Number of registered students in first shift		Number of registered students in second shift		Number of registered students in third shift		Number of registered students in fourth shift			Incoming Transferred students		Outgoing Transferred students		Number of students with disabilities	
	Male	Female	Both	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female		Male	Female	Male	Female	Male	Female
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

Source: SMIS form – The Gambia and Afghanistan.

(b) No. of Economically Weaker Section* (EWS) students enrolled in schools that have qualified to attain the status to be eligible to receive land, building, equipment or other facilities at a concessional rate:

Pre-Primary		Class I		Class II		Class III		Class IV		Class V		Class VI		Class VII		Class VIII		Class IX		Class X		Class XI		Class XII	
B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G

* As defined in Section 2/e) of the RTE Act i.e. child belonging to such parent or guardian whose annual income is lower than the minimum limit specified by the appropriate Government, by notification.

Note: The economically weaker section (EWS) students are those who are in the 'general category' and whose families' annual gross income is less than INR 800,000 (US$10,600) and do not own agricultural land more than 5 acres, or a specific category of residential flat. India offers concessions based on social groups similar to what Nepal does for the Dalit and Janajati.

Source: SMIS form – India.

and country level: international migration and internal migration. Both are relevant and pose different challenges to education systems.

The stock of international migrants present in a country is defined as 'the set of persons who have ever changed their country of usual residence, that is to say, persons who have spent at least a year of their lives in a country other than the one in which they live at the time the data are gathered' (UNSD, 1998). However, given that this information can be difficult to obtain, it is often approximated by other population groups, such as persons born abroad or persons whose country of citizenship differs from the country they reside in (UNSD, 2017).

For EMIS data recording, questions to capture the following criteria are recommended to facilitate consistent data collection across national educational institutions during each annual school census to help improve data comparability across countries (see **National Example 11**):

1. Criteria to screen and identify migrant and non-migrant students:
   - Country of birth
   - Country of citizenship
   - Ever-resided abroad
   - Household members residing abroad
2. Criteria to collect key information on migrant students or migration:
   - Year of arrival for foreign-born population
   - Acquisition of citizenship
   - Reason for migration

National Example 11. Recording migrants – Rwanda

Level	Refugees			Other foreigners			Total foreigner		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
P1			0			0			0
P2			0			0			0
P3			0			0			0
P4			0			0			0
P5			0			0			0
P6			0			0			0
TOTAL	0	0	0	0	0	0	0	0	0

Source: SMIS form – Rwanda.

Transferred or internally migrant students

Apart from international migration and refugees, there is also a good number of students who migrate internally within a country for schooling. It is quite challenging for EMIS to record such migrant student; yet, it is very relevant to policy and planning. Most countries do not ask students about their migration directly, however, many countries do ask for the in-transfer school information which helps to monitor the transfer of the students from one location to another. To record in-transfer data, the following information should be asked of the transferred students:

- Name of the previous school and School IDs
- Address/location of the school
- Last grade in the previous school
- Currently enrolled grade
- Transfer year

These information helps to produce data on migration/transfer of the students within the district/location, outside of the district/location, rural to urban transfer, rural to rural, urban to urban transfers. In-transfer data is also very important to accurately calculate numbers of education indicators and performing student cohort analysis by location. **National Example 12** shows the transfer form used in Timor-Leste.

5.3.7. Ethnicity

Ethnicity is the state of belonging to a social group that has a common national or cultural tradition. Changes in ethnic identity can occur at both the group and individual level over a period of time.

Generally, indigenous peoples of a particular country are social groups with an identity that is distinct from the social and cultural identity of the

National Example 12. Student in-school transfer form – Timor-Leste

dominant society in that country […] Defining the indigenous population can be done in many ways, such as through a question on ethnic origin (that is to say, ancestry) or on indigenous identity […] There is no single term among countries to describe the indigenous population. Countries tend to use their own national concepts to identify the indigenous population. For example, in Australia the terms 'aboriginal' or 'Torres Strait Islander' are used, while in New Zealand the term 'Maori' is used'. – UNSD, 2017.

To harmonize management information system (MIS) data and record a student's ethnic origin or indigenous status, questions that capture certain criteria are proposed to facilitate consistent data collection across national educational institutions during each annual school census.

Depending on the country, questions on ethnicity and indigenous status could be done through self-declaration or options with multiple ethnic affiliations, such as: *how do you best describe yourself among the following affiliations: [list affiliations]*? Data on ethnicity provide information on the diversity of a population and can serve to identify subgroups of that population (see National Examples 13 and 14). Where ethnicity represents a sensitive characteristic, appropriate data protection and disclosure control measures must be put in place.

National Example 13. Recording of student numbers by ethnicity – Lao PDR

Level	S1			S2			S3			S4			S5			S6			TOTAL		
Language gr.	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Lao Tai																					
Mon Khmer																					
Chinese Tibetan																					
Hmong Iu Mian																					
Foreigner																					
Other																					
TOTAL																					

For students with original Lao nationality, to take among 4 language groups attached in the back, for other ethnic not covered ethnics to choose "other", for foreigners not naturalized into Lao citizenship yo chose "foreigner", name of language group and ethnics is in the attachment.

Source: Education and Sport Centre for Statistics, MOES, Lao PDR.

National Example 14. Recording ethnicity and language – Afghanistan

	UZBEKI		TUKMANI		BALOCHI		NORISTANI		PASHAYEE		WAKHANI		SHEGNANI		GUJRI	
Class	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
TOTAL																

Source: SMIS form – Afghanistan.

6. National EMIS typology

All countries in the world collect data from schools, mainly on an annual basis. As noted in Section 5, some countries use paper, some use spreadsheets while the majority collect administrative data from schools using online and offline software. In most cases, countries collect data on enrolment, new entrance, repeaters and graduates from schools – data required to calculate SDG 4 thematic indicators (UIS, 2018).

To understand the multiplicity of situations depending on the country, the UIS administered a questionnaire on EMIS metadata to gain a better understanding of the characteristics of existing EMIS in countries to help gauge their capacity to produce administrative data as well as assess the involvement of development partners in producing education data in the countries. The questionnaire is divided into four significant sections: the data management platform and mode of data collection; school-level; student- and teacher-levels; and partnership involvement.

The analysis in this section covers the platforms used; the existence of the school; student and teacher coding system and use of codes to collect data and for other management purposes; use of software to process collected data; and mode of the data collected from the schools.

6.1. Data management platform

The three main components of the education ecosystem are schools, students and teachers. A data management platform is used to collect, process and disseminate data from these three units to inform SDG 4 indicators. The platform is crucial to tracking changes, ensuring data quality and timely reporting of essential information needed for planning, management and policymaking. The data management platform used by countries depends on factors, such as governance structure; complexity of the education system; physical size and geographic features of the country; available human resource capacity; and availability of financial resources to support and maintain the EMIS.

The data management platform and mode of data collection vary across regions, depending on the country context. It is guided by the available resources, location of decision-making (federal vs state), requirements for disaggregated data and culture of use of evidence in planning and monitoring. This sub-section presents an overview of various data management platforms and the mode of collection used by countries. It also presents country examples and indicates exceptions. Figure 12 presents the type of data management platforms used in each region.

The most used data management platform is own-developed software with a share of 80% of countries using this type of EMIS platform. East Asia, Central Asia and Central and Eastern Europe rely 100% on own-developed software. By comparison, sub-Saharan Africa has the lowest regional share with 63% of countries using own-developed software. Some examples of own-developed software include the Sistema de Información para la Gestión Escolar de República Dominicana (SIGERD) (Dominican Republic) and SANAD (Registry of Students) (Iran).

Figure 12. Typology of EMIS platforms
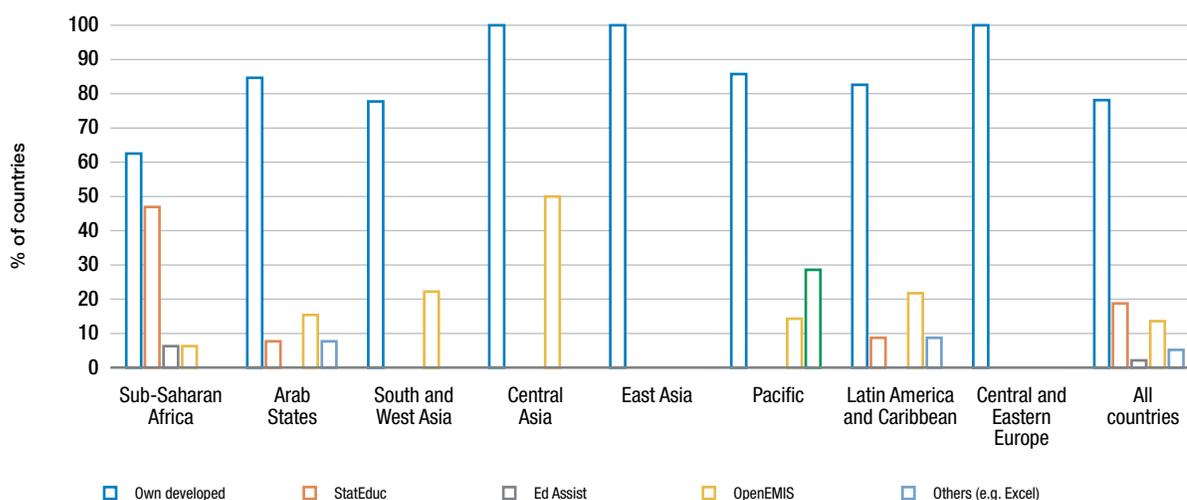
Note: Calculations are based on responses of the countries and not on the total countries in the region.

Source: EMIS typology data, UIS 2020.

The second-highest used data management platform is the EMIS software StatEduc (18%), of which the UIS was involved in the development. Of the regions that use StatEduc, its use is highest in sub-Saharan Africa (47% of countries) and Central and Eastern Europe (13% of countries).

Another built-in software is EdAssist, used only by 6% of sub-Saharan African countries. The OpenEMIS software is used by 13% of countries in the world, covering all regions except East Asia and Central and Eastern Europe. A few mostly small countries also use Microsoft Excel to collect data from schools.

It is important to note that many countries are using multiple software types within one ministry while in a few countries, different ministries use different types to cover different levels of education. In the case of Ghana, Madagascar and Zimbabwe, different software is used to collect data at each level of education. In Madagascar, a spreadsheet is used to collect data for the secondary level (TVET) while for all other levels, the country uses its own-developed software, the statistical web application, Fiche Primaire d'Enquête (FPE). This suggests that countries are not complementing existing software by adding new features, but are instead implementing alternative software to complement the existing data management system. This raises the issue of compatibility between the software, data migration, integration and sustainability of the system. In Comoros, there is a lack of stability in using software. It was using BOZO from 2013 to 2015 and from 2016 on, the country started to use new software.

In summary, while each country has a data management platform, the platform operates differently in each country depending on contextual factors, such as the availability of resources, the location of decision-making (federal vs state), and the ministry covering the level of education.

Table 7. Mode of data collection by region (% of countries)

Regions	Paper	Standalone electronic mode	Online interface
Sub-Saharan Africa	81	31	19
Arab States	38	31	46
South and West Asia	33	22	78
Central Asia	33	33	67
East Asia	67	67	67
Pacific	75	75	25
Latin America and the Caribbean	42	38	71
Central and Eastern Europe	0	25	100
All countries	53	36	50

Source: EMIS typology data, UIS 2020.

6.2 Mode of data collection

There are many modes of data collection, including paper, online and other electronic modes. Before the availability of the Internet, paper was used universally for any communication and data collection. However, in the past 10 to 15 years, there have been vast technology-related developments with significant implications for EMIS. The expansion of the use of the Internet is arguably the most important. While easy Internet access is available in all large cities and major towns in most countries, most rural areas and schools have limited or no access to the Internet, due to the unavailability of Internet facilities and other resources.[9]

Many countries are still using paper to collect data. Later, these data are entered into the computer systems either at the national level or district headquarters where Internet and human resources are available.

