Data Innovation for Producing SDG 4 Indicators: A Global Analytical Report

UNESCO

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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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ADB	:	Asian Development Bank
ADEA	:	Association for the Development of Education in Africa
BPL	:	Below Poverty Line
CSO	:	Central Statistical Office
DFAT	:	Department of Foreign Affairs and Trade
DFID	:	Department for International Development
DOE	:	Department of Education (Nepal)
DP	:	Development Partner
DQAF	:	Data Quality Assessment Framework
ECD	:	Early Childhood Development
EMIS	:	Education Management Information System
EU	:	European Union
EWS	:	Economically Weaker Sections
FMIS	:	Financial Management Information System
GPE	:	Global Partnership for Education
HRD	:	Human Resource Department (Chad)
ID	:	Identification
IDB	:	Inter-American Development Bank
LAC	:	Latin America and Caribbean
LEMIS	:	Laos Education Management Information System
MEMIS	:	Maldives Education Management Information System
MIS	:	Management Information System
MOE	:	Ministry of Education
MOF	:	Ministry of Finance
RCSC	:	Royal Civil Service Commission (Bhutan)
OBC	:	Other Backward Class
SABER	:	Systems Approach for Better Education Results
SC	:	Scheduled Caste
SDG	:	Sustainable Development Goals
ST	:	Scheduled Tribes
TMIS	:	Teacher Management Information System
TRO	:	Teacher Record Office
TVET	:	Technical and Vocational Education and Training
UDISE	:	Unified District Information System for Education
UIS	:	UNESCO Institute for Statistics
UNESCO	:	United Nations Educational, Scientific and Cultural Organization
UNICEF	:	United Nations Children's Fund
USAID	:	United States Agency for International Development
WFP	:	World Food Programme

Background

There are four primary data sources used in calculating the Sustainable Development Goal (SDG) 4 indicators. These include household-based survey and assessment data, census data, school-based survey and assessment data, and Education Management Information System (EMIS) or administrative data. The school/individual-based administrative data can produce around half of the 43 thematic indicators. Thematic indicators based on the EMIS are included in regional SDG 4 monitoring indicators adopted by many regional bodies in the world (UIS, 2018). The EMIS is a vital element of an education system as it provides systematic, quality data in a structured environment that facilitates the use of information produced in planning and policy dialogue.

Data are collected from the three units of the education system – school, student and teacher – and stored on a data management platform. The data are then used in decision making by policymakers and other stakeholders of the education sector. Globally, all countries collect data from schools on an annual basis, and many developing countries have recently started collecting information on individual data on teachers and students, which provides an opportunity to disaggregate the indicators. Some countries use paper, some use spreadsheets, and the majority of the countries use online and offline software to collect administrative data from schools. Countries primarily collect data on enrolment, new entrance, repeaters and graduates from schools, which are required to calculate SDG 4 thematic indicators (UIS, 2018). The extent of data needed to report on SDG 4 indicators is vast; developing countries struggle with producing the data and making EMIS functional. Therefore, many international development organizations are supporting low- and middle-income countries by providing technical and financial support. Thus, the scope of this report is to understand the status of the EMIS of each country. A combination of both quantitative and qualitative research methodology is used to inform the objective of the study. Assessing the quality of a country's EMIS is beyond the scope of this report. Thus, the analysis of this report covers the status of EMIS in each country and not the presence of quality of EMIS in the countries.

Objective of data collection

The main objective of data collection is to understand the characteristics of the existing EMIS database in countries. This is helpful for understanding the capacity of countries to produce administrative data in partnership with development partners. It covers the existence of the school, student and teacher coding (ID) system and using those codes (IDs) for collecting data and other management purposes; use of software to process collected data and mode of the data collection from the schools. The report is divided into four main sections covering: (i) data management platform and mode of data collection; (ii) school, student and teacher-level data collection; (iii) involvement of development partners in low- and middle-income countries, and (iv) conclusion and recommendations for the education stakeholders. This report also contains an Annex where a copy of the survey and tables are attached (Annex I).

Process of data collection, entry and cleaning

Based on past experiences of the UNESCO Institute for Statistics (UIS) data collection on EMIS, a pilot questionnaire was developed and shared with partners in sub-Saharan Africa. After receiving feedback from the partners, it was revised and tested in some countries to contextualize the questionnaire for use in other regions. For example, the question on using a national ID and other region-specific elements were added and/or revised. The questionnaire was first launched in sub-Saharan Africa and subsequently in Asia, the Arab States and Europe, respectively, from May to August, 2020. The questionnaire was first developed in English and later on translated into French, Arabic and Russian prior to launch in relevant regions/countries.

For the quantitative analysis, a data entry template was developed to enter the responses from the survey. It ensured the quality and consistency of the collected data. For example, if the country responded that it does not collect student-level data but planned to do so in the future, the following question about the generation of student ID and use of ID were not analysed or they were removed. Similarly, if the country either left blank or responded "No" to the question that it collects student-level data and follow up it was revised as "No" and vice versa. Furthermore, if the country mentioned, in the comments, that it partially covered/partially completed/only some province/district collects and, in the response, it says "Yes" then it was cleaned as "No". Multiple responses to the survey were received from a few countries that have different ministries for the various levels of education. All of the responses were tabulated into one final survey which were then entered into the data template form.

For the qualitative analysis, responses collected during the survey were analysed and incorporated into this report. These responses provide deeper insights into how the EMIS system of a country functions, the status of the EMIS in a country, as well as the context around non-compliance or attrition. The comments from countries were received in English, Arabic, French, Spanish or Russian. Google translate was used to translate the responses and comments into English. These translated comments were then thematically arranged against the components of the EMIS and used for analysis/example purposes.

Limitations of the survey

The respondents of the survey are the ministries of education (MOE) in each country. In a few countries, responses have also been received from the EMIS consultants. One limitation of the survey is reporting bias. Respondents may have an incentive to over- or under-report. The respondent may under-report to get more investments for their EMIS or over-report to show that the country has a fully functioning EMIS. In addition, the respondent may not have the correct information. A final limitation of the survey is that no data quality checks were conducted to verify the responses provided.

The response of the questionnaire

The questionnaire was sent to UIS counterparts covering sub-Saharan Africa, the Arab States, South and West Asia, Central Asia, East Asia, the Pacific, Latin America and Caribbean, and Central and Eastern Europe regions. The overall response rate of the questionnaire was 59% across all regions. The response rate differed across the regions, ranging from 100% of countries in South and West Asia to 33% of countries in Central Asia. The analysis in this report is based on the responses. The countries are arranged according to their regions and sub-regions. Since the responses varied across regions, the average response rate of a region should not be taken as representative of that particular region. For example, given the low, 33%, response rate from Central Asia, the data should not be seen as representative of the region. However, in the cases of South and West Asia, and sub-Saharan Africa, where the response rates were 100% and 68%, respectively, the results are representative of those regions. The details of the response rates are given in **Table 1**.

If a country did not respond to some questions in the survey, it causes what is referred to as missing data. The missing data reduces representativeness of the particular variable(s).

Qualitative country case examples

Some elaboration, or clarification, of EMIS were also received from many countries to better explain the status of their EMIS. Although the report has tried to present country examples from each region, there is a differential coverage since more elaboration was received from countries in the sub-Saharan Africa and Latin America and Caribbean regions. Since, not all countries provided elaboration in the survey, the qualitative country case examples do not cover every country. Some additional analysis was also done to provide insight into specific issues by using secondary sources.

Table 1: Response Rate of EMIS Typology Questionnaire by region

Regions	Number of Countries in the region	Response of questionnaire by countries	% of countries (Response to questionnaire)
Sub-Saharan Africa	47	32	68
Arab States	20	13	65
South and West Asia	9	9	100
Central Asia	9	3	33
East Asia	17	6	35
Pacific	15	8	53
Latin America and Caribbean (LAC)	37	24	65
Central and Eastern Europe	21	8	38
Total	175	103	59

Source: EMIS Typology Survey, UIS, 2020

Data Management Platform

The three main components of the education ecosystem are school, teacher and student. A data management platform is used to collect, process and analyse data from these three units to inform SDG 4 indicators. It is crucial for tracking changes, ensuring data quality and timely reporting of essential information for planning and management, and for facilitating the use of information in decision making by policymakers. The UIS has developed guidelines[1] for EMIS software development including design, team and system characteristics.

The data management platform and mode of data collection varies across regions depending on the country context such as the availability of resources; location of decision making (province/state level); requirements of disaggregated data and culture of using of evidence in planning and monitoring etc. This section presents an overview of various data management platforms and the mode of data collection used by countries. It also presents country cases as examples to explain further and indicate any exceptions. **Table 2** presents the type of data management platforms used in each region.

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[1] https://teams.unesco.org/cop/tcg/cd-en/SitePages/UIS%20Guidelines%20for%20EMIS%20Software%20development.aspx

The data management platform used by countries depends on factors like the size of the education system, governance structure; physical size and geographic features of the country; and the availability of human and financial resources to support and maintain the EMIS system.

Table 2: Data Management Platform by Region (% of countries)

Regions	Own developed	StatEduc	Ed Assist	OpenEMIS	Others (e.g. Excel)
Sub-Saharan Africa	63	47	6	6	0
Arab States	85	8	0	15	7
South and West Asia	78	0	0	22	0
Central Asia	100	0	0	33	0
East Asia	100	0	0	0	0
Pacific	88	0	0	13	25
Latin America and Caribbean	83	8	0	21	8
Central and Eastern Europe	100	13	0	0	0
Average	80	18	2	13	5

Source: EMIS typology survey, UIS, 2020

The primary data management platform used by countries is their own developed software. On average, 80% of countries developed their own software but this varies from 100% of countries in East Asia, Central Asia and Central and Eastern Europe regions to 63% of countries in sub-Saharan Africa. Some examples of own developed software include SIGERD (Dominican Republic), SANAD[2] (Iran), RA Web (Argentina), Pathway (Morocco), ERP Education (Uzbekistan), MIZŠinf.system (Slovenia), Agile Learning (Uganda), Enhanced Basic Education Information System (Philippines) Pineapple Software (Kribati). The second highest used data management platform is built-in software StatEduc[3] which is being used by an average of 18% of countries worldwide. StatEduc is the primary software being used in 47% of countries in sub-Saharan Africa e.g. Ghana and Burundi; 8% of countries in Latin America and the Caribbean e.g. Montserrat; 13% of countries in Central and Eastern Europe, e.g. Slovenia, and 8% of countries in the Arab States, e.g. Libya. Another built-in software is EdAssist (Global ED*ASSIST[4]) which is being used by an average of 2% of countries and is only being used by 6% of countries in the sub-Saharan African region e.g. Zambia and Zimbabwe. The OpenEMIS[5] software is being used by the world average of 13% of countries across all regions except the East Asia and Central and Eastern Europe regions, e.g. Maldives and Barbados. Furthermore, a few, mostly small, countries, are also using Excel to collect data from schools, e.g. Tuvalu[6], Marshall Islands[7] and the Cook Islands[8] in the Pacific region.