Table 7 illustrates the breakdown of the mode of data collection adopted by each region. The data shows that paper prevails as the predominant method of data collection (53%), followed by an online interface (50%) and lastly, a standalone electronic mode (36%). Paper is the most used mode only in sub-Saharan Africa (81% of countries). The majority of online interface use is confined to South and West Asia (78% of countries) and Latin America and the Caribbean (71% of countries). Meanwhile, 100% of countries in Central and Eastern Europe rely on an online interface for their data collection.[10] It is worth mentioning that Central and Eastern Europe is the only region that does not rely on paper.

In India, for instance, the software used holds the capability to collect data online. However, the

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9   Access to the Internet is determined by complementary resources, such as human capacity and access to electricity.

10   Europe is the region with the highest Internet usage rates (83% of the population). Africa is the region with the lowest Internet usage rates (28%). The Internet usage rates in the Americas (North America, Latin America and the Caribbean) is 77%; in Asia and the Pacific 48%; and in the Arab States 52% (ITU, 2019).

country is using paper as one of the methods of data collection from schools that do not have access to the Internet or other facilities. The data collected by paper is then entered at the block level.[11] Suriname relies on paper for data collection, where only a handful of schools share data by email (online interface).

In some countries, multiple modes of collection are used, depending on the level of education or unit of data collection (i.e. school, teacher and student). For instance, at the level of early childhood development, Mauritius uses paper for data collection (which is then sent by post and edited and coded by statistical officers) while at the secondary level (general education), it relies on Microsoft Excel (online interface).

6.3. Statistical unit: school-level

Good school conditions are needed to deliver quality education. SDG indicator 4.a.1 is focused on school infrastructure, such as the availability of electricity, Internet and computers. To assess the status of each of these indicators, administrative data are collected from schools to inform policy decisions. Among the most relevant aspects are the collection of data itself, the use of unique identifiers for schools, teachers and the recording of disaggregated data.

Regarding data collection, all countries record school-level data in their national EMIS database.

6.3.1. Use of school ID

The survey data show that recording school-level data in the national database and using school IDs

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11 India has a federal governance structure with three main tiers: national, state and district. The district level is further divided into blocks.

for data collection purposes varies according to region, level of education and management of the school (see Table 8). For instance, in East Asia, Singapore records 100% data collection at all levels of education while in the Pacific region, Tokelau does not record the school ID at any level of education but records school-level data in the national database. In this case, the name of the school is considered to represent the school ID. The following is a summary to illustrate the uses of school ID by education level or school management type:

a. **Use of school ID by educational level:** On average, school ID used to collect data from ECE and secondary Technical and Vocational Education and Training (TVET) is lower than in the primary and secondary level of education. East Asia uses school IDs to collect data from ECE and at the secondary TVET level of education for both public and private schools. In the Philippines, school-level data for secondary TVET only began to be recorded from the 2016–17 academic year.

b. **Generation of school ID and use of school ID within MoE, by region:** The school ID is used by 67% of the countries. **Figure 13** illustrates the breakdown of the IDs generated by the MoE and its use across all departments of the MOE.[12]

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12 The case for using unique school IDs varies from country to country. In Togo, it is mandatory for all departments of the MoE to use school IDs, yet this is not being done. On the contrary, it is not mandatory in Seychelles to use school IDs generated by the MoE and Human Resource Development (MEHRD) departments, but each department uses it regardless. In the case of Rwanda, unique school IDs are generated by the EMIS system, but are not integrated in a unified database. In Côte d'Ivoire, it is compulsory for all departments in the Ministry of General Education to use unique school IDs, but the codification process to assign each school a unique ID is still underway. In Burundi, the school codes are being revised to adapt to the administrative nomenclature of the Institute in charge of Statistics and Economics Studies. In Gabon, all schools have yet to be integrated into the database.

Table 8. Use of school ID by level of education and management of schools (% of countries)

Regions	ECE		Primary		Secondary (General)		Secondary (TVET)		Average	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
Sub-Saharan Africa	69	72	88	88	94	94	72	72	59	59
Arab States	85	85	100	100	100	100	85	77	77	77
South and West Asia	67	67	100	100	100	100	78	67	44	33
Central Asia	67	67	100	67	100	67	67	67	67	67
East Asia	100	100	100	100	100	100	67	67	67	67
Pacific	75	50	75	63	75	63	63	25	63	25
Latin America and the Caribbean	63	54	88	75	92	75	63	58	42	38
Central and Eastern Europe	75	75	88	88	88	88	88	88	75	75
All countries	72	69	90	85	93	87	72	66	**58**	**53**

Source: EMIS typology data, UIS 2020.

Figure 13. Use of school IDs by all departments of the MoE by region
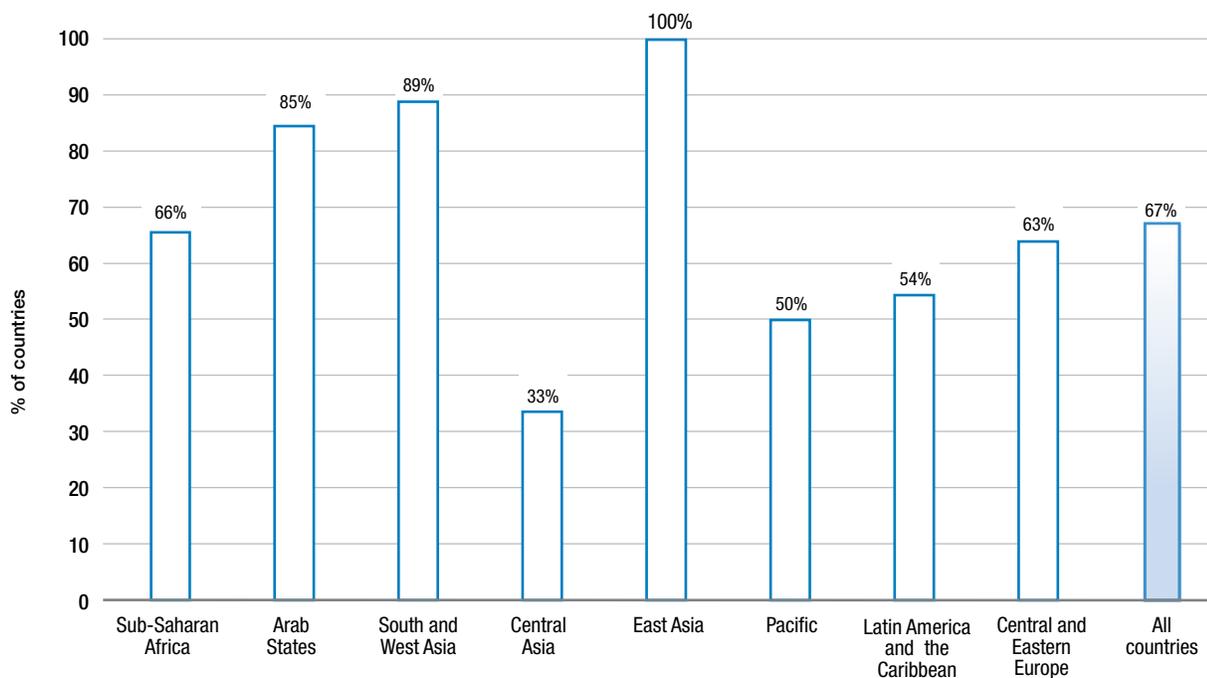
Source: EMIS Typology data, UIS 2020.

c. **Use of school ID by school management type:** The disparity between the use of school IDs in public and private schools to collect data varies by region but consistently shows that the use of school IDs is higher in public schools than private schools across all levels of education. Latin America and the Caribbean has the lowest percentage of use of schools IDs for data collection in public schools (38% of countries) while the Pacific has the lowest percentage of use in private schools (25% of countries).

6.3.2 Collection of school geographical coordinates

It is useful to link the geographical coordinates of a school[13] to other spatial data to inform targeted planning and monitoring. These data can be used to build a geospatial database with a relational database of educational, demographic, social and economic information to inform educational administrative authorities. It presents a holistic representation and exploration of the contexts of schooling by providing access to multiple sources of essential data, such as censuses as well as transportation, utilities, health care, land use and agricultural databases, which are otherwise quite difficult to include in educational planning and management. This serves as an excellent tool for education policymakers.

Figure 14 illustrates the availability of the geographical coordinates of schools across regions. Overall, 71% of countries collect the geographical coordinates of their schools. This

percentage varies from 89% in South and West Asia to 50% in the Pacific region.

Some countries, such as Madagascar, have just started recording the geographical coordinates of schools. In a mapping exercise in 2019, Uganda captured the geographical coordinates, however, this has yet to be integrated into their EMIS. In the Philippines, only partial school coordinates are available. In a project financed by the Inter-American Development Bank, Suriname stored the records for the geographical coordinates of schools ranging from primary to upper secondary schools.

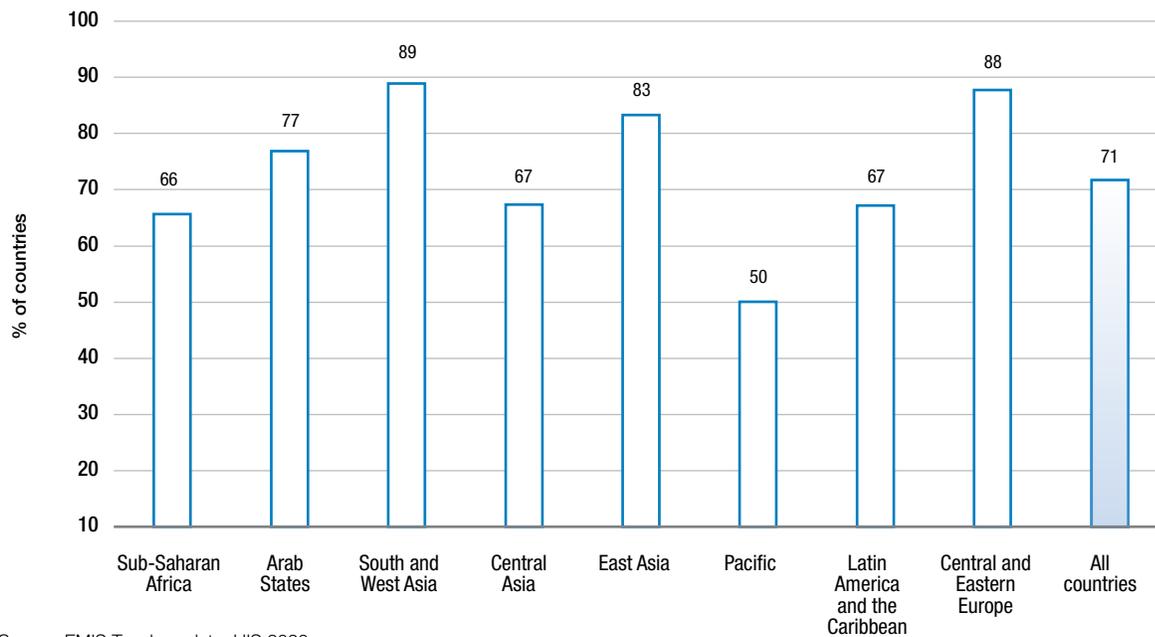### 6.3.3. Retrieval of historical school-level data

Historical data can help decision makers understand the trends and identify areas of need that should be addressed or accorded priority attention. Figure 15 presents the school-level data retrieval ability across region, by level of education and school management. Despite recording 100% of school-level data, a significantly lower percentage of countries can actually retrieve school-level data from 5 years ago.

Arab States and Central and Eastern Europe have the highest percentage of retrieval ability for 5-year-old school-level data across all levels of education, both in public and private schools. The Pacific region performs poorly as countries in this region use the name of the school as opposed to school IDs (as explained earlier in this section).

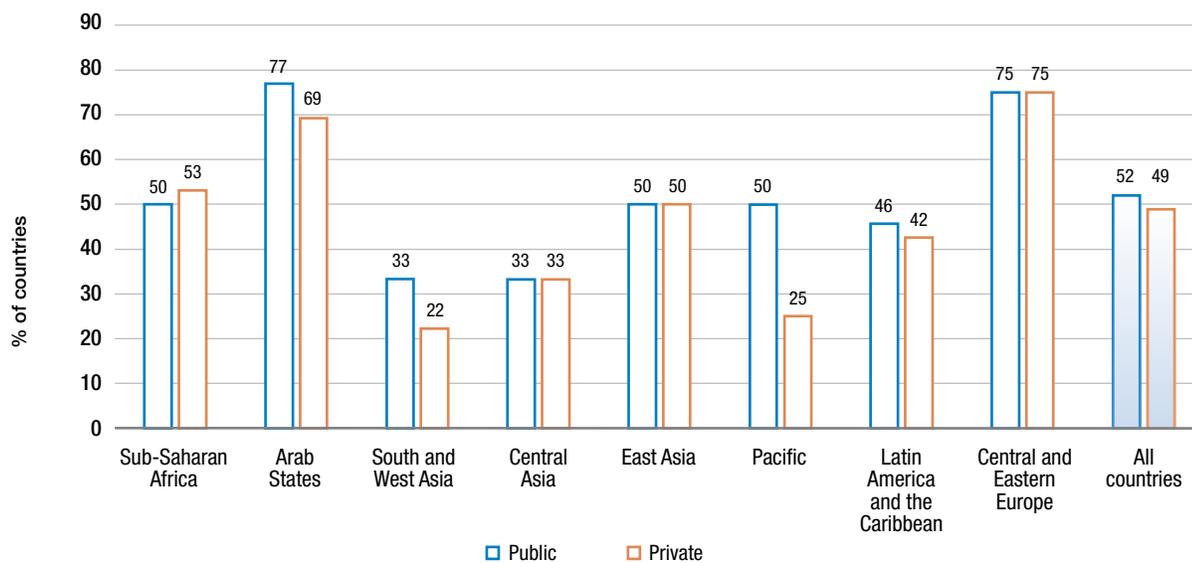a. **Retrieval of 5-year-old data using school ID – Level of Education:** The level of retrieval in primary and secondary (general) level of education is higher than this ability for ECE and secondary TVET, which have only recently started to record using school IDs.

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13 The geographic coordinate system is a three-dimensional reference system that locates points on the earth's surface. The unit of measure is usually decimal degrees. A point has two coordinate values: latitude and longitude. The latitude and longitude measure angles (ArcGIS Resource Center).

Figure 14. Collection of geographical coordinates by region (% of countries)

Source: EMIS Typology data, UIS 2020.

Figure 15. Retrieval of historical data (5-year-old data) by region (% of countries)

Source: EMIS Typology data, UIS 2020.

b. **Retrieval of 5-year-old data using school ID – Management of Education**: The retrieval of 5-year-old data for public schools is more available than for private schools due to the problem of data integration (see Figure 15). For example, in Eritrea, the database is not integrated to retrieve data on school IDs over the last five years even if it can retrieve data for each year.

6.4. Statistical unit: student-level

SDG 4 aims to improve the learning outcomes of children. Student-level data enables monitoring and tracking while providing greater insight into student progression and learning. Student-level data typically yield information on enrolment, new entrants, attendance, transfers and dropouts, and learning level. Countries should record and use student data to identify gaps and prioritize resources wherever they are needed the most. The main advantage of using a student ID is that it affords the ability to disaggregate data easily based on the country's requirements.

For countries that do not collect student-level data or have unique student IDs, the schools are compiling the data and submitting these to higher authorities. In general, student-level data collection is time-consuming. Additionally, the chances of mistakes while compiling student-level data is very high. For example, data show that when India started collecting data at the individual level using Adhaar,[14] there were around 1.25 million fewer students recorded in two states in India (Bihar and Uttar Pradesh) as enrolled in Grades 1 to 12 (UDISE and UDISE+ 2017–2019 data) than the number recorded using aggregated data by schools.

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14   Aadhar is a 12-digit unique identification number (UID) issued by the Authority of India on behalf of the Government of India.

6.4.1 Use of unique student IDs

A unique student ID is a single, non-duplicated number that is assigned to and remains with a learner throughout their education career, irrespective of whether the learner changes schools. This helps countries track the progress of each learner over time and across schools or districts within the country. Table 9 presents the percentage of countries by region that record student-level data using student IDs and that plan to record student-level data.

Overall, 54% of countries record data at the student level using student IDs. The data collection, however, varies across regions – from 100% in Central Asia to 22% in sub-Saharan Africa – a gap of more than 70 percentage points. All the other regions also record student-level data at or above the overall average percentage – including the Pacific (63%) and the Arab States (54%). In some cases, especially in small countries, such as Tuvalu in the Pacific region, student-level data are recorded, but a unique student ID is not assigned.

Some of the countries have recorded only partial student-level data. For instance, in Pakistan, student-level data are collected only for a few provinces. Similarly, in Tanzania, there is partial coverage for student-level data collection. However, the country intends to increase this coverage soon.

The quality of the data collected depends on many factors. Recording student-level data with 'minimum required' information allows for the disaggregation of the indicators required to monitor national and international commitments as well as targeted interventions. Some countries only record the number of students by age and gender, which is insufficient for monitoring national commitments and targeted interventions nor for international reporting.

Table 9. Recording of and future plans to collect student-level data by region (% of countries)

Regions	Currently using student IDs	Future plan to record student-level data
Sub-Saharan Africa	22	53
Arab States	54	46
South and West Asia	67	33
Central Asia	100	0
East Asia	67	33
Pacific	63	13
Latin America and Caribbean	79	17
Central and Eastern Europe	63	25
All countries	54	34

Source: EMIS Typology data, UIS 2020.

Table 9 illustrates that out of the total respondent countries, a third plan to collect student-level data in the future, including Afghanistan, Burundi, Chad and India. Some countries have already started doing so. In some cases, a student ID is only issued at certain levels of education. For instance, Aruba only records data for lower secondary vocational schools but plans to scale up to other levels of education.

6.4.2. Retrieval of five-year-old student data

The ability to retrieve five years of data is vital to tracking the progress of students or a cohort of

students. This would help better inform policy decisions, prioritize resources and monitor progress. It also indicates the sustainability and integration of student-level data in EMIS.

Table 10 shows that 54% of countries can retrieve five years of student data based on student IDs. The capacity to retrieve student data ranges from 67% in East Asia to 33% in Central Asia.

There are two reasons for low data retrieval. First, most countries have only started data collection at the student level in the past four to

Table 10. Retrieval of five years of student-level data by region (% of countries)

Regions	Can retrieve five years of data
Sub-Saharan Africa[1]	...
Arab States	54
South and West Asia	44
Central Asia	33
East Asia	67
Pacific	50
Latin America and the Caribbean	58
Central and Eastern Europe	50
All countries	**56**

Source: EMIS Typology data, UIS 2020.

1   Not available

five years. South Africa can provide school-level data for 20 years, but at the student level, it can retrieve data only for the last 3 years. In Jamaica, the EMIS was developed three years ago by the Student Registration Unit, and hence can retrieve data for the past three years. The data management platforms in Honduras and Peru (Sage) have been in operation since 2014 and so can retrieve five years of data for every single student.

Second, countries are using multiple software, and the systems are not compatible, which leads to difficulties in system migration and integration. In Curaçao, it is theoretically possible to retrieve five years of data but since the data for all years are not integrated into one system, this cannot be done. In

Ecuador, the unique student ID entered is sometimes incorrect, or the unique ID of the parents of the student is entered instead. This system requires debugging. Other than that, retrieval of data should be possible in most cases, which then allows for the accurate monitoring of students.

6.4.3. Generation of student IDs

There are two types of student IDs used by different countries – student IDs generated by the EMIS under the MoE and IDs generated outside the MoE (e.g. national IDs). Most of the IDs generated by the MoE are used only within the ministry for data collection and for other management purposes (e.g. transfer of scholarships, preparing certificates of examination results, etc.). National IDs can be

linked to many other databases outside the MoE (e.g. social benefits, income and family income). This helps provide an inter-sectoral analysis of development policies.

Figure 16 illustrates that of the total number of countries maintaining student-level data and IDs, 57% have student IDs generated by the MoE. This varies from 100% in the Pacific region to 0% in Central and Eastern Europe. In all countries of South and West Asia – with the exceptions of the Islamic Republic of Iran and Maldives – student IDs are generated by the MoE.

Student IDs are generated outside the MoE vary across the regions from 71% of countries in the Arab States to 0% in the Pacific. Botswana's basic education sector uses national IDs that are generated by the Department of Civil Registration. Egypt and Saudi Arabia are also countries whose student IDs are generated outside the MoE. In Syria, the national ID is used as the student ID, which is also linked to other databases. In Honduras, student IDs are used by other ministries – mainly to track cash transfers to families.

Maldives and Colombia use student IDs a little differently than other countries. In the majority of

Figure 16. Generation of student IDs by region (% of countries)
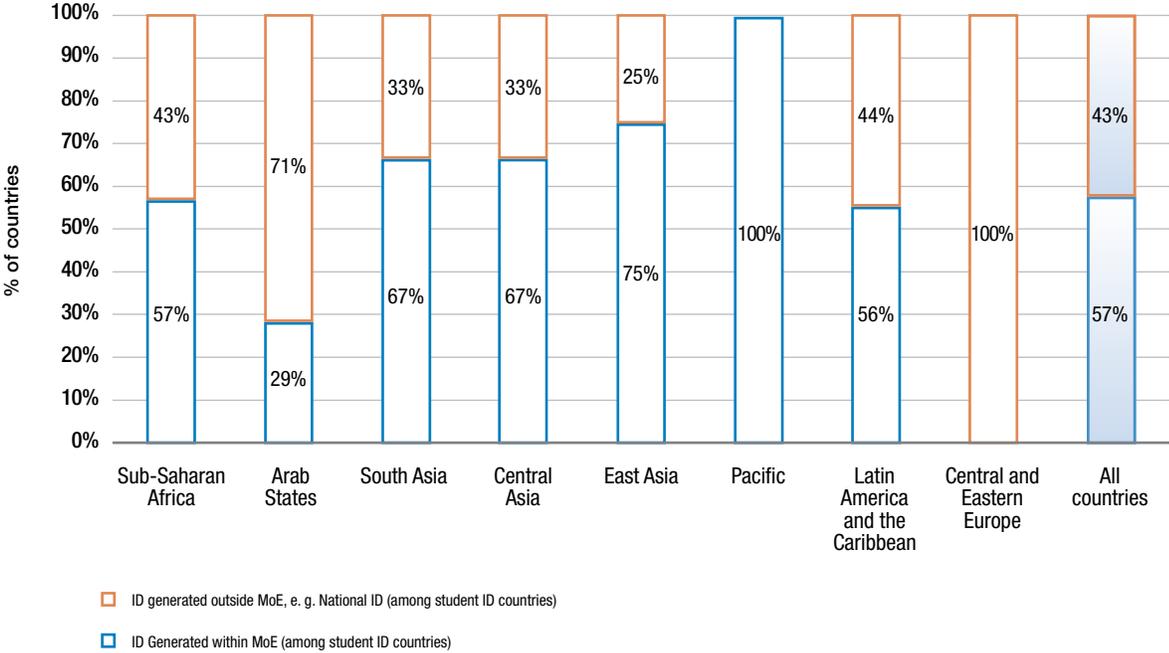
Note: Only countries that record student ID information are represented.