It is important to note that many countries use multiple types of software within the MOE, and in a few countries, different departments, covering different levels of education, also use different data management platforms. In the cases of Madagascar, Ghana, and Zimbabwe, different software is used to collect data for each level of education. In Madagascar, for example, the spreadsheet is used to collect data for the secondary and Technical and Vocational Training (TVET) levels, while for all the other levels it uses its own developed

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[2] Registering of student.
[3] StatEduc is a built-in EMIS software developed with UIS involvement on system development.
[4] Global ED*ASSIST or more commonly referred to as EdAssist is an integrated built-in EMIS software.
[5] OpenEMIS is a built-in open-source EMIS software developed by Community System Foundation.
[6] The total population of Tuvalu is 12,000 (UIS, 2020).
[7] The total population of Marshall Islands is 58,000 (UIS, 2020).
[8] The total population of Cook Islands is 17,565 (Worldometer, 2020).

software called the *Statistical Fiche Primaries' d'Enquête* (FPE). It is similar in the case of Sri Lanka and Bangladesh. This suggests that countries are not complementing existing software by adding new features; instead, they are implementing an alternative software altogether. This imposes an issue of compatibility between the software, data migration, integration and sustainability of the system. For example, Comoros reports a lack of stability in its software. It was using BOZO in 2013-2015 but from 2016 onwards, it started using a new software. In the case of Senegal, the data management platform for teachers and students is not integrated. It is facing difficulty in bringing the two dimensions together, which has resulted in a delay in the production of statistics.

The survey data confirms that each country has at least one electronic data management platform. However, it exists differently in each country depending on contextual factors, such as the availability of resources, source of decision making (federal/state level) and the ministry covering the level of education.

Mode of data collection

There are many modes of data collection including paper, online, offline, and other electronic modes. Before the availability of the internet, only paper was used for communication and data collection purposes. However, with the technological developments and expansion of the internet in the last 10 to 15 years, its use has had substantial implications for EMIS development. While easy internet access is available in all large cities, major towns and urban schools in most countries, most rural areas and rural schools in many countries have limited or no access to the internet. The accessibility of internet in schools varies across the regions[9]. Therefore, due to the lack of availability of internet facilities and other resources[10] many countries are still using paper to collect data from rural schools. The data is entered into the computer system at a later time, either at the national level or at district headquarters, depending on wherever internet and human resources are available.

Table 3 illustrates the breakdown of the mode of data collection adopted by each region. The data show that paper prevails as the predominant mode of data collection, being used by 53% of the countries across all regions, followed by online interface which is being used by 51% of countries with standalone electronic mode[11] being used by 36% of countries. Sub-Saharan Africa has the highest share of paper use, with 81% of countries reporting use of this mode of data collection. On the other hand, Eritrea, Tanzania and Rwanda are a few examples from sub-Saharan Africa that are not using paper. Most of the online interface for data collection is confined to Central and Eastern Europe (100% of countries) and South and West Asia (78% of countries). For the standalone electronic mode, 75% of countries in the Pacific region rely on it[12]. It is worth mentioning that Central and Eastern Europe is the only region where no country is using paper for data collection purposes. The fact that the total of all the modes of collection in each region exceeds 100% suggests that countries are using multiple modes of data collection. Both online and offline reporting mechanisms are put in place for data collection. For example, although the EMIS software of India has the ability to collect data online, it is using paper as one of the modes of data collection from schools that do not have access to the internet. The data collected by paper from remote schools is then entered into a computer at the block level[13].

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[9] Proportion of primary schools with access to computers for pedagogical purpose: in average 45.3%, Arab States (66.3%), Central Asia (95.9%), East Asia and the Pacific (66.8%) and Latin America and Caribbean (62.0%), North America and Europe (99.0%) and South and West Asia (16.0%) (UIS, 2020).

[10] Access to the internet is determined by complementary resources like human capacity, access to electricity etc.

[11] In most of the cases, countries are using Excel and PDF format to collect data.

[12] Europe is the region with the highest internet usage rates (82.5% population), sub-Saharan Africa is the region with the lowest internet usage rates (28.2%). The internet usage rate in the Americas (North America, Latin America and the Caribbean) is 77.2%; Asia and the Pacific is 48.4%; and the Arab States is 51.6%. (ITU, 2019).

[13] India has a federal governance structure. There are three main tiers in the governance structure: national, state, and district. However, for administrative purposes, the district level is further divided into blocks (rural areas) and urban local bodies (urban areas).

Suriname is mostly relying on paper for data collection, and only a handful of schools share the data by email (online interface).

In some countries, multiple modes of data collection are used depending on the level of education or unit of data collection (e.g. school, teacher, and student) as well. For instance, Mauritius is using paper at the Early Childhood Development (ECD) level which then are sent by post and edited and coded by statistical officers, while at the secondary (general) level, the country relies on Excel (online interface).

Table 3: Mode of Data Collection

Regions	Paper (% of countries)	Standalone electronic mode (% of countries)	Online interface (% of countries)
Sub-Saharan Africa	81	31	19
Arab States	39	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 Caribbean	42	38	71
Central and Eastern Europe	0	13	100
Average	53	36	51

Source: EMIS typology survey, UIS, 2020

School-level data recording[14]

The first unit of data recording is done at the school-level in a country's EMIS database. It is important to collect administrative school-level data as better school conditions are helpful for delivering a quality education, which in turn helps education policymakers take evidenced-based policy decisions and inform international reporting on SDG 4 indicators. The SDG 4.a.1 indicators focus on school infrastructure, including access to electricity, internet, computers, etc. To assess the status of each of these indicators, data is collected and stored in the EMIS database and used for analysis purposes by education policymakers. This section provides an overview of the percentage of countries recording school-level data and using school ID, the issuing authority of the school ID, and the ability of countries to retrieve 5 years of school-level data.

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[14]The school-level data recording is not different from recording of school ID and these two words are used interchangeably.

Table 4 shows that 100% of countries record school-level data in the national EMIS database. This suggests that every country in the world is recording school-level data electronically in national EMIS. All countries across all regions record school-level data. The survey data suggests that school-level data recording does not vary across regions, intra-regions, level of education and ownership of the school.

Table 4: School-Level Data Recording by Region

Region	Unit of data collection at the school level (% of the country)
Sub-Saharan Africa	100
Arab States	100
South and West Asia	100
Central Asia	100
East Asia	100
Pacific	100
Latin America and Caribbean	100
Central and Eastern Europe	100
Average	100

Source: EMIS typology survey, UIS, 2020

Collection of Geographical Coordinates[15] of school:

The geographical coordinates of a school when linked with other spatial data is useful for targeted educational planning, management, and monitoring. The geographical coordinates build a geospatial database with a relational database of educational, demographic, social and economic information. They provide a holistic representation and exploration of the contexts of schooling by providing access to multiple sources of essential data such as those found in the census, transportation, utilities, healthcare, land use, and agricultural databases. Therefore, collecting geographical coordinates of schools is important as it helps policymakers take decisions based on a holistic picture of different variables.

Figure 1 illustrates the recording of geographical coordinates of schools across regions. Out of 100% of countries that record school-level data, only 71% of them are collecting geographical coordinates of schools. The percentage varies from 89% of countries in South and West Asia to 50% of countries in the Pacific region.

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

Figure 1: Collection of Geographical Coordinates by Region (% of countries)
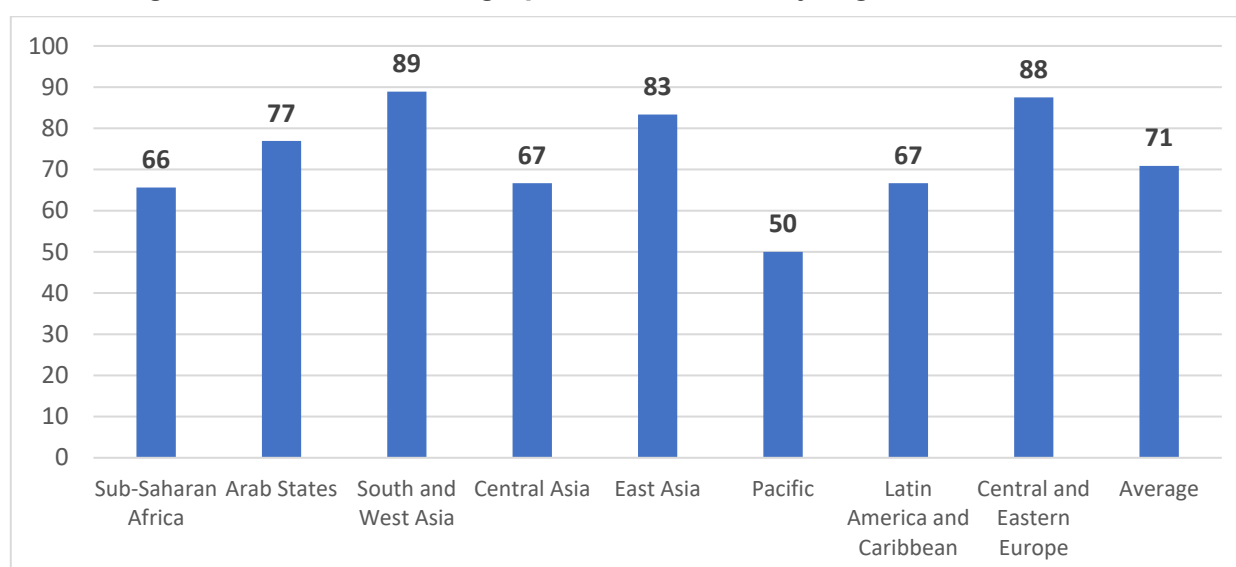
Source: EMIS Typology data, UIS 2020

The reason for the low coverage is because either countries have only recently started collecting geographical coordinates of schools and hence, have not been able to cover all schools,[16] or plans are underway to integrate the geographical coordinates in its EMIS database. For instance, in a mapping exercise in 2019, Uganda captured geographical coordinates, but they have not yet been integrated into the country's EMIS database. Philippines has also recently started recording geographical coordinates, therefore, its EMIS database has only recorded geographical coordinates of some schools. Similarly, Madagascar has recently started collecting geographical coordinates of its schools and it has yet to cover all schools and integrate it in its EMIS. However, there are some countries that have collected geographical coordinates of all its schools. For instance, Suriname, in an IDB[17] financed project, has stored school coordinates from primary schools to upper secondary schools. Some more examples of the countries that are recording geographical coordinates are Afghanistan and Bangladesh in South and West Asia, Timor-Leste and Malaysia in East Asia; Guyana and Guatemala in Latin America and Caribbean, Iraq and Jordan in the Arab States; Ghana and Botswana in sub-Saharan Africa, Poland and Ukraine in Central and East Europe, and Fiji in the Pacific region. Some examples of countries that are not recording geographical coordinates are Bhutan in South and West Asia, Cambodia in East Asia, Curaçao in Latin America and Caribbean, Syria in the Arab States, Nauru in the Pacific region, Mali in sub-Saharan Africa and Estonia in Central and Eastern Europe.