Source: EMIS Typology data, UIS 2020.

cases, Maldives uses the national ID as the student ID. However, if a child does not have a national ID due to legal reasons, the auto-generated number by the Maldives Education Management Information System (MEMIS) is used, and for expatriate students, their passport number is used. Colombia hosts a considerable number of refugees from Venezuela who do not have a national ID. In this case, Columbia generates a temporary unique student ID until the legal status of Venezuelan refugee children are confirmed, to avoid delaying their education.

Although student IDs represent a promising option to accurately track students' educational pathways and progress, some countries have not made it mandatory to use them. In Belize, the MoE requests departments to use student IDs, but it is not yet compulsory. However, Maldives and Singapore are using their national IDs as student IDs, and it is mandatory for all departments to use them.

6.5. Statistical unit: individual teacher-level

Overall, 72% of countries record individual teacher-level data. The collection of teacher-level data among regions varies from 100% in Pacific and Central Asia to 53% in sub-Saharan Africa. Comparing this with school-level data, at the individual teacher level, the percentage points go down significantly. Some small countries, such as Ethiopia, collect teacher-level data but do not generate unique teacher IDs.

There are generally four types of teacher IDs. First, in some countries, the unique teacher ID is generated by the MoE. In Rwanda, the EMIS generates a unique ID for every teacher. The IDs generated by the MoE are useful for data collection, historical data retrieval and afford the

possibility of interfacing with other MoE databases (e.g. payroll).

Second, in many countries, national IDs are used as unique identifiers for teachers. In all countries, national IDs are issued by a government authority but not by the MoE. In Botswana, the basic education department does not provide unique IDs for teachers and uses national IDs generated by the Department of Civil Registration instead. The situation is the same in Madagascar and Pakistan.

Third, many countries also use employee IDs as unique teacher IDs. This ID is different from the national ID and is issued outside of the MoE. In Iran, teacher IDs are employee codes that differ from national IDs. In Bhutan, the teacher ID is the employee ID generated by the Royal Civil Service Commission. This is also the case in Yemen. National IDs used as teacher IDs allow for interfacing between databases within the MoE and outside the Ministry.

Lastly, there are many countries where a unique teacher ID is used in public schools but not private schools. In Togo, a unique teacher ID is generated only for public school teachers, and the Ministry of Civil Service issues this ID. In Uganda, the Ministry of Public Service issues a unique teacher ID for public teachers but this is only used to manage the payroll.

The quality of the data collected depends on many factors. For instance, recording teacher data with the 'minimum required' information allows for the disaggregation of indicators which is needed to monitor national and international commitments and guide targeted interventions. Some countries only count the number of teachers while some collect a deeper level of information on individual teachers. So, while in Chad, the

Table 11. Recording of and plans to record teacher-level data by region (% of countries)

Regions	Recording teacher-level data	Plans to record teacher-level data
Sub-Saharan Africa	53	34
Arab States	85	31
South and West Asia	89	11
Central Asia	100	0
East Asia	67	33
Pacific	100	0
Latin America and the Caribbean	71	13
Central and Eastern Europe	75	13
All countries	72	21

Source: EMIS Typology data, UIS 2020.

Human Resource Development (HRD) Ministry only collects information on the number of teachers in a school, Niger records more information, including a teacher's highest qualification and the number of weekly hours worked.

Out of all the countries, 21%, including El Salvador and Tanzania, have responded that they are planning to record individual teacher-level data in the future (see Table 11). In some countries, they have already started collecting teacher data. For example, the Philippines has covered half their teachers, and this is being scaled up. In Uganda, plans are underway to assign each teacher a unique ID through the Teacher Management Information System (TMIS). In Nigeria, the teacher ID is undergoing development but has suffered many setbacks due to the frequent attrition of teachers from the education system.

6.5.1. Use of teacher IDs for data collection

Table 12 presents the purpose and use of individual teacher-level data at both public and private schools. In total, 36% of countries use teacher IDs to collect data from both public and private schools with an important regional variation – 51% of countries use teacher IDs to collect data from public schools while 39% use teacher IDs to collect data from private schools.

Use of teacher IDs within the MoE databases

Teacher-level data are used to track the induction, training and professional development of teachers. This allows the Ministry to develop needs-based career development programmes for teachers. This represents a critical intervention in an environment where teachers lack proper qualifications. The use of IDs depends on various factors, including compatibility with databases; standardization of IDs;

Table 12. Purpose and use of teacher IDs by management of school and region (% of countries)

Regions	Data collection from schools			Teacher IDs used within Ministry of Education databases			Teacher IDs used outside Ministry of Education databases		
	Public	Private	Both	Public	Private	Both	Public	Private	Both
Sub-Saharan Africa	28	28	22	44	28	28	25	16	16
Arab States	46	31	31	62	31	31	46	31	31
South and West Asia	89	67	67	78	44	44	44	33	33
Central Asia	33	33	33	100	67	67	33	0	0
East Asia	83	83	83	83	67	67	33	33	33
Pacific	75	63	50	75	50	50	0	0	0
Latin America and the Caribbean	58	25	25	46	21	21	21	8	8
Central and Eastern Europe	50	50	50	38	38	38	13	13	13
All countries	51	39	36	55	34	34	26	17	17

Source: EMIS Typology data, UIS 2020.

their purpose; and generating authority to oversee ID assignment. Many countries have different databases to record teacher information using IDs and some use the same ID for data collection, salary processing, pension, promotion as well as for other administrative purposes. However, some countries use different teacher IDs for the Financial Management Information System (FMIS), Teacher Management Information System (TMIS) and other databases. The standard and common ID allows for interfacing between different databases (MIS systems) within the MoE.

Table 12 shows that 44% of countries in South and West Asia use both public and private school teacher IDs within MoE databases. The gap using public and private school teacher IDs within the MoE is 21 percentage points on average with the biggest gap in the Arab States and smallest in sub-Saharan Africa while in "Central Asia" and "Central and Eastern Europe" there is no gap.

Use of teacher IDs outside MoE databases

The use of teacher IDs outside MoE databases can be useful for inter-sectoral analyses and broad human resource development planning for a country. If teachers' salaries are paid by the Ministry of Finance (MoF) directly to teachers' accounts then maintaining compatibility between the MoF and MoE database would be necessary. The use of teacher IDs outside the MoE depends on school governance policy set by the government. Public school teacher IDs are used by the MoE if they are compatible and standardized. However, private school teacher IDs are not used by public institutes other than for data collection unless the government provides financial and other resources to the private school. For example, Maldives provides financial resources to private schools and teacher IDs used, which are standardized and compatible with other databases within the MoE as well as other governmental databases, are private school teacher IDs – across all governmental

databases. In Nepal, private schools do not receive financial and other resources from the government and private school teacher IDs are not used other than for data collection within the MoE. The government has a separate TMIS to manage public school teacher-level data for salary, pension and promotion purposes.

6.6. Involvement of development partners to produce education data

The extent of data to monitor SDG 4 is vast and complex. Most low- and middle-income countries already find it challenging to collect the necessary data on education systems. Thus, partnerships with development aid organizations are essential to establish and sustain EMIS in these countries. Development agencies have provided aid, particularly in countries with the greatest data needs, to strengthen the capacity of ministries of education on EMIS so they can continue to produce the high-quality and timely education and financial data needed to reach their specific targets and goals.[15] Many development partners, such as UNICEF, the World Bank and UNESCO, have been involved in low- and middle-income countries to provide support to develop and sustain EMIS databases so reliable, high-quality and cross-nationally comparable data can be produced from a variety of data sources. Figure 17 provides an overview of the involvement of development partners in the production of EMIS data across regions.

UNICEF is the most active development partner supporting countries to produce education data. Figure 17 shows that 50% of countries in sub-

Saharan Africa have received UNICEF support – financial, technical or both. UNICEF's involvement in South and East Asia is also remarkable as it involves one third of countries in the region. The second-largest development partner is the World Bank, and its involvement is visible in sub-Saharan Africa, South Asia and Central and Eastern Europe. Australia's Department of Foreign Affairs and Trade (DFAT) involvement in education data production is confined to the Pacific (25% of countries) and East Asia (17% of countries). The Asian Development Bank (ADB) is involved in East Asia (33% of countries) and the Pacific (13% of countries). USAID, UNESCO and WFP are involved in many regions where they provide technical and financial support. The Latin America and the Caribbean region and Central Asia have the lowest involvement of development partners, with 4% of countries and zero countries receiving aid, respectively.

6.6.1. Type of support received from development partners

Low- and middle-income countries receive three types of support from development partners to build EMIS databases: (i) technical, (ii) financial or (iii) both technical and financial. Technical support is provided as training and capacity-building for statistical officers. This support is useful to establish the EMIS, make it functional and help produce education data in a sustained manner.

Table 13 provides a breakdown of the support received by region, according to the type of support countries have received to produce education data in different years. The data show that most countries receive both technical and financial support. This support was received between 2013 and 2020 with some exceptions. Sub-Saharan Africa is the largest recipient of technical, financial and both types of support from development partners with 78% of

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15 In sectors like health, sustained, coordinated and long-term investment in data and data systems, by a variety of donors and in partnership with governments, has resulted in fast progress. Evidence-based planning has reduced costs by allocating resources effectively (UIS, 2018).

Figure 17. Involvement of development partners by partner and region (% of countries)

Legend: UNICEF, World Bank, DFAT, ADB, USAID, UNESCO, WFP, GPE
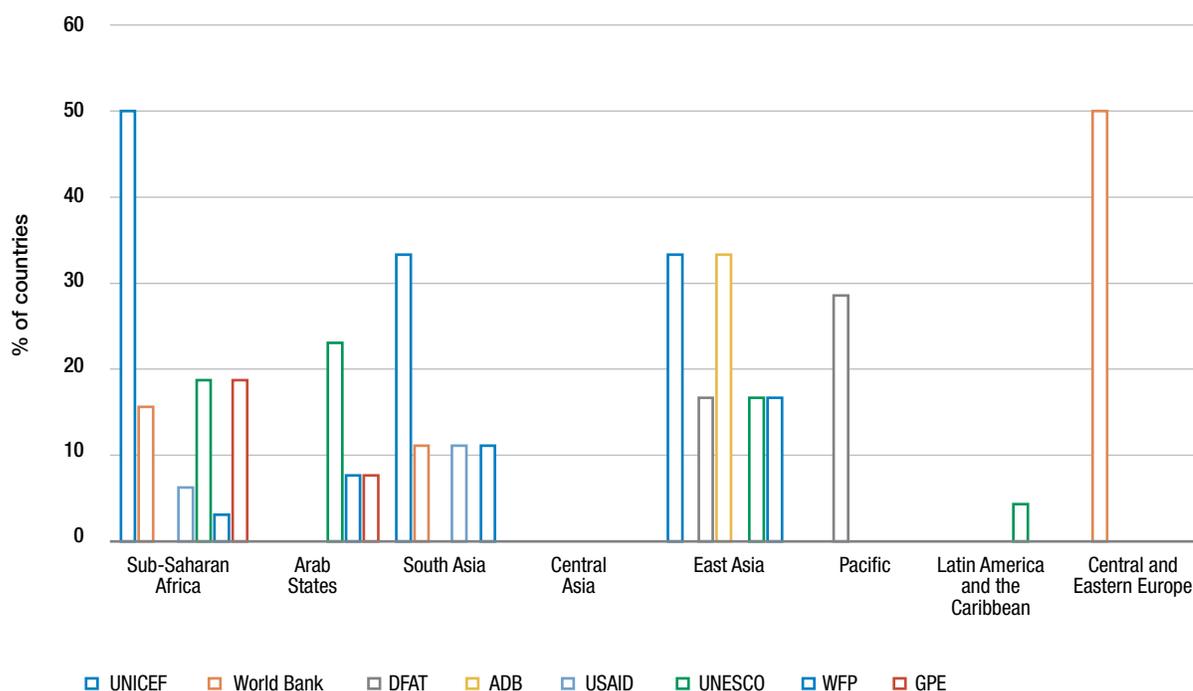
Note: There is multiple counting. For example, if UNICEF and the World Bank are involved in a country, both development partners are counted. Bilateral support confined to only a few countries is not counted in the figure, e.g. Government of France/French Development Agency (Burkina Faso, Madagascar, Mauritania, Gabon), Government of India (Bhutan), Luxembourg (Burkina Faso), EU (Angola), UK Aid Direct (Nigeria), Association for the Development of Education in Africa – ADEA (Zimbabwe, Angola), Department of Foreign Affairs and Trade – United Kingdom (Zimbabwe), and pooled funds (Nepal). Some countries also mentioned national partners, e.g. Sri Lanka is not counted in the figure.

Source: EMIS Typology data, UIS 2020.

countries receiving this aid. However, no countries in Central Asia have received support for producing education data.

In Côte d'Ivoire and Mali, UNICEF provides technical support in various areas. In Côte d'Ivoire, UNICEF provides training to Regional Statistics Coordinators to fill out questionnaires and conduct data collection workshops. In Mali, UNICEF funds the training of statistical officers in analysing indicators for the sector review. Burkina Faso has a special treasury allocation account (CAST) supplemented by several technical and

financial partners (Canada, UNICEF, Switzerland, Luxembourg and the GPE); CAST funds help finance the production of statistics.

Findings suggest that, despite receiving external support, a few countries still face constraints – sometimes financial and sometimes software problems. For example, UNICEF provides financial assistance to Eswatini but only up to the secondary education level due to budgetary constraints. Palestine received financial support from UNICEF to build a school management information system (SMIS) that was tested on a sample of schools but

Table 13. Type of support provided by development partners by region (% of countries)

	Technical	Financial	Both
Sub-Saharan Africa	22	47	78
Arab States	31	23	8
South Asia	0	0	56
Central Asia	0	0	0
East Asia	0	50	67
Pacific	14	0	25
Latin America and Caribbean	4	0	0
All countries	0	25	25

Source: EMIS typology data, UIS 2020.

was unsuccessful due to poor infrastructure and repeated software errors.

6.7. EMIS-quality assessment

EMIS-quality assessment aims to help countries improve their data collection, data and system management, and data use for decision-making to improve different elements of the education system. A quality assessment, guided by eight principles, will ensure a high-quality EMIS. The UIS has piloted a revised light Data Quality Assessment Framework (DQAF) in 11 countries, covering Asia, Africa and Latin America in 2018-2019. At the same time, the World Bank is using its own product – the Systems Approach for Better Education Results (SABER) – to assess the data quality in a country. The Association for the Development of Education in Africa (ADEA) has its own product. However, these three types of EMIS assessment tools have many aspects in common. Table 14 presents the type of EMIS-quality assessment conducted by region.

According to Table 14, of the three types of EMIS-quality assessments, UIS-DQAF is the most widespread with 30% of the countries of the world using it. Only 3% of countries have conducted the World Bank-SABER EMIS quality assessment, and this assessment is only used in Arab States, South and West Asia and Pacific countries.

6.8. Conclusions

This section summarizes the inner workings of and components that shape an EMIS. It is worth mentioning that some countries have conducted more than one EMIS quality assessment. For instance, other than in the African region, Afghanistan and Jordan have received both UIS-DQAF and World Bank-SABER EMIS quality assessments. For many countries in the world, however, no EMIS quality assessment is conducted at all.

In EMIS, firstly, data collected from the three components of the education system – school,

Table 14. Type of EMIS quality assessment by region (% of countries)

Regions	UIS-DQAF	World Bank- SABER
Sub-Saharan Africa[1]	…	…
Arab States	8	8
South and West Asia	33	11
Central Asia	0	0
East Asia	33	0
Pacific	0	14
Latin America and the Caribbean	4	0
Central and Eastern Europe	0	0
All countries	30	3

Source: EMIS Typology data, UIS 2020.

1   Not available

student and teacher – are stored, managed and analyzed on a data management platform where it is easily accessible to policymakers and administrators. Data suggest that all the regions prefer using their own developed software, with the exception of Africa. Findings also suggest that many countries use multiple data management platforms to a great extent.

Secondly, the mode of collection for the three components should be considered. Countries rely on both offline (paper) and offline (email) methods for data collection. The lack of internet access and other facilities in remote school locations means that offline methods remain the most popular mode of data collection.

Data recording at the school level is the highest, followed by teacher-level data and then student-level data. The reason for this is that countries have been collecting data at the school level for a long time but have only started collecting data at the teacher- and student-level a few years back. South Africa, for example, has been collecting school-level data for 25 years, yet has only been collecting student- and teacher-level data for the past 3 to 4 years.

To render the EMIS more efficient, there are different types of unique teacher and student IDs used. The EMIS database generates some IDs within the MoE. Few countries use national IDs, which are generated outside the MoE. The use of student and teacher IDs differ across levels of education and for public/private

schools. In general, the use of IDs for data collection is high at the primary and secondary (general) level and low at the ECE and secondary (TVET) level. For school management, data availability is higher in public schools than in private schools.

Lastly, in regard to partnerships, UNICEF's involvement in countries to produce education data (EMIS) is the highest, especially in the African region. This is followed by the World Bank's involvement in countries. Typically, development partners offer technical, financial or both (technical and financial) support. The African region has received the most support, both in terms of financial and technical aid. The involvement of development partners in the Pacific and Latin America and the Caribbean is low. Evidence suggests that despite receiving assistance, some countries face constraints, such as inadequate funding, weak institutional framework and poor technical capacity.

The extent and development of EMIS efforts vary considerably across regions. There are some very promising examples of good practices in terms of data collection and maintenance as well as good examples of data dissemination and use. Yet, given its potential benefits to collect pertinent education data, efforts to use EMIS need to be strengthened, especially in Africa, to boost the production of quality, disaggregated and timely data to better inform policy decisions.

7. Indicator-by-indicator metadata

In this section, the definition and purpose of each indicator is provided as described in UNESCO's metadata for the global and thematic indicators for the follow-up and review of SDG 4 and Education 2030. The section presents a brief overview of the metadata for indicators produced by traditional EMIS.

GLOBAL INDICATORS

Indicator 4.1.2   Completion rate (primary education, lower secondary education, upper secondary education)

Concept
This indicator indicates how many persons in a given age group have completed the relevant education level. Indicator 4.1.2 measures how many children and adolescents enter school more or less on time and progress in their educational attainment without excessive delays.

Definition
Percentage of a cohort of children or young people who have completed a given education level.

Formula
When using data from population-based surveys (PBS):

$$\text{Completion rate}_{PBS} = \frac{\text{Number of persons in age group } x \text{ who have completed the level } n}{\text{Population of the same age group}}$$

This indicator is calculated as the number of persons who have completed the last grade of the given education level. This is expressed as a percentage of the total population of the same age group.

More specifically, it is the population aged 3 to 5 years above the official entrance age **a** into the last grade of level **n** of education who completed level **n** divided by the population aged 3 to 5 years above the official entrance **age** into the last grade of level **n** of education.

The *official entrance age for the last grade* of each education level is the age at which pupils would enter the grade if they had started school at the official primary entrance age, had studied full-time and had progressed without repeating or skipping a grade.

When using administrative data (AD):

a. True cohort approach (TC):

$$\text{Completion rate}_{ADTC} = \frac{\text{Number of graduates (cohort } i\text{) from ed. level } n \text{ in years } y \text{ to } y+m}{\text{Number of new entrants (cohort } i\text{) to education level } n \text{ in year } y-dn}$$

Where:

dn = theoretical duration of education level n

m = 3 to 5 years of margin to finish the studies

The true cohort approach follows individual students from entry into a given education level until a specified number of years later. Completion is then calculated as the share of entrants who have graduated in that time frame.

b. Cross cohort approach (CC):

$$\text{Completion rate}_{ADCC} = \frac{\text{Number of graduates from education level } n \text{ in year } y}{\text{Number of new entrants to education level } n \text{ in year } y-dn}$$

Where:

dn = theoretical duration of education level n

The cross cohort is used when individual data are not available. It calculates completion by dividing the number of graduates in a year by the number of new entrants to that programme a certain number of years before, when the number of years corresponds to the theoretical duration of the programme.

The calculation methods using administrative data (true and cross-cohort approaches) are based on measurement of completion in upper secondary education carried out by the OECD.

Data sources and variables

a. Population-based surveys:

- Completion of the level **n** by individual **x** declared in the population-based survey.
- Population in the relevant age group.
- The theoretical entrance age and duration of each education level.

b. Administrative data:

- True cohort approach:
  - › Entry and completion dates of the level **n** by individual **x** recorded by the administrative systems unit (typically the school) in an EMIS.
  - › The theoretical duration of each education level.
- Cross-cohort approach:
  - › Number of new entrants to education level **n**.
  - › Number of graduates from education level **n**.

The information required for this indicator can be collected from:

a. Population-based surveys such as:

i. Population censuses and household surveys that collect data on the highest education level or grade completed by children and young people in a household, through self-declaration or household declarations. The survey completed by one person or head of the household (i.e. reference person) indicates the highest grade and/or education level completed by that person or each member of the household. Administrative data from ministries of education and/or relevant state agencies on the structure of the education system are also needed.

ii. Labour force surveys can serve as a source of data for lower and upper secondary completion if they collect information for the age groups concerned.

iii. International sample surveys, such as Demographic and Health and Education Surveys (e.g. DHS or Multiple Indicator Cluster Surveys (MICS) are also potential data sources.

b. Administrative data:

i. **The entry and graduation dates of individual students with respect to a given education level, when the true cohort approach is used or**

ii. **The number of graduates and the new entrants, when the cross-cohort approach is used.**

When using administrative data, the completion rate can be calculated using one of the two approaches mentioned above, depending on data availability. The first method, true cohort, follows individual students from entry into an education level until a specified number of years later. Completion is then calculated as the share of entrants who have graduated in that time frame. The second method, cross cohort, is used when individual data are not available. It calculates completion by dividing the number of graduates in a year by the number of new entrants to that programme a

certain number of years before, when the number of years corresponds to the theoretical duration of the programme.

Due to the difference in methodologies, caution must be exercised when comparing true-cohort and cross-cohort completion rates. On the one hand, countries with true-cohort data are able to report exactly how many students from a given entry cohort have graduated within a specific time frame. That means that the true-cohort completion rate includes students who graduated before or exactly at the end of the time frame (even if they graduated from a different tertiary level than the one in which they began) and excludes students who took longer than the time frame to graduate.

On the other hand, the number of graduates used in the cross-cohort calculation is the total number of graduates of a tertiary level in a given calendar year. Thus, it includes every student who graduated that year, regardless of the time they took to successfully complete the programme.

Interpretation

⬆ *A high rate indicates…*

A higher number of students have completed a given education level.

Disaggregation

By sex from administrative sources; and by sex, location and wealth/income and others as available.

What variables should the EMIS collect at the school level?

When the **true-cohort approach** is used:

Entry and completion dates of each enrolled student at a given education level

Theoretical duration of the education level

When the **cross-cohort approach** is used:

New entrants: number of new entrants to a given education level by sex.

Graduates: number of graduates from a given education level by sex.

Can the indicator be estimated at the school level?

No

Indicator 4.2.2　Participation rate in organized learning (one year before the official primary entry age), by sex

Concept

The indicator measures children's exposure to organized learning activities in the year prior to the start of primary school.

Definition

Percentage of children aged one year less than the official entry age of primary education who participate in one or more organized learning programmes, including programmes that offer a combination of education and care.