Use of unique school ID to collect school-level data

School-level data is collected and stored in the EMIS database using a unique school ID. A unique school ID is a single, non-duplicated number assigned by the MOE to all schools and remains with a school throughout its existence. It is a 8-11 digit number based on the size of the country and number of schools and administrative divisions, first based on the number of schools, and second on sub-national administrative divisions, management of school etc. It helps to identify each school, track progress and make comparisons.

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[16] Some of the countries have not covered all schools and are in the process of covering all schools (e.g. Madagascar and Philippines).
[17] Inter-American Development Bank.

School-level data recording is different from using school ID for data collection purposes, especially for some small countries. Small countries record school-level data but do not have a unique school ID. For instance, small countries, mostly in the Pacific region, do not have unique school ID but record school-level data and school name as the school ID. Tonga and Tokelau in the Pacific region collect school-level data but do have school ID.

There are many countries that record school-level data and unique school ID. For instance, Iran in South and West Asia, Gabon in sub-Saharan Africa, Jamaica in Latin America and Caribbean, Poland in Central and Eastern Europe, Armenia in Central Asia, and Timor-Leste in East Asia. Niger, however, has two unique school IDs. The first unique ID is called an administrative ID which is generated by the MOE and it refers to the region and municipality where the school is located. The second, and the primarily used unique school ID, is the one that is automatically generated by StatEdu. In the case of Angola, schools are registered with a number and a name when they are created under the responsibility of the provinces. However, Angola also uses a unique school ID for each school at the national level. **Table 5** shows the current status of the use of school IDs across regions and the level of education and management (public/private) of schools.

Table 5: Recording of School-Level Data Using Unique School ID by Level of Education and Management of School18

Regions	ECD (% of countries)		Primary (% of countries)		Secondary (General) (% of countries)		Secondary (TVET) (% of countries)	
	Public	Private	Public	Private	Public	Private	Public	Private
Sub-Saharan Africa	69	72	88	88	94	94	72	72
Arab States	85	85	100	100	100	100	85	77
South and West Asia	67	67	100	100	100	100	78	67
Central Asia	67	67	100	67	100	67	67	67
East Asia	100	100	100	100	100	100	67	67
Pacific	75	50	75	63	75	63	63	25
Latin America and Caribbean	63	54	88	75	92	75	63	58
Central and Eastern Europe	75	75	88	88	88	88	88	88
Average	72	69	90	85	93	87	72	66

Source: EMIS typology survey, UIS, 2020

Although most countries in the world have developed a unique school ID and use the ID for data collection purpose, there are a few exceptions. For example, in Burundi, the school ID is being revised to adapt to the administrative nomenclature of its institute in charge of statistics and economic studies.

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[18] The data breaks out public and private schools separately. The lowest figures between public and private of each region will be the both (private and public). For example, in sub-Saharan Africa, at primary level 68.8% and 71.9% for public and private respectively and for both- private and public will be 68.8%.

Similarly, in Cote d'Ivoire the codification process to assign a unique school ID at the general education level, is still underway. Comoros is also in the process of developing both school and student IDs.

Use of a unique school ID to collect school-level data by level of education

On average, the use of a unique school ID to collect school-level data is higher at the primary and secondary (general) level than ECD and secondary (TVET) levels. At the public primary and secondary (general) levels 90% of countries and 93% of countries, respectively, use a unique school ID to collect school-level data. On the other hand, at the public ECD and secondary (TVET) levels only 72% of countries use school ID to collect school-level data.

At the private primary and secondary (general) levels, 85% and 87% of countries use school ID, respectively, to collect school-level data. For ECD and Secondary (TVET) it is 69% of countries and 66% of countries, respectively, using school ID to collect school-level data.

In conclusion, regardless of the management of schools, the percentage of countries using school ID to collect school-level data is higher by around 20% at the primary and secondary (general) levels as compared to the ECD and secondary (TVET) levels. It must be noted that 100% of countries in East Asia use school ID to collect school-level data at all levels of education except at the secondary (TVET) level where 67% of countries are using school ID to collect school-level data.

The percentage of countries using a school ID is higher at the primary and secondary (general) levels than ECD and secondary (TVET) because of the timeline of the development the EMIS system. Many countries have recently started recording school-level data using school ID at the ECD and secondary (TVET) levels. For instance, Philippines started using school ID to collect school-level data at secondary (TVET) level from both public and private schools as recently as 2016-17.

Use of school ID to collect school-level data by school management

More generally, a higher percentage of countries use a unique school ID to collect school-level data from public schools than from private schools. On average, 58% and 53% of countries use a unique school ID to collect school-level data from public and private schools, respectively, covering all levels of education. There is a 5 percentage point gap between public and private schools. However, if one specific region and level of education is seen in isolation, the gap between the public and private schools rises considerably. For instance, in the Pacific region at the ECD level, 75% of countries use a school ID to collect school-level data in public schools, whereas in private schools only 50% of countries use a school ID to collect school-level data. The fact that Tuvalu, an island in the Pacific region, has only one private school could be a contributing factor to the overall low percentage of schools using unique school ID to record school-level data from private schools.

Similarly, at the secondary (general) level in Central Asia, while 100% of countries use a unique school ID to record school-level data from public schools, only 67% of countries use school ID to collect school-level from private schools. All the regions follow the same pattern of using school ID to collect more school-level data from public schools than from private schools. However, an exception is the sub-Saharan African region at the ECD level, where the use of a unique school ID to collect school-level data is 3 percentage points higher from private than from public schools.

Nevertheless, Suriname has mentioned that the reason that unique school ID use to collect data from private schools is low, is because not all private schools are sending their data. This may also be the case for many other countries, where the private schools are often either unregistered, unregulated, or both (Central Square Foundation, 2020; NEP; 2020).

Responsibility for generating school ID and use of school ID within the MOE:

Figure 2 illustrates the breakdown of countries where a unique school ID is generated within the MOE and the percentage of countries where the unique school ID is being used by all departments within the MOE.

On an average, in 79% of countries, the unique school ID is generated within the MOE. The percentage of countries where the school ID is generated within the MOE varies from 100% of countries in East Asia to 33% of countries in Central Asia. Of the 79% of countries that are using unique school ID generated by MOE, only 67% of them are using a unique school ID within all departments of the MOE. The use of a unique school ID within all departments of the MOE varies from 100% of countries in East Asia to 33% of countries in Central Asia.

Figure 2: Generating School ID and Use of ID within MOE by Region (% of countries)
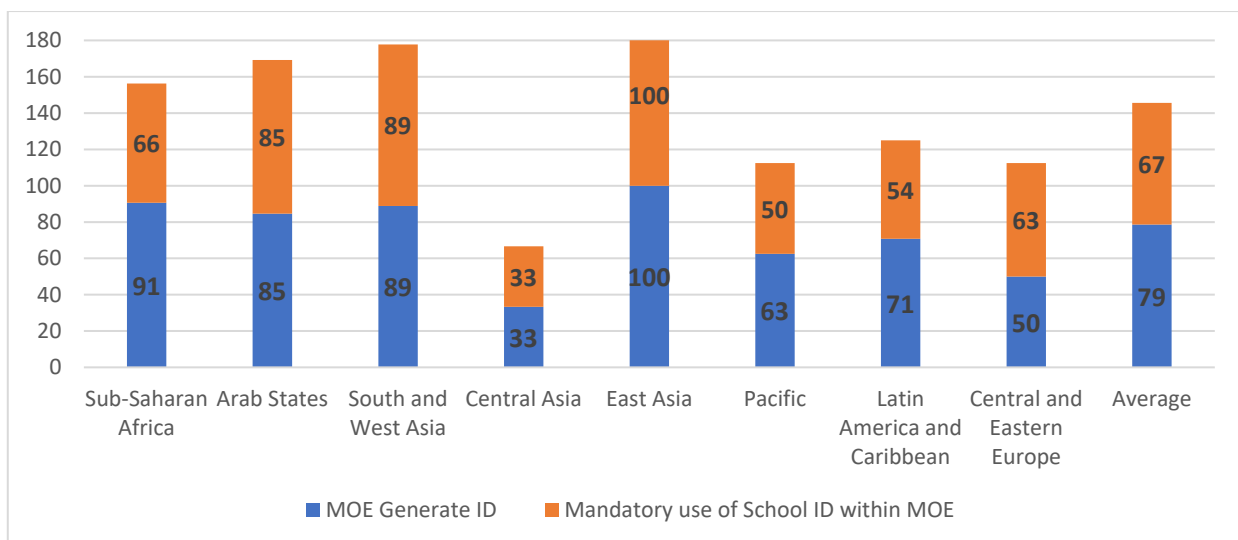
Source: EMIS typology survey, UIS, 2020

It is interesting to see that while 91% of countries in sub-Saharan Africa use a school ID generated by the MOE, only 66% of countries have made it mandatory to use a unique school ID within departments of the MOE. This is reversed in Central and Eastern Europe where 50% of countries have a unique school ID generated within the MOE but a whopping 63% of them have made it mandatory to use the unique school ID within all departments of the MOE. It shows school IDs are not only generated by the MOE; other agencies are also generating school IDs used for data collection and other management purposes in the Central and Eastern Europe region.

In some countries it is compulsory to use a unique school ID within all the departments of the MOE, while in other countries it is not. For instance, in Togo, while it is compulsory that all departments of the MOE use a unique school ID, none of them are doing so. In Seychelles, even though it is not mandatory to use a unique school ID, all the departments within the MOE are using it. In the case of Rwanda, the unique school ID is

generated by the EMIS system, but it is not integrated in a unified database. However, once it is integrated it into the system, it will become compulsory to use the unique school ID. In Gabon, none of the schools are in the database and it has yet to integrate all its schools in the EMIS database.

Retrieving 5 years of school-level data

The ability to retrieve 5 years of school-level data means that countries are recording school-level data and have integrated at least the last 5 years of school-level data into its EMIS. The historical data is first analysed, processed and then made available to education policymakers and other stakeholders to understand the trends and identify areas of need that should be addressed or accorded priority attention. Therefore, it becomes essential for countries to store data which can be easily retrieved when required. **Figure 3** presents the ability of the regions to retrieve 5 years of school-level data by level of education and management of schools.

Despite the fact that 100% of countries record school-level data, only 52% and 49% of countries in public and private schools, respectively, across all levels of education are able to retrieve 5 years of school-level data. Central and Eastern Europe has the highest percentage of countries able to retrieve 5 years of school data from public and private schools, with 75% of countries able to do so. On the other hand, in South and West Asia, only 33% and 22% of countries, respectively, are able to retrieve 5 years of school-level data from public and private schools. In East Asia and sub-Saharan Africa, 50% of countries are able to retrieve 5 years of public school-level data.