Formula

Indicator 4.2.2 =	$\dfrac{\text{Children aged one year less than the official entry age of primary education who participate in organized learning programmes}}{\text{Population of children aged one year less than the official entry age of primary education}}$

Data sources and variables

a. Administrative data:
- Number of children participating in organized learning activities by single year of age.

b. Administrative data from ministries of education:
- Official entrance age to primary education.

c. Population censuses:
- Population estimates by single year of age.

Interpretation

⬆ *A higher value indicates …*

a higher participation of children in organized learning immediately before the official entrance age to primary education.

Disaggregation

By sex from administrative sources; and by sex, location, and income from household surveys and others as available.

What variables should the EMIS collect at the school level?

Enrolment: number of children participating in organized learning activities (early childhood programmes and primary education) by single year of age, by education level, and by sex.

Can the indicator be estimated at the school level?

No.

Indicator 4.3.1 — Participation rate of youth and adults in formal and non- formal education and training in the previous 12 months, by sex

Concept

This indicator measures the level of participation of youth and adults in education and training of all types.

Definition

Participation in formal and non-formal education and training in a variety of settings including schools and universities, workplace environments and others regardless of their duration. Administrative data often capture only provision in formal settings such as schools and universities while the two possible sources, formal and non-formal, could be collected from Household or Labour Force Surveys giving a more comprehensive and accurate estimate.

Formula

$$\text{Indicator } 4.3.1 = \frac{\text{Number of youth or adults participating in formal and non-formal education and training}}{\text{Population of youth or adult age}}$$

Interpretation

⬆ *A high value indicates …*

a higher participation of youth and adults in training programmes.

Data sources and variables

a. Administrative data from schools and other places of education and training:

- Number of youth or adults participating in formal and non-formal education and training

b. Population censuses:

- Population estimates by single year of age.

Disaggregation

By sex from administrative sources; and by sex, location and income from household surveys and others as available.

What variables should the EMIS collect at the school level?

Participation of youths/adults by age in formal and non-formal education and training by sex.

Can the indicator be estimated at the school level?

No.

Indicator 4.a.1   Proportion of schools offering basic services, by type of service

Concept

This indicator measures access in schools to key basic services necessary to ensure a safe and effective learning environment for all students.

Definition

Percentage of schools offering basic services by type of basic service and levels of education (primary, lower secondary and upper secondary education).

Basic services are:

Electricity: Regularly and readily available sources of power (e.g. grid and mains connection; wind, water, solar and fuel-powered generators) that enable the adequate and sustainable use of ICT infrastructure for educational purposes.

Internet for pedagogical purposes: Internet that is available for enhancing teaching and learning and is accessible by pupils. Internet is defined as a worldwide interconnected computer network, which provides pupils access to a number of communication services including the World Wide Web and carries e-mail, news, entertainment and data files, irrespective of the device used. It is not assumed to be only via a computer and thus can also be accessed by mobile telephone, tablet, personal digital assistant (PDA), games machine, digital TV etc.). Access can be via a fixed narrowband, fixed broadband, or via a mobile network.

Computers for pedagogical use: Use of computers to support course delivery or independent teaching and learning needs. This may include activities using computers or the Internet to meet information needs for research purposes; develop presentations; perform hands-on exercises and

experiments; share information; and participate in online discussion forums for educational purposes. A computer is a programmable electronic device that can store, retrieve and process data, as well as share information in a highly structured manner. It performs high-speed mathematical or logical operations according to a set of instructions or algorithms. Computers include the following types:

- A desktop computer usually remains fixed in one place; normally the user is placed in front of it, behind the keyboard.
- A laptop computer is small enough to carry and usually enables the same tasks as a desktop computer. It includes notebooks and netbooks but does not include tablets and similar handheld devices.
- A tablet (or similar handheld computer) is a computer that is integrated into a flat touch screen, operated by touching the screen rather than using a physical keyboard.

Adapted infrastructure is defined as any built environment related to education facilities that is accessible to all users, including those with different types of disability, to be able to gain access to use and exit from it. Accessibility includes ease of independent approach, entry, evacuation and/or use of a building and its services and facilities (such as water and sanitation), by all of the building's potential users with an assurance of individual health, safety and welfare during the course of those activities.

Adapted materials include learning materials and assistive products that enable students and teachers with disabilities or functional limitations to access learning and to participate fully in the school environment. Accessible learning materials include textbooks, instructional materials, assessments and other materials that are available and provided in appropriate formats such as audio, braille, sign language and simplified formats that can be used by students and teachers with disabilities or functional limitations.

Basic drinking water is defined as a functional, improved drinking water source on or near the premises and water points accessible to all users during school hours. An improved drinking water source is a water delivery point that by the nature of its design protects the water from external contamination, particularly of fecal origin. Examples of improved drinking water facilities include piped water, protected wells, tubewells and boreholes, protected springs and rainwater, purchased bottled water and tanker trucks. Unimproved water sources include unprotected wells and springs and surface water (e.g. from rivers or lakes).

Basic sanitation facilities are defined as functional improved sanitation facilities separated for males and females on or near the premises. Improved sanitation facilities include a pit latrine with slab, a ventilated improved pit latrine, a flush toilet, a pour-flush toilet or a composting toilet. Unimproved facilities include a pit latrine without a slab, hanging toilets and bucket toilets.

Basic handwashing facilities are defined as functional handwashing facilities, with soap and water available to all girls and boys.

Formula

$$\text{Indicator 4.a.1} = \frac{\text{Number of schools offering a given basic service at a given education level}}{\text{Total number of schools at the same education level}}$$

Interpretation

⬆ *A high value indicates …*

that schools have good access to the basic services. Ideally, each school should have access to all the basic services.

Data sources and variables

Administrative data from schools:

- Number of schools at each education level providing basic services, by type of basic service
- Total number of schools at the same level of education.

Disaggregation

By level of education.

What variables should the EMIS collect at the school level?

Number of schools that offer basic services by education level.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.c.1   Proportion of teachers with the minimum required qualifications, by education level

Concept

This indicator measures the share of the teaching work force with the minimum required qualifications.

Definition

Percentage of teachers by education level taught (pre-primary, primary, lower secondary and upper secondary education) with the minimum required qualifications.

Formula

$$\text{Indicator 4.c.1} = \frac{\text{Number of teachers with the minimum required qualifications in a given education level}}{\text{Number of teachers at the same education level}}$$

Interpretation

⬆ *A high value indicates …*

a trained teaching force.

Data sources and variables

a. Administrative data from schools and other organized learning centres by educational level:
- Number of teachers with the minimum required training.
- National definition of minimum required training.

b. National definition of the minimum level of qualification for teachers.

Disaggregation

By sex, level of education and type of institution (public/private).

What variables should the EMIS collect at the school level?

Teachers with the minimum required qualifications by education level and sex.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.1.3   Gross intake ratio to the last grade (primary education, lower secondary education) – as percentage of the population at the intended entrance age

Concept

The objective of thematic indicator 4.1.3 is to measure the impact of policies on access and the progression of students to the final grade of that educational level. The number produced is an indication of the capacity of the education system to enable students to progress to their final grade. This indicator was traditionally used as a proxy indicator for completion but completion is a global indicator and, thus, the gross intake ratio is no longer used for that purpose.

Definition

The total number of new entrants into the last grade of primary education or lower secondary general education, regardless of age, expressed as a percentage of the population at the intended entrance age to the last grade of primary education or lower secondary general education.

The *intended entrance age to the last grade* is the age at which pupils would enter the grade if they had started school at the official primary entrance age, had studied full-time and had progressed without repeating or skipping a grade.

Formula

$$\text{Gross intake ratio} = \frac{\text{Number of new entrants into the last grade of a given education level}}{\text{Population of the entrance age to the last grade of that education level}}$$

Data sources and variables

a. Administrative data from schools:
- Number of new entrants into the last grade of primary education or of lower secondary education (or the number of students enrolled in a given education level minus the number of repeaters for that same education level).

b. Administrative data from ministries of education:
- Theoretical entrance age to the last grade of primary education or of lower secondary education (or information on the theoretical entrance age and duration of each education level).

c. Population censuses:
- Population estimates by single year of age.

Interpretation

⬆ *A higher value indicates ...*

a higher degree of efficiency as a higher percentage of the intended universe is entering in the last grade.

Disaggregation

This indicator can be disaggregated by sex and reported by education level.

What variables should the EMIS collect at the school level?

New entrants (or enrolment/repeaters) by grade: number of **new entrants** into the last grade of primary education or of lower secondary education (or the number of **students enrolled** in a given education level minus the number of **repeaters** for that same education level) by sex.

Can the indicator be estimated at the school level?

No

Indicator 4.1.4   Out-of-school rate (primary education, lower secondary education, upper secondary education)

Concept

The completion of 'free, equitable and quality primary and secondary education' referred to in SDG target 4.1 is directly related to reducing the out-of-school rate of students. This indicator identifies the size of the population, within the official age range for the given education level, not enrolled in school.

Definition

Children and young people in the official age range for the given education level who are not enrolled in primary, secondary or higher levels of education.

Formula

$$\text{Out-of-school rate} = \frac{\begin{array}{c}\text{(Population of the official age of a given education level} - \text{Number of}\\ \text{students of the official age of a given education level enrolled in that level)}\end{array}}{\text{Population of the official age of a given education level}}$$

Data sources and variables

a. Administrative data from schools:
  • Number of students enrolled by single year of age in each education level.
b. Administrative data from ministries of education:
  • Theoretical entrance age and duration of each education level.
c. Population censuses:
  • Population estimates by single year of age.

Interpretation

⬆ *The higher the number …*

the higher the out-of-school children (OOSC) number and the greater the need to focus on improving access to education.

Disaggregation

By sex from administrative sources; and by sex, location and wealth/income and others as available.

What variables should the EMIS collect at the school level?

Enrolment: number of students enrolled by single year of age, by education level, and by sex.

Can the indicator be estimated at the school level?

No.

Indicator 4.1.5   Percentage of children over-age for grade (primary education, lower secondary education)

Concept

This indicator measures the progress towards ensuring that all girls and boys complete a full cycle of quality primary and secondary education. This indicator also aims to ensure that students achieve at least minimum levels of proficiency in reading and mathematics at each level. Children may be over-age for a grade because they started school late and/or have repeated one or more previous grades.

Definition

Percentage of pupils in each education level (primary and lower secondary general education) who are at least two years above the intended age for their grade.

The *intended age for a given grade* is the age at which pupils would enter the grade if they had started school at the official primary entrance age, had studied full-time and had progressed without repeating or skipping a grade.

Formula

$$\text{Indicator 4.1.5} = \frac{\text{Number of students enrolled in a given education level who are two or more years older than the intended age}}{\text{Number of students enrolled in a given education level}}$$

Interpretation

⬆ ***Low values indicate …***

that the majority of students start school on time and progress with minimum levels of grade repetition.

Data sources and variables

a. Administrative data from schools:
- Number of students enrolled in a given educational level disaggregated by single grade and year of age in each education level.

b. Administrative data collected from schools by ministries of education:
- Theoretical entrance age and duration of each education level.

Disaggregation

By sex (administrative data); by sex, location, and socio-economic status (household surveys) and others as available.

What variables should the EMIS collect at the school level?

Enrolment by age, by grade, by education level (primary and lower secondary education), and by sex.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.2.4 Gross early childhood education enrolment ratio in (a) pre-primary education and (b) early childhood educational development

Concept

The indicator measures the capacity of the education system to enrol children of early childhood education age in two categories of early childhood education: pre-primary education and early childhood educational development.

Definition

Total enrolment in (a) early childhood educational development [ISCED 01] and (b) pre-primary education [ISCED 02] regardless of age, expressed as a percentage of the population of the official age for the respective ISCED category.

Formula

$$\text{Indicator 4.2.4}_{\text{ECED}} = \frac{\text{Number of students enrolled in early childhood education development (ECED)}}{\text{Population of the official age for early childhood education development}}$$

$$\text{Indicator 4.2.4}_{\text{PPE}} = \frac{\text{Number of students enrolled in pre-primary education (PPE)}}{\text{Population of the official age for pre-primary education}}$$

The number of students enrolled in each of the two categories of early childhood education is expressed as a percentage of the population of the official age for each corresponding group.

Interpretation

⬆ *A high value generally indicates …*

a greater degree of participation in early childhood education programmes.

Data sources and variables

a. Administrative data:
- Number of children enrolled in early childhood education development [ISCED 01].
- Number of children enrolled in pre-primary education [ISCED 02].

b. Administrative data from ministries of education:
- Official entrance age and duration of childhood education development [ISCED 01] and pre-primary education [ISCED 02] levels.

c. Population censuses:

- Population estimates by single year of age.

Disaggregation

By sex from administrative sources; and by sex, location and wealth/income and others as available.

What variables should the EMIS collect at the school level?
Enrolment:

- Number of children enrolled in early childhood education development [ISCED 01] by sex.
- Number of children enrolled in pre-primary education [ISCED 02] by sex.

Can the indicator be estimated at the school level?
No.

Indicator 4.3.2   Gross enrolment ratio for tertiary education, by sex

Concept

This indicator measures the capacity of the education system to enable participation and enrol students into tertiary education.

Definition

Number of students enrolled in tertiary education, **regardless of age,** expressed **as a percentage of the population in the five-year age group** immediately following upper secondary education. If the official entrance age to upper secondary education is 15 years and the duration is 3 years, then the 5-year age group immediately following upper secondary education is 18 to 22 years.

Formula

$$\text{Indicator 4.3.2} = \frac{\text{Number of students enrolled in tertiary education}}{\text{Population of the 5-year age group immediately following upper secondary education}}$$

Interpretation

↑ *A high value shows …*

a high degree of participation in tertiary education by students of all ages. Given it is referring to a 5-year cohort as the denominator, the enrolment of students below and above the age group could make the indicator's value be over 100 percent.

Data sources and variables

a. Administrative data from institutions offering tertiary education programmes:
- Number of students enrolled in tertiary education.

b. Administrative data from ministries of education:
- Official entrance age and duration of upper secondary education.

c. Population censuses:
- Population estimates by single year of age.

Disaggregation

By sex from administrative sources; and by sex, location and wealth/income and others as available.

What variables should the EMIS collect at the school level?

Enrolment: number of students enrolled in tertiary education by sex.

Can the indicator be estimated at the school level?

No.

Indicator 4.3.3   Participation rate in technical and vocational programmes (15- to 24-year-olds), by sex

Concept

This indicator measures the level of youth participation in technical and vocational education and training.

Definition

The percentage of young people aged 15 to 24 years participating in technical or vocational education either in formal education, work-based or other settings, on a given date or during a specified period.

Formula

$$\text{Indicator 4.3.3} = \frac{\text{Number of young people (15 to 24 years) participating in technical and vocational education}}{\text{Population of the same age group}}$$

Interpretation

⬆ *A high value indicates …*

that a large share of the 15- to 24-year-old population is participating in education and training that might lead to a job.

Data sources and variables

a. Administrative data from schools and other places of technical and vocational education and training:
- Number of students enrolled in technical and vocational education and training programmes.

b. Population censuses:
- Population estimates by single year of age.

Disaggregation

By sex from administrative sources; and by sex, location and wealth/income and others as available.

What variables should the EMIS collect at the school level?

Enrolment: number of students enrolled in technical and vocational education and training programmes by sex.

Can the indicator be estimated at the school level?

No.

Indicator 4.5.2   Percentage of students in primary education whose first or home language is the language of instruction

Concept

This indicator measures the extent to which children in primary education are learning in a language with which they are familiar and in which they are likely to be proficient.

Definition

The percentage of primary students whose first or home language is the language of instruction. The first or home language is defined as the student's main language of communication outside the school environment. It is usually either the first language students learn or the language of their family or local community.

Formula

$$\text{Indicator } 4.5.2 = \frac{\text{Number of students enrolled in primary education whose first or home language is the language of instruction}}{\text{Number of students enrolled in primary education}}$$

Interpretation

⬆ *A high value indicates …*

a large number of primary pupils are being taught in a language in which they are proficient, thus making it easier for them to adapt to the school learning environment.

Data sources and variables

a. Administrative data from schools:
- Number of students enrolled in primary education by first or home language and language of instruction.
- Number of students enrolled in primary education.

Disaggregation

By sex from administrative sources; by sex, location and income from household surveys, and others as available.

What variables should the EMIS collect at the school level?

Enrolment: students enrolled in primary education by first or home language, by language of instruction, and by sex.

Can the indicator be estimated at the school level?

No.

Indicator 4.5.4   Education expenditure per student by education level and source of funding

Concept

This indicator highlights the resources invested on average on a single student, going beyond government sources so that an actual unit cost can be calculated. Expressing the indicator either as a percentage of GDP per capita or in PPP$ allows comparisons between countries, and using constant values when looking at time-series data is necessary to evaluate how real resources (eliminating the effects of inflation) are evolving over time.

Definition

Total initial funding from government (central, regional, local), private (households and other private) and international sources for a given education level (pre-primary, primary, lower secondary, upper secondary, post-secondary non-tertiary and tertiary education) per student enrolled at that level in a given year.

The indicator is expressed:
    (i) As a percentage of GDP per capita.
    (ii) In PPP$ (constant).

Formula

$$\text{Indicator 4.5.4} = \frac{\substack{\text{Initial funding from governments (including transfers paid but excluding} \\ \text{transfers received) from government (central, regional, local), private} \\ \text{(households and other private) or international sources for a given} \\ \text{education level}}}{\text{Number of students enrolled in that level}}$$

Interpretation

Government funding: When considered as a percentage of GDP per capita, a higher value would indicate a greater priority given by public authorities to the specific education level. When considered in PPP$, the indicator can show the 'real' amount of resources invested in one student.

Private/household funding: A higher value would signify a greater burden on households, and potential implications for equity and access to education.

For international sources: A higher value would signify a greater commitment from donors to an education level in a given country, but also potentially a greater degree of aid dependency for governments in terms of education funding.

For all sources combined: The indicator would show the real, total value of resources invested in one student, and therefore the real unit cost. Since the indicator is constructed on a comparable scale (i.e. for one student, and relative to GDP per capita or using a common currency), all its subcomponents can be compared to other levels of education, over time, or between countries.

Data sources and variables

a. Administrative data from educational institutions:
- Number of students by education level.

b. Other data sources (central/national, regional and local government expenditure data on education by education level and type of institution; household and (ideally) other private expenditure on education by education level and type of institution; international expenditure on education by education level and type of institution):
- At the national level, the financial management systems of ministries of finance and/or ministries of education are the sources of government expenditure on education.
- Household expenditure on education is collected through consumption/expenditure surveys when available.
- Data on other private sources of funding for education (e.g. corporations, local NGOs) are rarely collected systematically and would often require additional surveys preceded by significant analytical, preparatory and advocacy work.
- International sources as available.

Disaggregation

By level of education, source of funding (government, private, international), type of institution (public/private) but with expected lower coverage for private institutions. For household expenditure, eventually disaggregation by wealth, location and sex could also be calculated, but not for government and international sources.

What variables should the EMIS collect at the school level?

Enrolment: number of students enrolled by education level.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.6.3   Participation rate of illiterate youth/adults in literacy programmes

Concept

This indicator measures the participation of illiterate youth/adults in literacy programmes.

Definition

Number of youth (aged 15 to 24 years) and adults (aged 15 years and older) participating in literacy programmes expressed as a percentage of the illiterate population of the same age.

Formula

$$\text{Indicator } 4.6.3 = \frac{\text{Number of persons participating in literacy programmes}}{\text{Number of illiterate persons of the same age group}}$$

Interpretation

⬆ *A high rate indicates …*

a high degree of coverage of the illiterate population by the programmes designed to reach that specific group.

Data sources and variables

a. Administrative data from educational institutions:
- Number of youth/adults participating in literacy programmes.

b. Population-based surveys:
- Illiterate population estimates for the same age groups.

Disaggregation

By sex from administrative sources; and by sex, location and wealth/income and others as avail

What variables should the EMIS collect at the school level?

Participation of youth/adults in literacy programmes by age and by sex.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.7.2 Percentage of schools that provide life skills–based HIV and sexuality education

Concept

This indicator tracks the proportion of schools that provide life skills–based HIV and sexuality education within the formal curriculum or as part of extracurricular activities.

Definition

Percentage of schools providing life skills-based HIV and sexuality education within the formal curriculum or as part of extracurricular activities.

Formula

$$\text{Indicator 4.7.2} = \frac{\text{Number of schools providing life skills–based HIV and sexuality education}}{\text{Total number of schools}}$$

Interpretation

⬆ *A high value indicates …*

that a large number of schools at the given education level provide life skills–based HIV and sexuality education to students.

Data sources and variables

a. Administrative data from schools:

- Number of schools at each education level providing life skills–based HIV and sexuality education.
- Total number of schools at the same education level.

Disaggregation

By level of education.

What variables should the EMIS collect at the school level?

Provision of life skills–based HIV and sexuality education by the school.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.c.2   Pupil–trained teacher ratio by education level

Concept

This indicator measures trained teacher workloads and human resource allocations in educational institutions to give a general indication of the average amount of time and individual attention a pupil is likely to receive from trained teachers.

Definition

Average number of pupils per trained teacher at each education level (pre-primary, primary, lower and upper secondary education).

A trained teacher is one who has received at least the minimum organized pedagogical teacher training pre-service and in-service required for teaching at the relevant level in a given country.

Formula

$$\text{Indicator 4.c.2} = \frac{\text{Number of students enrolled at a given education level}}{\text{Number of trained teachers at the same education level}}$$

Interpretation

⬆ *The higher the ratio …*

> the lower the relative access of pupils to trained teachers. Results can be compared with established national norms on the number of pupils per trained teacher for each education level.

Data sources and variables

a. Administrative data from schools and other organized learning centres:

- Number of students enrolled by education level.
- Number of teachers by education level by training.
- Definition of the requested minimum level of training.

Disaggregation

By level of education and type of institution (public/private).

What variables should the EMIS collect at the school level?

Enrolment: number of students enrolled by education level.

Trained teachers: number of trained teachers by education level.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.c.3   Percentage of teachers qualified according to national standards by education level and type of institution

Concept

This indicator measures the share of the teaching work force that is academically well-qualified.

Teachers play a key role in ensuring the quality of education provided. Ideally, all teachers should receive adequate, appropriate and relevant pedagogical training to teach at the chosen education level and be academically qualified in the subject(s) they are expected to teach.

Definition

Percentage of teachers by education level taught (pre-primary, primary, lower secondary and upper secondary education) who have at least the minimum academic qualifications required for teaching their subjects at the relevant level in a given country. Ideally, the indicator should be calculated separately for public and private institutions.

Formula

$$\text{Indicator 4.c.3} = \frac{\text{Number of qualified teachers at a given education level}}{\text{Number of teachers at the same education level}}$$

Interpretation

⬆ *A high value indicates …*

that students are being taught by teachers who are academically qualified in the subjects they teach according to the national standard.

Data sources and variables

a. Administrative data from schools and other organized learning centres by educational level:

- Number of teachers by qualification
- National definition of the minimum qualification.

Disaggregation

By sex, level of education and type of institution (public/private).

What variables should the EMIS collect at the school level?

Teacher by qualification/training programme and sex.

Teachers by education level and sex.

Can the indicator be estimated at the school level?
Yes.