Figure 3: Retrieval of Five Years of School-Level Data Using School ID by Region Level and Management of School (% of countries)
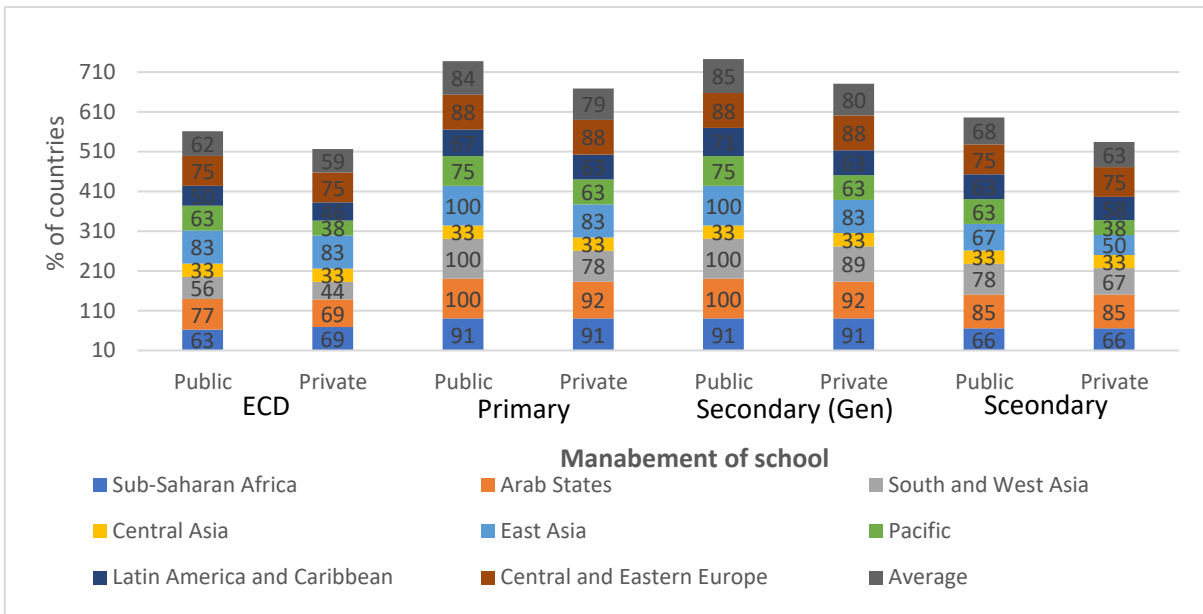
Source: EMIS typology data, UIS 2020

Retrieving 5 years of data using school ID by level of education

The data show that a higher percentage of countries can retrieve 5 years of school-level data at the primary and secondary (general) levels than at the ECD and secondary (TVET) levels. On average, the possibility of retrieving 5 years of school-level data using a unique school ID for public schools at the primary and secondary (general) levels is 85% countries for both levels, while at the public ECD and secondary (TVET) levels, 62% and 68% of countries are able to retrieve 5 years of school-level data using school ID.

For private schools, at the primary and secondary (general) levels of education, 79% countries for both levels are able to retrieve school-level data using school ID as compared to 59% and 63% of countries being able to retrieve school-level data using school ID for the ECD and secondary (TVET) levels.

Retrieving 5 years of data using school ID by management of education

The data also show that a higher percentage of countries are able to retrieve 5 years of data using school ID from public schools than they are from private schools. The data show that 52% and 49% of countries in public and private schools, respectively, at all levels of education, are able to retrieve 5 years of school-level data. This is only a difference of 3 percentage points, however, the data show that the difference rises considerably when comparing the regions. For instance, in public and private schools in Central and Western European, 75% of countries can retrieve 5 years of data using a school ID, while in South and West Asia, only 22% of countries can retrieve 5 years of data using a school ID for private schools. Private schools are the same for all the other regions, except sub-Saharan Africa where 53% of countries can retrieve 5 years of data using school ID, as opposed to 50% of countries that are able to retrieve data from public schools.

In conclusion, regardless of the management of schools, a higher percentage of countries are able to retrieve school-level data at the primary and secondary (general) levels than at the ECD and secondary (TVET) levels.

The reason for not being able to retrieve school-level data using school ID is that most of the countries have developed their country EMIS in the last 3-4 years. A lower percentage of countries is able to retrieve 5 years of data at the ECD and secondary (TVET) levels due to the recent integration of ECD and secondary (TVET) in the main EMIS system. Many countries have recently started collecting data from those levels of education. For instance, Philippines started recording school data for secondary (TVET) for both private and public only in 2016/17; hence, it can only retrieve data by using school ID for 4 years. Another reason for not been able to retrieve 5 years of data is due to the lack of integration of data for all years in one EMIS. For example, in Eritrea, the database is not integrated to be able to retrieve 5 years of school-level data using school ID, but it can retrieve data for each year individually from different EMIS systems.

The reason behind the low percentage of retrieval of 5 years of data in private schools is either because private schools do not respond to EMIS questionnaires regularly, or many countries have unregistered and unregulated private schools.

Recording individual student-level data[19]

The second unit of data recording is at the student-level in the EMIS database. It is essential to record student-level data as it includes information such as enrolment, new entrants, attendance, transfers, and dropouts. This data provide insight into student progression which policymakers and other stakeholders use to take policy decisions. Based on student-level data, countries can not only identify gaps and prioritize resources, but also inform international reporting on SDG 4 indicators. This section provides an overview of the percentage of countries recording student-level data and using a unique school ID, the issuing authority of the unique school ID, and the ability of countries to retrieve 5 years of student-level data using a unique student ID.

The student-level data is recorded using a unique student ID. A unique student ID is a single, non-duplicated number assigned to a learner, and which remains with that learner throughout his or her education journey, irrespective of whether the learner changes schools and or locations. This helps to follow the progress of each learner over time, and across schools or districts/state within the country. A unique student ID is useful to disaggregate the data based on country requirements. It also helps to improve the data quality by authenticating the information. For instance, in some countries, public schools have a tendency to inflate student enrolment to maintain teacher quotas and other benefits tied up with student enrolment. However, a unique student ID is useful to improve the data quality by authenticating the information on the number of students in its EMIS database. **Table 6** presents the breakdown of the percentage of countries in each region that record student-level data in the form of student ID and looks at whether countries that do not record student-level data plan to do so in the future.

Table 6: Recording of Student-Level Data and Future Plan to Collect it by Region

Regions	Recording of student-level data (% of countries)	Future plan of recording student-level data (% of countries)
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 the Caribbean	80	17
Central and Eastern Europe	63	25
Average	54	34

Source: EMIS typology survey, UIS, 2020

On average, 54% of countries record student-level data in EMIS at the national level. The recording of student ID for data collection varies across regions, from 100% of countries in Central Asia to 22% of countries in sub-Saharan Africa, a gap of 78 percentage points between the two regions. With the exception of sub-Saharan Africa, countries in all of the other regions record student-level data above the world average including the Arab States (54% of countries).

Many countries, especially small countries, record student-level data but a unique student ID is not assigned to the students. For example, Tuvalu in the Pacific region records student-level data but does not assigned a unique student ID. There are also a few countries that only have partial student-level data. For instance, in

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[19]The student-level data recording is not different from recording of student ID and these two words are used interchangeably.

Pakistan, student-level data is only collected from a few provinces. Similarly, in Tanzania, there is a partial coverage of the student-level data collection. However, Tanzania intends to cover each individual student soon. Similarly, Sri Lanka uses student ID across all levels of education with the exception of the ECD level. Montserrat does not use a unique student ID at the ECD secondary (TVET) or secondary (general) levels in private schools. Many countries do not use school ID in the private schools. For example, Guyana does not use a unique school ID in private schools at the ECD and secondary (general) levels, nor does it use a unique school ID at secondary (TVET) in either public or private schools.

Out of the total responses, 34% of countries that do not currently collect individual student-level data plan to collect student-level data in the future including Afghanistan, Chad, and Burundi. Some countries have already started doing so. There are cases where a student ID is only issued in some levels of education. For instance, Aruba only records data for lower secondary vocational schools and it is planning to scale up to other levels of education.

The countries that do not record student-level data, or do not have a unique student ID, are compiling aggregate student-level data and submitting it to higher authorities. The student-level data compilation is cumbersome and time consuming for schools. Additionally, the possibility of making a mistake while compiling the student-level data is high. For example, the data of 1-12 enrolments from two states of India – Bihar and Uttar Pradesh – show that after recording student-level data by using Aadhar[20] at the school-level, there was a reduction of 2.1 and 2.4 million students, respectively, between the 2016/17 and 2018/19 school years[21]. This is a reduction of 8.5% and 5.2% of students in the same period, respectively. (UDISE[22] and UDISE+, 2017-2019). Nepal has also experienced a similar situation before and after collecting individual student-level data. Nepal started collecting individual student-level data from schools in 2017 and between 2015 and 2019, the enrolment of students dropped by 19.3% (60,4753 enrolments) at the primary level and 0.6% (10,536 enrolments) at the lower secondary level (DOE[23], Flash I report of various years). The mistakes are not only on total enrolment; it also greatly helps to record the age of the students.

The quality of the data collected also depends on data coverage. Some countries collect student-level data by disaggregating grade, age and gender only, which is enough for international reporting. For example, Madagascar in the sub-Saharan African region and Cook Island in the Pacific region, collect student data only on the number of enrolments for all levels by age and sex. However, collecting data on individual student-level only by age and gender will not serve to monitor the national and regional commitments and targeted interventions. Some countries record student-level data in-depth and disaggregate it by special needs (disability), academic achievement etc. For instance, India records disaggregated data on students, other than grade, age and sex, by special needs[24], language (medium of instruction), religion, social groups: general,

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[20] Aadhar is a 12 digit Unique Identification number (UID) issued by the Unique Identification Authority of India on behalf of the Government of India.

[21] There are many reasons for reduction in enrolments: mainly demography, population of early age students is falling due to a reduction in fertility rates, response rate of schools (not all public schools are responding to the EMIS questionnaire, many public schools are losing students and these students are moving to private schools) both recognized and unrecognized private schools. The response rate of private schools is low and unrecognized private schools response is even lower, use of Aadhaar, in 2015/16 government asked every state and school to keep each student record based on the Aadhaar number. As a result, most schools are now keeping a record on Aadhaar and so can no longer inflate enrolment randomly.

[22] http://udiseplus.gov.in/

[23] https://www.doe.gov.np/

[24] Children with special needs is categorized by 21 types of disabilities including physical and mental disabilities.

schedule caste (SC), scheduled tribes (ST), other backward class (OBC), economically weaker sections (EWS)[25] and below poverty line (BPL) [26]. The recording of student-level data with the minimum required information allows for disaggregation of indicators and monitoring of national, regional and international commitments and targeted interventions at the country level. Angola in the sub-Saharan African region is also collecting student-level data by the number of students, level of education, age, gender, special needs and academic achievement.

Generating a unique student ID

There are two types of student IDs used by different countries. First, a student ID generated by the EMIS system under the MOE and second, an ID generated outside the MOE, for example, a national ID. In most cases, ID generated under the MOE is used only within the MOE for data collection and other management purposes such as the transfer of scholarships, preparation of certificates of examination results etc.

Student ID generated outside the MOE, for example a national ID, is used outside the MOE as well as within the MOE database. Its compatibility is much higher than MOE generated ID since the national ID can be linked with many other databases outside of MOE, such as social benefits, direct cash transfer, family incomes etc. It helps provide an intersectoral analysis for the development of intersectoral policies.