Indicator 4.c.4   Pupil–qualified teacher ratio by education level

Concept
This indicator seeks to measure qualified teacher workloads and human resource allocations in educational institutions, and to give a general indication of the average amount of time and individual attention a pupil is likely to receive from qualified teachers.

Definition
Average number of pupils per qualified teacher at each education level (pre-primary, primary, lower and upper secondary education). A qualified teacher is one who has at least the minimum academic qualifications required for teaching their subjects at the relevant level in a given country.

Formula

$$\text{Indicator 4.c.4} = \frac{\text{Number of students enrolled in a given education level}}{\text{Number of qualified teachers at the same education level}}$$

Interpretation
⬆ *The higher the ratio …*

the higher the number of students per qualified teacher, which might imply a lower level of quality.

Data sources and variables

a. Administrative data from schools and other organized learning centres:

- Number of students enrolled by education level.
- Number of teachers by qualification.
- National definition of the minimum level of qualifications.

Disaggregation

By level of education and type of institution (public/private).

What variables should the EMIS collect at the school level?

Enrolment: number of students enrolled by education level.

Teachers by level of qualification, education level and sex.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.c.6   Teacher attrition rate by education level

Concept

This indicator measures the proportion of teachers leaving the profession in a given school/academic year. Assessing and monitoring teacher attrition is essential to ensuring a sufficient supply of qualified and well-trained teachers, and to their effective deployment, support and management.

Definition

The percentage of teachers at a given education level leaving the profession in a given school year as a percentage of the teachers in the same education level the previous year.

Formula

$$\text{Indicator 4.c.6} = \frac{\text{Number of teachers leaving the profession in a given education level in year } t}{\text{Number of teachers at the same education level in year } t\text{-}1}$$

Interpretation

⬆ *A high value indicates …*

high levels of teacher turnover, which can be disruptive for learners.

Data sources and variables

a. Administrative data from schools:

- Number of teachers by education level in year **t-1**

a. Administrative data from human resources records on educational personnel:

- Number of teachers leaving the profession by education level in year **t**.

Disaggregation

By sex and level of education.

What variables should the EMIS collect at the school level?

New entrant teachers by education level and sex.

Teachers by education level and sex.

Can the indicator be estimated at the school level?

Yes.

Indicator 4.c.7 Percentage of teachers who received in-service training in the last 12 months by type of training

Concept

This indicator measures the share of the teaching work force which received in-service training during the last academic year. In-service teacher training programmes usually aim to improve the quality of classroom instruction. Besides pre-service qualification and training requirements, from time to time teachers should receive relevant in-service training for the education level they teach in order to enhance their teaching proficiency.

Definition

Percentage of teachers by education level taught (pre-primary, primary, lower secondary and upper secondary education) who, during the last academic year, have received the in-service training required for teaching at the relevant level in a given country, by type of training received.

Formula

$$\text{Indicator 4.c.7} = \frac{\text{Number of teachers who received in-service training in the last year and in a given education level}}{\text{Number of teachers at the same education level}}$$

Interpretation

⬆ *A high value indicates …*

that teachers are receiving additional training during their working careers in the given area of training, thus enhancing their ability to teach.

Data sources and variables

a. Administrative data from schools:
- Number of teachers by education level.
- Number of teachers who received in-service training in the last year by education level.

Disaggregation

By sex, level of education, and type of training.

What variables should the EMIS collect at the school level?

Teachers who received in-service training of each type in the last year by education level and sex.

Teachers by education level and sex.

Can the indicator be estimated at the school level?

Yes.

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Annex A. List of SDG 4 indicators

Table A-1. List of SDG 4 indicators (July 2020)

Indicator #	Indicator Type	Indicator Name
4.1.1	Global	Proportion of children and young people (a) in grades 2/3; (b) at the end of primary; and (c) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex
4.1.2	Global	Completion rate (primary education, lower secondary education, upper secondary education)
4.1.3	Thematic	Gross intake ratio to the last grade (primary education, lower secondary education)
4.1.4	Thematic	Out-of-school rate (primary education, lower secondary education, upper secondary education)
4.1.5	Thematic	Percentage of children over-age for grade (primary education, lower secondary education)
4.1.6	Thematic	Administration of a nationally representative learning assessment (a) in Grade 2 or 3; (b) at the end of primary education; and (c) at the end of lower secondary education
4.1.7	Thematic	Number of years of (a) free and (b) compulsory primary and secondary education guaranteed in legal frameworks
4.2.1	Global	Proportion of children aged 24-59 months who are developmentally on track in health, learning and psychosocial well-being, by sex **Note:** Refinement of the indicator name approved by the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) on 13 March and 2 April 2020. Final approval pending the 52nd session of the Statistical Commission in March 2021.
4.2.2	Global	Participation rate in organized learning (one year before the official primary entry age), by sex

Indicator #	Indicator Type	Indicator Name
4.2.3	Thematic	Percentage of children under 5 years experiencing positive and stimulating home learning environments
4.2.4	Thematic	Gross early childhood education enrolment ratio in (a) pre-primary education and (b) early childhood educational development
4.2.5	Thematic	Number of years of (a) free and (b) compulsory pre-primary education guaranteed in legal frameworks
4.3.1	Global	Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex
4.3.2	Thematic	Gross enrolment ratio for tertiary education by sex
4.3.3	Thematic	Participation rate in technical-vocational programmes (15- to 24-year-olds) by sex
4.4.1	Global	Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill
4.4.2	Thematic	Percentage of youth/adults who have achieved at least a minimum level of proficiency in digital literacy skills
4.4.3	Thematic	Youth/adult educational attainment rates by age group and level of education
4.5.1	Global	Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous peoples and conflict-affected, as data become available) for all education indicators on this list that can be disaggregated
4.5.2	Thematic	Percentage of students in primary education who have their first or home language as language of instruction
4.5.3	Thematic	Extent to which explicit formula-based policies reallocate education resources to disadvantaged populations

Indicator #	Indicator Type	Indicator Name
4.5.4	Thematic	Education expenditure per student by level of education and source of funding
4.5.5	Thematic	Percentage of total aid to education allocated to least developed countries
4.6.1	Global	Proportion of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex
4.6.2	Thematic	Youth/adult literacy rate
4.6.3	Thematic	Participation rate of illiterate youth/adults in literacy programmes
4.7.1	Global	Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment
4.7.2	Thematic	Percentage of schools that provide life skills-based HIV and sexuality education
4.7.3	Thematic	Extent to which the framework on the World Programme on Human Rights Education is implemented nationally (as per the UNGA Resolution 59/113)
4.7.4	Thematic	Percentage of students in lower secondary education showing adequate understanding of issues relating to global citizenship and sustainability
4.7.5	Thematic	Percentage of students in lower secondary education showing proficiency in knowledge of environmental science and geoscience
4.7.6	Thematic	Extent to which national education policies and education sector plans recognize a breadth of skills that needs to be enhanced in national education systems
4.a.1	Global	Proportion of schools offering basic services, by type of service

Indicator #	Indicator Type	Indicator Name
4.a.2	Thematic	Percentage of students experiencing bullying in the last 12 months
4.a.3	Thematic	Number of attacks on students, personnel and institutions
4.b.1	Global	Volume of official development assistance flows for scholarships by sector and type of study
4.c.1	Global	Proportion of teachers with the minimum required qualifications, by education level **Note:** Refinement of the indicator name approved by the Inter-agency and Expert Group on SDG Indicators (IAEG-SDGs) on 13 March and 2 April 2020. Final approval pending the 52nd session of the Statistical Commission in March 2021.
4.c.2	Thematic	Pupil-trained teacher ratio by education level
4.c.3	Thematic	Percentage of teachers qualified according to national standards by education level and type of institution
4.c.4	Thematic	Pupil-qualified teacher ratio by education level
4.c.5	Thematic	Average teacher salary relative to other professions requiring a comparable level of qualification
4.c.6	Thematic	Teacher attrition rate by education level
4.c.7	Thematic	Percentage of teachers who received in-service training in the last 12 months by type of training

Annex B. Technical note on UIS data collection on EMIS metadata

Based on the past experiences of UIS data collection on EMIS, a draft questionnaire was developed and shared with partners in Africa. After receiving feedback from partners, it was revised and tested in some countries to contextualize the questionnaire in other regions. As a result, some region-specific elements or texts were added and revised. The questionnaire was first launched in Africa and then Asia, the Arab States and Europe from May to June 2020. The questionnaire was first developed in English and translated into French, Arabic and Russian, and subsequently disseminated in relevant regions and countries.

A data entry template was then developed. The quality and consistency of the collected data was ensured. For instance, if the country responded that it does not collect student-level data but this is planned for the future, the subsequent question on generation of IDs and the use of IDs is not analysed or removed.

Table B-1. Response rate of EMIS typology questionnaire

Regions	Number of countries	Data available	% of countries
Sub-Saharan Africa	47	32	68
Arab States	20	13	65
South and West Asia	9	9	100
Central Asia	9	2	22
East Asia	17	6	35
Pacific	15	7	47
Latin America and the Caribbean	37	23	62
Central and Eastern Europe	21	4	19
Total	**153**	**96**	**55**

Note: The information presented includes respondent countries as of August 10th, 2020.

Source: EMIS typology data, UIS 2020.

Response to questionnaire: The questionnaire was sent to UIS counterparts covering all regions of the world. The overall response rate for the questionnaire is 55%, covering all the regions. The response rate across the regions ranges from 19-100% of countries with the highest response rate coming from South and West Asia (100%) and the lowest from Central and Eastern Europe (19%). The analysis in this report is based on the current response rate.

For analytical purposes, countries are arranged according to their regions. Since the rate of response differs across regions, the average response rate of the regions should not be taken as representative of the status of EMIS in that particular region. The rate of response from Central Asia and East Asia is 22% and 35% respectively, which is a very low number and would not be serve as an approximate representation for the group of all countries in those regions. However, in the case of South and West Asia and Africa, where the response rate is 100% and 68% respectively, the results should be fairly indicative for those groups of countries.

Education Management Information Systems

Operational Guide
to Using EMIS to Monitor SDG 4

As the custodian agency of most indicators for the fourth Sustainable Development Goal (SDG 4), the UNESCO Institute for Statistics (UIS) is setting the targets of the SDGs by creating frameworks to better monitor progress. However, monitoring SDG 4 and charting a nation's progress over time is no easy feat as attaining robust comparable statistics over time is crucial yet difficult to achieve. *The Operational Guide to Using EMIS to Monitor SDG 4* is intended to strengthen this vital variable by providing concise operational definitions and presenting concrete national examples of how to measure indicators.

The first International Conference on Education Management Information Systems (EMIS), which was hosted by UNESCO and the Global Partnership for Education (GPE) in April 2018, led to the development of the *Efficiency and Effectiveness in Choosing and Using an EMIS – Guidelines for Data Management and Functionality in EMIS*. These guidelines list EMIS functionality standards required to supply accurate, valid information to education sector policymakers, school managers and international organizations to whom most countries report. The *Operational Guide to Using EMIS to Monitor SDG 4* serves as a companion publication that provides in-depth operational guidance on how to implement data collection from the viewpoint of existing global commitments related to SDG 4 indicators. This publication elaborates on the processes followed by the UIS to aggregate and curate data, and explores the key characteristics of existing national EMIS to illustrate the capacity of this tool to produce administrative data. In addition, this Guide proposes a set of standards to illustrate and support countries in their efforts to collect and produce better quality data.

Information is a necessary resource produced by information systems and is a key building block of management and decision-making in education. Effective decision-making relies on quality data managed within efficient information systems. With the proper guidance, EMIS can be used to fulfil this need, serving not only as a technological solution to operational processes but as an information system to facilitate strategic decision-making, policy formulation, budgeting and – if necessary – routine management above and towards the school.

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