Figure 4 illustrates that of the 54% of countries that maintain student-level data and use student ID, only 52% are using a unique student ID generated within the MOE. The region with the highest percentage of countries using student ID generated within the MOE is the Pacific region[27] (80% of countries) and the lowest is in Central and Eastern Europe (zero countries). All countries of South and West Asia, with the exception of Iran and Maldives, use student ID generated within the MOE. Barring South Africa[28] and Botswana, all countries in the sub-Saharan African region also use student ID generated by the MOE. Uzbekistan, in Central Asia, also uses two types of student ID, one generated by the MOE and one outside MOE (state centre of personalisation). Trinidad and Tabago has not used any ID generated by the MOE or outside of the MOE.

Out of the 54% of countries that maintain student-level data and use student ID, 39% generate a unique student ID outside the MOE. This proportion varies across regions, from 71% of countries in the Arab States to zero countries in the Pacific region. Saudi Arabia and Qatar are examples of some countries in the Arab States where a student ID is generated outside the MOE. In Syria, a national ID is used as a student ID which is also linked to other databases. Botswana's basic education sector uses a national ID that is generated by the Department of Civil Registration (a department outside the MOE). In Honduras, the student ID is used by other ministries mainly to track cash transfers to families and other information that is handled through surveys.

The cases of Maldives and Columbia are different from other countries. Maldives uses a national ID as the student ID. However, if a child does not have a national ID due to some legal reasons, an auto-generated number by the Maldives Education Management Information System (MEMIS) is used, and for expatriate students, a passport number is used. Columbia, on the other hand, receives a considerable number of refugees

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[25] EWS are those who are in a general category and annual gross income of the family is less than INR 800,000 (USD 10,600), the family does not have own agriculture land more than 5 acres, a specific category of a residential flat.

[26] Below poverty line or BPL an economic benchmark set by the government of India to identify economically weaker people and households in urgent need of government aid. The income limit for households for qualifying as a beneficiary under BPL has been pegged at INR 27,000 per annum (USD 360).

[27] Some Pacific countries record student data but do not use ID and ID generated by the MOE or any other agency.

[28] South Africa is using both – ID generated within the MOE and ID generated outside the MOE.

from Venezuela and for the refugee children it is generating a temporary unique student ID until their legal status is confirmed, to avoid hampering refugee students' education.

Figure 4: Generation of Student ID by Region (% of countries)
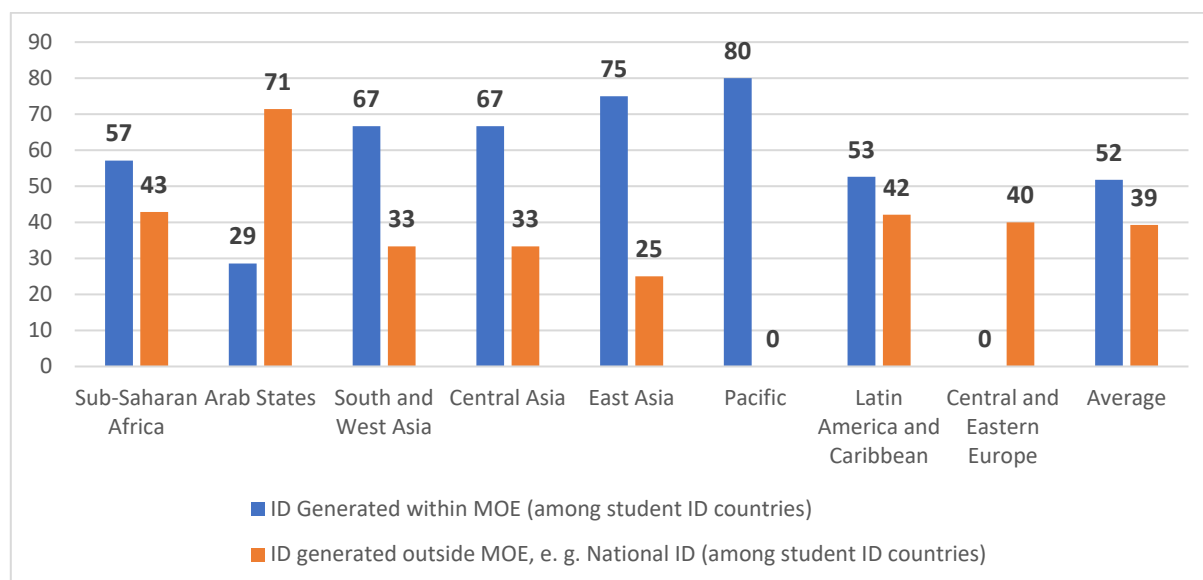
Source: EMIS typology survey, UIS 2020

Even when a student ID is generated, some countries have not made its use mandatory. For instance, in Belize, it is requested by MOE to use the student ID, but it is not compulsory. However, Maldives and Singapore use a national ID as a student ID, and it is mandatory to use it for all departments, within and outside the MOE.

Purpose of using a unique student ID

There are two purposes for a student ID as classified in the survey questionnaire: (i) management and (ii) data collection. The management/administrative purpose goes beyond data collection. For example, using a student ID for data collection purposes only means that the IDs are not used for any other purpose e.g. examination results, scholarship distribution etc. and are used only for EMIS data collection. If a country uses a student ID for management purposes, it is for other managerial purposes, such as examination management, scholarship distribution, student performance, school fee management, etc. In many cases, countries use a student ID for both purposes.

Figure 5 presents the breakdown of the purpose of student ID. On average, only 36% of countries use a student ID for management/administrative purposes. The use of student ID for management purpose varies across regions and is highest in South and West Asia (67% of countries) and lowest in sub-Saharan Africa (16% of countries). In South and West Asia and sub-Saharan Africa[29] the proportion of countries using student ID for management and data collection purposes is the same.

In the case of data collection, on average, 41% of countries use student ID for collection purpose only. The use of student ID for data collection varies from 71% of countries in Latin America and Caribbean, to 16% of

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[29] The data collection and management was not asked separately and used the same figure for data collection as at the minimum these IDs are used for data collection purpose.

countries in the sub-Saharan African region. Besides sub-Saharan Africa, the Arab States is the only region whose use of student ID for data collection purpose is below the overall world average percentage.

Figure 5: Purpose of Using Student ID by Region (% Of Countries)
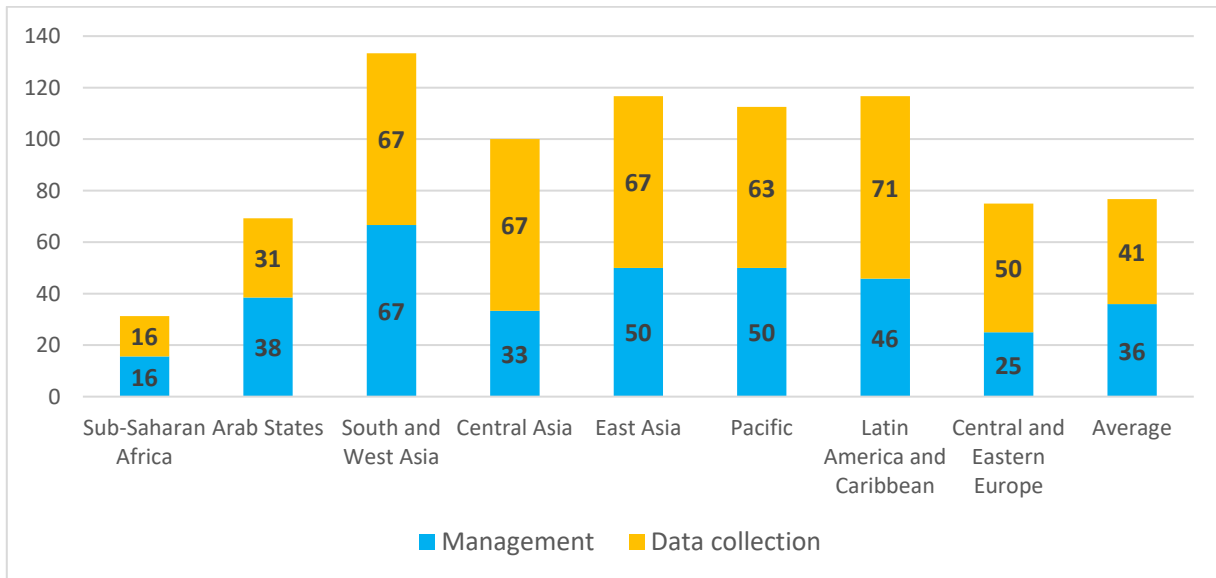
Source: EMIS typology survey, UIS, 2020

The survey findings also conclude that countries use student ID for many purposes other than data collection. For example, some countries, such as Jamaica, collect data only for examination purposes. Yemen and Aruba use a unique student ID for examination and security purpose and Honduras uses a student ID to track cash transfers to families.

Retrieving 5-year student data

Retrieval of 5 years' data is vital to track the progress of a student or a cohort of students. It helps to make informed policy decisions, prioritize resources and monitor progress. It also indicates the sustainability, integration and functionality of student-level data in the EMIS.

Table 7 shows that, on average, only 54% of countries can retrieve five years of student data based on student ID. Student data retrieval capacity is highest in East Asia where 67% of countries can retrieve five years of student data, and lowest is in Central Asia where only 33% of countries are able to retrieve student data.

There are two reasons for low data retrieval. First, most countries started collecting data at the student level in the last 5-6 years. For instance, South Africa can retrieve school-level data for 20 years, but at the student level, it can retrieve data for only the last 3 years. In Jamaica, as well, the EMIS system was developed 3 years ago by the student registration unit, and hence it can retrieve data for the last three years only. The OpenEMIS in Barbados has not been in use for some time. However, there are a few countries that can retrieve student-level data for the last 5 years. For example, Honduras and Peru's data management platform (SAIGE) has been in operation since 2014 and can retrieve five years of data for every single student.

Table 7: Retrieval of 5-Years of Student-Level Data by Region

Regions	Retrieving five years of student data (% of countries)
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
Average	54

Source: EMIS typology survey, UIS, 2020

Second, countries use multiple types of software, and system incompatibility leads to difficulties in system migration and integration. For example, Curaçao uses different systems and that is why the data for all five years is fragmented in different systems, making it unable to retrieve 5 years of data. In the case of Ecuador, student and parent ID is occasionally entered incorrectly; the country is currently fixing the problem.

A few countries have started the process of data integration. For instance, in Cameroon, there are four different ministries in charge of education (basic education, secondary education, higher education and professional training). Each of these ministries uses its own version of the EMIS platform independently even though the same conceptual database model is used. Under its 2020/21 plan, the country is planning to integrate all the four sub-sectors EMIS. Laos PDR is not collecting individual student-level data and monitoring of student ID in the national education database is being developed under LEMIS (Laos Education Management Information System), the strategic plan for 2018-2022.

Recording individual teacher data[30]

The third unit of data collection in the EMIS database is teacher-level data. It is essential to collect individual teacher-level data because education systems are only as good as the teachers who deliver the education. By 2030, the SDG 4.c target aims to increase the supply of qualified teachers through international cooperation for teacher training in developing countries and small island developing states. Hence, it is essential to not only strengthen the capacity of teachers in each country but also to monitor and track the progress of training, the pupil-teacher ratio and other parameters related to teachers. Individual teacher-level data helps to increase data quality and relevancy, and allows reliable disaggregated analysis for policy interventions. This section reviews the level of individual teacher data availability and the use of a unique teacher ID across regions by management of schools.

Table 8 presents an overview of recording teacher-level data along with the future plan of countries to record teacher-level data. Out of the 59% of countries that responded to the survey, 72% of countries record individual teacher-level data. Comparing the availability of individual teacher data with school-level data, 26% fewer countries record teacher-level data than school-level data. The recording of teacher-level data ranges from 100% of countries in the Pacific and Central Asia region to only 53% of countries in the sub-Saharan African region. Some countries, specifically small countries, collect teacher-level data, but these countries have not yet generated teacher ID. Ethiopia is one example, and all the Pacific countries also come in this category.

Table 8: Recording and Planning of Teacher-Level Data Collection by Region

Regions	Recording of Teacher ID (% of countries)	Future plan for Teacher ID (% of countries)
Sub-Saharan Africa	53	34
Arab States	85	31
South and West Asia	89	11
Central Asia	100	33
East Asia	67	33
Pacific	100	0
Latin America and the Caribbean	71	13
Central and Eastern Europe	75	13
Average	72	21

Source: EMIS typology survey UIS, 2020

Out of the total responses, 21% of countries plan to record individual teacher-level data in the future including Cambodia, El Salvador and Tanzania and many others. In some cases, countries have already started collecting teacher-level data. For example, Philippines has covered half the teachers, and the process to cover the remaining teachers is being scaled up. In Uganda, plans are underway to assign each teacher a unique ID through the Teacher Management Information System (TMIS). Currently, it is has a teacher ID only for public school teachers which is generated by the Ministry of Public Service for managing the payroll. In Nigeria, the teacher ID is under development as it suffers from many setbacks due to frequent attrition of teachers in the system.

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[30] The teacher-level data recording is not different from recording of student ID and these two words are used interchangeably.

It is important to note that each country uses a different type of teacher ID. Firstly, some countries use a teacher ID generated within the MOE. For instance, in Rwanda, the EMIS generates a unique ID for every teacher. The MOE generated ID is useful for data collection, historical data retrieval and the possibility to interact with other MOE databases, for example, payroll.

Secondly, many countries use the national ID as a teacher ID which is generated by a government authority outside the MOE. For instance, in Botswana, the basic education department uses the national ID as a unique teacher ID, which is generated by the Department of Civil Registration. It is the same case in Pakistan, Maldives and Madagascar.

Thirdly, many countries also use an employee ID as a teacher ID. The employee ID is different from the national ID but it is also issued by a government authority outside the MOE. In Iran, for instance, teacher ID is an employee code which is different from the national ID. In Bhutan, as well, the teacher ID is the employee ID which is generated by the Royal Civil Service Commission (RCSC). It is the same in Yemen. Using a national ID is as a teacher ID allows EMIS (teacher-level data) to interact with other databases within the MOE and outside the MOE.

Lastly, there are many countries where a unique teacher ID is limited to public schools. For example, in Togo, a unique teacher ID is generated only for public school teachers, and it is issued by the Ministry of Civil Service. In Uganda, the Ministry of Public Service issues a unique teacher ID for public teachers for managing payroll. However, a unique teacher ID covering all teachers from public and private schools is underway.

The quality of the data collected depends on the depth or the number of indicators on which the teacher-level data is collected. Some countries only collect basic information like the number and sex of teachers, while other countries go in depth and record teacher-level data on weekly teaching hours, qualification of the teacher, etc. Recording teacher-level data with the minimum required information allows for the disaggregation of indicators to monitor national, regional and international commitments and targeted interventions. The Human Resource Development (HRD) ministry in Chad collects information only on the number of teachers in a school, while Niger records in-depth information like teachers' highest qualification, weekly teaching hours etc.

Use of teacher ID

The use of the teacher ID depends on various factors including compatibility with databases, standardization of ID, purpose, and generating authority of teacher ID. Many countries have different databases to record teacher-level data using teacher ID. Many countries use teacher ID for data collection, salary processing, pension, promotion and other administrative purposes. However, other countries use the Management Information System (MIS) for a different purpose, for example, Financial Management Information System (FMIS), Teacher Management Information System (TMIS) and other databases. The standard ID allows for interaction between different databases (MIS systems) within the MOE and outside the MOE. Table 8 provides a breakdown of the purpose and the use of teacher ID for data collection purpose, along with the use of teacher ID within and outside the MOE.

Use of teacher ID for data collection

Individual teacher-level data is useful for planning recruitment, training and other professional development of teachers. The teacher attrition rate in developing counties is around 3-5% with some exceptions (UIS, 2020) and planning to recruit new teachers will help to impart a quality education. For instance, based on teacher data, the head teacher can gauge the competencies of teaching staff and subsequently enlist staff in training programmes to bridge competency gaps. Equally, teachers can track their training history through EMIS, allowing them to extract information to justify their need for professional development.

Table 9 presents the purpose and use of individual teacher-level data in both public and private schools. On average, 36% of countries use teacher ID to collect data from both public and private schools. The use of teacher ID for data collection purposes is highest in the East Asia region where 83% of countries use teacher ID for data collection purposes and lowest in sub-Saharan Africa where only 22% of countries use teacher ID for data collection purposes from both public and private schools.

Table 9 shows that 52% of countries use teacher ID for data collection from public schools and 39% of countries do so from private schools. The percentage of countries using teacher ID for data collection purposes in public schools is higher than private schools by 13 percentage points on average. In both public and private schools, the use of teacher ID for data collection ranges from 83% of countries in East Asia to 28% of countries in sub-Saharan Africa.

Table 9: Purpose and Use of Teacher ID by Management of School and Region

Regions	Data collection from schools (% of countries)			Teacher ID is used within MOE databases (% of countries)			Teacher ID is used outside MOE databases (% of countries)		
	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 Caribbean	58	25	25	46	21	21	21	8	8
Central and Eastern Europe	50	50	50	38	38	38	13	13	13
Average	52	39	36	55	34	34	26	17	17

Source: EMIS typology survey, UIS, 2020

Use of teacher ID within MOE databases

A unique teacher ID is used to track the induction, training and professional development of individual teachers. This allows the ministry to develop needs-based career development programs for teachers. It is a critical intervention in low- and middle-income countries where teachers often lack proper qualifications and skills to impart a quality education.
Table 9 shows that, on average, 34% of countries use teacher ID within the MOE only, generated for both public and private schools. The use of teacher ID issued for both public and private schools by the MOE is highest in

Central and East Asia where 67% of countries in both regions use teacher ID within the MOE. The use of teacher ID issues for both public and private schools is lowest in the Latin America and Caribbean region where only 21% of countries use teacher ID issued for both public and private schools within the MOE.

The use of teacher ID, generated for both public and private schools, within the MOE database is 55% and 34% of countries, respectively. The use of teacher ID, recorded for public schools within the MOE database, ranges from 100% of countries in Central Asia to 38% of countries in Central and Eastern Europe. The use of teacher ID recorded for private schools within the MOE database varies from 67% of countries in East Asia and Central Asia to 21% of countries in Latin America and Caribbean region. To conclude, in all regions, more countries use teacher ID within the MOE database generated for public schools than private schools.

Use of teacher ID outside MOE databases

The use of teacher ID outside the MOE database is useful for inter-sectoral analyses and broad human resources development planning of a country. If a teacher's salary is released by the Ministry of Finance (MOF) directly to the teacher's bank account, then compatibility with MOF's database is useful. The use of teacher ID outside the MOE depends on the school governance policy of the government. The MOE uses public school teacher ID if it is compatible and standardized. However, for private schools, teacher ID is not used by public institutes other than for data collection purposes unless the government is providing financial and other resources to private schools. For example, Maldives provides financial resources to private schools using teacher ID from government databases, as it is standardized and compatible with other databases within MOE and other government 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 purpose within the MOE. The government has a separate Teacher Management Information System (TMIS) under Teacher Record Office (TRO) to manage public school teacher data for salary, pension and promotion purposes.

Table 9 presents the use of teacher ID outside the MOE database across regions. Only 17% of countries use teacher ID outside the MOE recorded for both public and private schools. The use of teacher ID, recorded for both private and public schools, varies from 33% of countries in both East Asia and South and West Asia to 13% of countries in the Latin America and Caribbean region.

On average, 26% of countries use teacher ID outside the MOE recorded for public schools, while for private schools only 17% of countries use teacher ID outside the MOE database. Of the teacher ID recorded for public schools, 46% of countries in the Arab States and only 13% of countries in Central and Eastern Europe use it outside the MOE. On the other hand, for the ID recorded for private schools, 33% of countries in both South and West Asia and East Asia use it outside the MOE. Only 8% of countries in Latin America and Caribbean are using teacher ID outside the MOE database.

Involvement of development partners (DPs) in producing education data[31]

The amount of data needed to monitor SDG 4 indicators is vast and complex. As has been seen from the previous sections, low- and middle-income countries are already facing challenges in collecting the data necessary to monitor SDG 4 goals effectively, especially at the individual student and teacher levels. Thus,

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[31]If UNICEF and the World Bank are involved in a country, both DPs are counted. Bilateral support, which is confined to just a few countries, is not mentioned in the figure e.g. Government France/French Development Agency (Burkina Faso, Madagascar, Mauritania, Gabon), Government of India (Bhutan), Luxemburg (Burkina Faso), EU (Angola), UKAID (Nigeria), ADEA (Zimbabwe, Angola), DFID (Zimbabwe), the Pooled fund (Nepal) etc. Some countries have also mentioned national partners, e.g. Sri Lanka, but are not counted in the figure.

partnerships with development partners[32] is essential to develop and sustain EMIS systems in these countries. The support received from the development partners helps countries produce reliable, high-quality and cross-country comparable data from a variety of data sources. International development organizations like UNICEF, UNESCO, the World Bank, USAID, Global Partnership for Education (GPE), and many more, have been involved in low- and middle-income countries to ensure support in developing and sustaining EMIS databases. This section provides an overview of the involvement of development partners, the type of support provided, and EMIS-quality assessment conducted in all regions.

Figure 6: Involvement of Development Partners by Development and Region [33]

(% of countries)
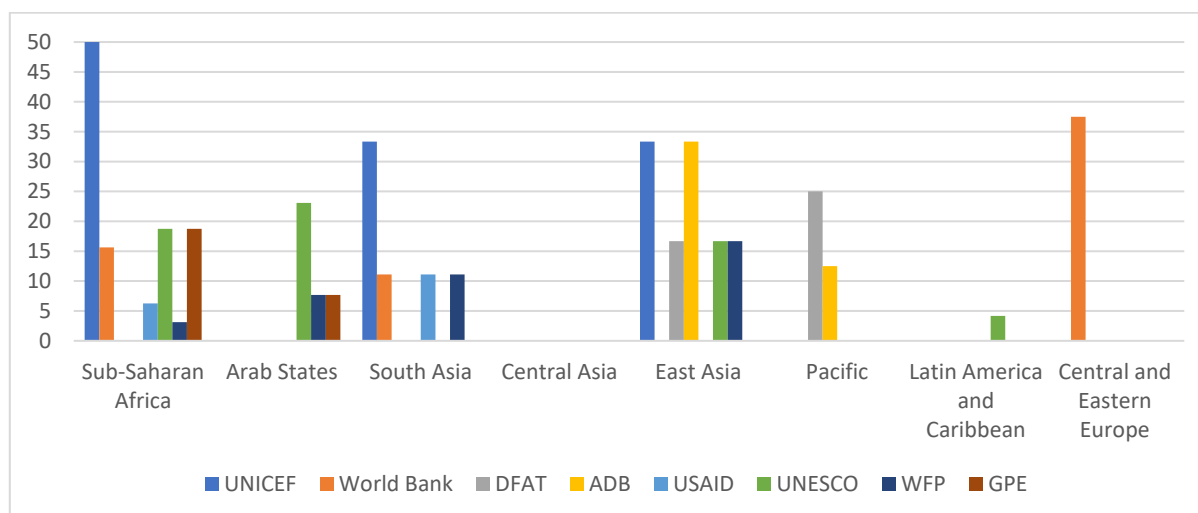
Source: EMIS typology survey, UIS, 2020

Figure 6 gives a regional overview of the involvement of development partners in establishing and sustaining an EMIS to produce education data. UNICEF's share of support is the highest. It provides support in 50% of countries in the sub-Saharan African region, 33% of countries in South Asia and again 33% of countries in East Asia, to develop, update and make the EMIS functional. After UNICEF, the involvement of the World Bank is notable in sub-Saharan Africa, South Asia and Central and Eastern European regions. The Department of Foreign Affairs and Trade (DFAT[34]) is providing support to 25% and 17% of countries in the Pacific and East Asia regions, respectively. The involvement of the Asian Development Bank (ADB) is limited to 33% of countries in East Asia and 13% of countries in the Pacific region. The only country outside of East Asia for which the ADB provides support is Marshall Islands in the Pacific region where the ADB is providing technical support for the assessment of data management practices. Other development partners like USAID, UNESCO and the WFP are also involved in many regions providing both technical and financial support. Sub-Saharan Africa has the

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[32] In the health sector, sustained, coordinated, and long-term investment in data and data systems, across a variety of donors, and in partnership with governments, has resulted in fast progress. Evidenced-based planning has reduced costs by allocating resources effectively (UIS, 2018).

[33] It is a multiple counting, for example, if UNICEF and the World Bank are involved in a country, both DPs are counted. Bilateral support which is confined with few countries are not mentioned in figure e. g. Government France /French Development Agency (Burkina Faso, Madagascar, Mauritania, Gabon), Government of India (Bhutan), Luxemburg (Burkina Faso), EU (Angola), UKAID (Nigeria), ADEA (Zimbabwe, Angola), DFID (Zimbabwe), the Pooled fund (Nepal), JEMFAC (USA) (Marshall Islands) etc. Some countries have also mentioned national partners, e.g. Sri Lanka, are not counted in the figure.

[34] The department of the Government of Australia responsible for foreign policy, foreign relations, foreign aid, consular services, and trade and investment.

highest number of development partners while Central Asia and Latin America and Caribbean regions have the lowest involvement of development partners in producing education data.

Type of support received from development partners

The development agencies provide support – financial, technical or both – in countries with the greatest data needs, to strengthen the capacity of MOEs to make the EMIS functional and produce quality education data in a sustained manner. Technical support comes in the form of training, capacity-building of the statistical officials in the MOE, and technical advisory support.

Table 10 provides a breakdown of the type of support received by low- and middle-income countries from development partners to produce education data. The support received from the development partners is between 2013-2020, with some exceptions. Sub-Saharan Africa is the largest receiver of technical and financial support or both. It shows that 78% of countries in sub-Saharan Africa have received support from various development partners to produce education data with a EMIS. On the other hand, only one country in the Latin America and Caribbean region has received support from UNESCO for producing education data and no country in Central Asia is receiving any support from any development partners.

Table 10: Type of Support Provided by Development Partners by Region (% of countries)

Region	Technical (T)	Financial (F)	Both (T and F)
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	25	0	25
Latin America and Caribbean	4	0	0
Central and Eastern Europe	0	13	25

Source: EMIS typology survey, UIS, 2020

In Cote d'Ivoire, UNICEF has provided technical support in three main areas. Firstly, it has provided training to regional statistics coordinators in filling out questionnaires and using an online data entry application. Secondly, it conducted a workshop to consolidate data collection. Thirdly, it conducted a data collection workshop for all regions and districts of Cote d'Ivoire. It is the same case in Mali where UNICEF has funded training for statistical officers in analysis of indicators for the education sector. Burkina Faso has established an exclusive treasury allocation account (CAST) for the production of education statistics, which is being supplemented by several multilateral and bilateral development partners like UNICEF, Switzerland, Luxembourg and Canada, with their technical and financial support. Mali is currently receiving funding from UNICEF for an activity on the analysis of indicators.

The survey findings show that despite receiving financial support from development partners, some countries continue to face constraints in integrating and making the EMIS functional. For instance, Nigeria has four development partners that support the production of education data. Nigeria faces financial constraints and it is also struggling to integrate and sustain the EMIS.

Secondly, few countries have reported technical issues in making the EMIS functional. For example, Palestine has received financial support from a development partner to develop school information in the EMIS. After developing the EMIS it was tested on a sample of schools but due to the poor infrastructure and frequent errors in the software it was unsuccessful.

There are also countries that have successfully developed the EMIS without the support of a development partner. Kazakhstan in Central Asia has developed a fully functioning EMIS database through its own budgetary funds across all education organizations, regardless of ownership and departmental affiliation. It aggregates all data on the education system at all levels and provides access to information at the district, regional and national levels. Externally, an annual audit is carried out for information security by authorized bodies.

EMIS-quality assessment

The EMIS-quality assessment aims to help countries improve the quality of administrative data collection, data and system management, and data use in decision making, thereby improving these elements of the education system. There are three types of EMIS-quality assessments: Data Quality Assessment Framework (UIS-DQAF[35]) conducted by the UIS, Systems Approach for Better Education Results (SABER[36]) by the World Bank and the Association for the Development in Africa (ADEA[37]) which is only conducted by sub-Saharan African countries. The UIS-DQAF is guided by eight principles and ensures the production of high-quality education data. The UIS has piloted and revised UIS-DQAF in 11 countries covering Asia, sub-Saharan Africa and Latin America in the 2018/19 period. Most aspects of these three types of EMIS-quality assessment tools are standard. **Table 11** presents the type of EMIS-quality assessments conducted by the countries in a specific region.

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[35] http://uis.unesco.org/en/capacity-development-tools
[36] http://saber.worldbank.org/index.cfm
[37] http://www.adeanet.org/en

Table 11: Type of EMIS Quality Assessment by Region (% of countries)

Region	UIS-DQAF	ADEA-Peer Review	SABER
Arab States	8	0	8
South and West Asia	33	0	11
Central Asia	0	0	0
East Asia	33	0	0
Pacific	0	0	13
Latin America and Caribbean	4	0	0
Central and Eastern Europe	0	0	12
Average	28	0	4

Source: EMIS typology survey, UIS, 2020

The most commonly used EMIS-quality assessment is the UIS-DAQF. It has been used by 28.2% of countries. In the second place, 3.9% of countries have conducted the World Bank-SABER, and this assessment is confined to countries in the Arab States, South and West Asia and Pacific regions.

Some countries, such as Afghanistan and Jordan, have conducted multiple EMIS-quality assessments. Both of these countries have conducted both the UIS-DQAF and SABER EMIS-quality assessment. There are also many countries that have not conducted any EMIS-quality assessment including Costa Rica, Bolivia, India, Bhutan and others.

Summary of the findings

There are four primary data sources used in calculating SDG 4 indicators. These include household-based survey and assessment data, census data, school-based survey and assessment data, and EMIS or administrative data. School and individual-based administrative data can produce around 50% of the 43 thematic indicators for SDG 4. The main objective of the data collection is to understand the characteristics of existing EMIS systems in the countries. This is helpful for understanding a country's capacity to produce administrative data and a development partner's involvement to produce education data. The report has described the main findings of the 2020 UIS EMIS typology survey data and examines the key characteristics of EMIS of each region. This report has used both quantitative and qualitative method to analyse the existing features of EMIS around the world.

Every country has a data management platform, and paper is the primary mode of data collection

Data collected from the three major components of the education system – school, student and teacher – are stored, managed and analysed on a data management platform where it is easily accessible by policymakers and administrators. The survey findings suggest that every country has at least one electronic data management platform. However, it depends on specific country contexts like availability of resources, location of decision making (province/state level), and the ministry covering the level of education. It also concludes that all regions prefer their Own developed software instead of a built-in EMIS software. Some countries, primarily in sub-Saharan Africa, use built-in software like StatEduc and Global Ed*ASSIST while other regions use own-developed or OpenEMIS .

Countries rely on different modes of data collection, including electronic (online/offline) and paper. Paper remains the most popular mode of data collection from schools even though every country uses an electronic mode of data collection for storing and processing data at the national level by using different software. The use of paper versus an electronic mode of data collection is determined by the availability and access to the internet and other required facilities like human resources. Paper is used as the primary mode of data collection from schools where there is limited or no access to the internet and other required resources. Countries use an electronic mode of data collection from schools where there is internet, and when other required facilities are available. Data collected from paper is entered at the district headquarters, national capital or block-level, or where there is internet and other facilities available. Central and Eastern Europe is the only region that does not rely on paper for data collection from schools and uses only an electronic mode of data collection.

Status of data recording for three major components of the education system differs from each other

Most countries have been recording school-level data for many years. However, a lot of countries have either only recently started collecting data at the individual student and teacher levels or are still in the process of setting up mechanisms to collect data at the individual student and teacher levels. This can be seen as 100% of countries record school-level data, while only 54% and 72% of countries record individual student-level and teacher-level data. Compared with school-level data, there is a 46 percentage-point gap between school-level data and individual student-level data, and 28 percentage-point gap between school and individual teacher-level data.

The reason behind the higher percentage of countries recording school-level data compared with individual student or teacher-level data, is that student-level and teacher-level data originate from schools and countries that have been collecting data at the school level for a long time. The recording of student-level and teacher-level data in the national database is a recent phenomenon. South Africa, for example, has been recording school-level data for 20 years, but it has only been collecting student-level and teacher-level data for the past 3-4 years. Almost all countries in the world collect and record school-level data in the national database. However, recording school-level data at the national level started only with the expansion of the internet facility in 1995-2000 in most developing countries.

Compatibility of ID regulates the scope of data use within and outside of MOEs

Data is collected from the three units by assigning them unique codes – meaning assigning unique identification numbers to schools, students and teachers. Many countries do not assign a unique student ID as they may not have data systems capable of assigning and tracking unique student ID for students, or they may lack the necessary staffing or funding, or some small countries such as Tuvalu, Marshal Islands etc, may collect the data but do not assign a unique ID. There are many advantages of using a unique ID. For example, a unique student ID is essential for the effective management of student-level data in longitudinal data systems, to collect reliable data and disaggregate it by sex, age, grade etc. Because data related to an individual student may be stored in multiple data systems across multiple districts, schools, and state agencies, unique student identifiers are seen as the most accurate way to link individual student records across all the different data systems tracking students over multiple years. A unique student ID can improve data quality by ensuring that individual students are consistently identified in a wide variety of databases, files, or reports. For example, districts and schools may inadvertently record a student's name differently, e.g., John Smith may have previously been enrolled in his previous school as John E. Smith or there may be multiple John Smiths enrolled in the same school and same grade level at the same time. The use of a unique student ID can also, for example,

improve the speed with which transcripts and other records are transferred among schools, in addition to other benefits. A unique teacher ID helps to increase data quality, relevancy and allows reliable disaggregated analysis for policy interventions. Individual teacher-level data is helpful for planning, recruiting, training and professional development of teachers. Some countries also use national ID as unique student ID or teacher ID. The use of a national ID as a unique school ID or teacher ID is more viable since it links the student data with all other databases and helps in an intersectoral analysis (US Department of Education, 2006).

The use of ID varies across regions, levels of education covered, and the management of a school (public/private). The use of student and teacher IDs are different across the level of education and public/private schools. In general, the use of IDs for data collection is high at the primary and secondary (general) levels and low at the ECD and secondary (TVET) levels. In the case of management of a school, data availability and the use of ID is used more often in public schools than in private schools.

An integration of school ID with student and teacher ID enables policymakers and educators to know which teacher preparation programs produce graduates whose students have the strongest academic growth; how school working conditions can affect the impact that teacher education has on student achievement; how the experience levels of teachers in a district's high-poverty schools compare with those of teachers in schools serving affluent students, and how these experience levels are related to the academic growth of students in their classrooms; and the relationship between the performance of a district's low-income students on state-wide assessments and teacher preparation in the tested subject(s).

However, the survey data find that the EMIS of many countries is facing an issue of compatibility between software, data migration, integration and sustainability of the EMIS system for various reasons. These issues affect the production of high-quality data at the national, regional and international level and hinder the use of data for policy and monitoring purposes.

Many development partners are involved in EMIS development

Many multilateral and bilateral agencies are involved with countries to develop and make the EMIS functional. Development partners provide both technical and financial support to countries. UNICEF, the World Bank, UNESCO, Asian Development Bank and other multilateral and bilateral agencies' involvement with countries to produce education data (EMIS) is highest in the sub-Saharan African region. Sub-Saharan Africa has the largest number of development partners and it is receiving both financial and technical support. The involvement of development partners is lowest in the Pacific and Latin and Caribbean regions. The survey data also suggest that despite receiving assistance, countries face constraints in terms of funding, weak institutional frameworks and inadequate technical capacity.

Some countries have conducted an EMIS assessment. The UIS-DQAF EMIS assessment is the most popular, followed by the World Bank's SABER. There is also uneven coverage in conducting an EMIS-quality assessment. Some countries have conducted two assessments while some countries have not conducted any EMIS-quality assessment.

Lessons learned

The analysis of survey data, additional information from countries and some secondary sources shows that countries and development partners are working together to improve the production of quality and timely education data to monitor SDG 4 at the national, regional and global levels. However, some undesirable lessons, presented below, are hindering the timely production of quality data.

- Lack of effective coordination among different departments/ministries leading to fragmented and duplicated work, is unsustainable and is breaking the linkage with different levels of EMIS;
- Establishing new EMIS without considering previous interventions. Technically developing a new EMIS is easier than making an existing one functional. Most of the nonfunctional EMIS are caused by unavailability of trained EMIS officials in the MOE and lack of an operational budget. In many cases, the nonfunctioning EMIS is led by computer professionals only and lacks education planners/statisticians/analysts to achieve the fullest utilization of EMIS.
- Scope of EMIS and availability of human and other resources at the national, sub-national and school levels are not mapped properly while developing the EMIS.
- The EMIS questionnaires are often lengthy, considering human and other resources available at schools, from where the data originates. At the same time, many SDG 4 indictors are not included in the EMIS questionnaire and some information is collected but not used or it pertains to indicators not being calculated. Collecting individual (student and teacher) data will reduce the size of EMIS questionnaire substantially and increase the quality of collected data.
- In most cases, the data keeping format at the school level are not standardized, or did not consider the data keeping format/mechanism while developing the EMIS. This is leading to poor quality data while transferring data from school to national EMIS systems.
- EMIS systems are often developed using various platforms/architects. Often, software licenses are not renewed, source codes are not documented, data dictionaries are not developed, and even if developed, they are not documented properly. This all hampers the integration of data from multiple EMIS into a central EMIS. These are some of the reasons behind developing a completely new EMIS system instead of enhancing or updating an existing EMIS system without archiving historical data and making the new system incompatible with old systems.
- Central statistics offices (CSO) and MOEs have not developed a standardized guideline to generate and use school, student and teacher IDs. In some cases, MOEs generate IDs that are not compatible with each other. The use of national IDs makes EMIS data more compatible with other databases.

Recommendations and action points

In many ways, the condition of the EMIS in low- and middle-income countries is like a scenario illustrated by Montoya (2018), where the air traffic controller sees a storm as he/she is approaching an airport only to realize that all of a sudden 80% of navigation controls have malfunctioned. In other words, the MOEs of low- and middle-income countries, though committed to improving the quality of education and timely reporting on SDG 4 indicators, find their efforts limited simply because they do not have enough data to avoid or even mitigate a learning crisis. Therefore, increasing the availability and use of data and evidence is the critical arena for the effective management of the education sector. Low- and middle-income countries face challenges in improving their education systems' ability to meet the ambitious goals of SDG 4 related to access, quality, and equity in education.

However, there are some very promising examples of good practice in data collection and maintenance, as well as good examples of data dissemination and use, but overall, EMIS efforts have yet to be pulled up, especially in sub-Saharan Africa and Latin America and Caribbean regions, to produce quality, disaggregated and timely data for informed policy decisions. For this, coordinated efforts from development partners, as well as the UIS, is critical to help establish a functional EMIS in every country.

The EMIS typology survey reiterates the above conclusions and suggests the following recommendations and action points for the MOEs of countries, the UIS and development partners.

Action points for MOEs/countries

- Coordinate with all departments/ministers to make use of the same ID mandatory (for example, a national ID) or one common field in each EMIS to enhance interchangeability between different EMIS, if there is more than one MOE/department responsible for data collection from schools;
- Coordinate with the teacher commission, public service commission, MOF or the agency who keeps records of teacher recruitment (both permanent and non-permanent), salary, pension and other benefits;
- Develop integrated and interactive EMIS on a modular basis including student, teacher, population, examination, finance, learning assessment and household survey data;
- Develop EMIS on an open architecture platform (OS-independent and open source) and document source code, data dictionary properly;
- Form a national technical team bringing in relevant ministries and CSOs;
- Introduce a provision to enter data directly from admission and attendance registers after standardizing the data keeping format (admission and attendance register, school physical facilities register) at school;
- Introduce an output of EMIS to generate tables for the UIS questionnaire and develop a tool to automate the export of data into the Excel-based UIS QA questionnaire;
- Introduce internal data verification on data entry and processing mechanism in EMIS. For example, class 2 enrolment cannot be more than class 1 enrolment of previous year, other than special cases;
- Introduce methodology to identify and estimate missing data. For example, use last year's data with some estimation;
- Invest in adequate financial and human resources with proper knowledge and training to make EMIS functional. A human resource succession plan must be in place to make the EMIS functional after older staff members leave;
- Enhance the capacity of the human resources involved in data collection, production and use at national, sub-national and school levels;
- Produce a dashboard on national and international interest with the possibility to disaggregate it into national, regional / urban-rural etc.
- Reduce EMIS questionnaire length, excluding data not used for several years and promote collection of data at the individual level to enhance the quality, coverage and timelines of data production;
- Standardize data keeping format at schools;
- Use national ID for both students and teachers. In countries where a national ID is not mandatory, they should use system-generated unique EMIS-ID for schools, students and teachers.
- Develop an EMIS policy specifying the roles and responsibilities of each stakeholder, including the private sector and other uses of EMIS data, based on the recommendations of a data quality assessment.

Action points for the UIS

- Develop a knowledge hub for EMIS including EMIS questionnaires, minimum required features of EMIS software and hardware for developing EMIS, using standardized variables for EMIS software;

- Develop guidelines for data management and EMIS;
- Inviting countries to UIS organized workshops and webinars to enhance the capacity of officials and professionals involved in EMIS on challenges and opportunities of administrative data, disaggregation, use of school, student and teacher IDs, and the integration of EMIS;
- Work as clearing and brokerage agency to work with development partners and countries for setting a minimum standard of EMIS, coverage of EMIS questionnaire and indicators, and data keeping format for schools;
- Conduct a UIS-DQAF where EMIS are at "satisfactory" and "good" levels.

Action points for development partners

- Coordination among development partners is essential for developing/updating EMIS to avoid fragmented and uncoordinated interventions in a country;
- Coordinate with the UIS for a standardized EMIS questionnaire and the minimum features of EMIS software;
- Get government commitments to make EMIS functional by allocating adequate financial and human resources before developing/updating EMIS;
- Increase investment in enhancing human resource capacity on EMIS questionnaire design, data production, indicator calculation, disaggregation of data, dealing with missing data, data presentation, analysis and use etc. by using resources available within the UIS as much as possible;
- Invest resources to integrate EMIS systems, migrating old data to new EMIS systems;
- Map EMIS activities supported by development partners and country.

Annex I: Survey and summary of data collected

EMIS Metadata Survey

Respondent information

Country:	

1. Please provide information on the person(s) responsible for completing this questionnaire.

Contact 1: Person in charge of completing the questionnaire:

Full name:	
Organization:	
Organization unit:	
Function:	
Email address:	
Phone number:	
Fax number:	

Contact 2: Head of the organization (if different from Contact 1):

Full name:	
Organization:	
Organization unit:	
Function:	
Email address:	
Phone number:	
Fax number:	

I. Data management platform

I.1. At what unit level do you record data in your EMIS database system? Please, select Yes or No in the appropriate cells

Educational institution (School)	Teacher	Student

I.2. What data management platform do you use for data collection from schools ?

Own developed software? Provide name in the cell below	StatEduc	OpenEMIS	Other, inherited from a partnership/project

I.3. How is data collected from schools?

Paper	Spreadsheet	Online interface	Offline (using software)

II. School data

II.1. Do you record the geographical coordinates for each school in your database?

II.2. School unique ID is generated to collect data from schools ? Please fill the table below with a Y/N answer

School ownership	ECD Center	Primary	Secondary general education	Secondary Technical and vocational education
Public				
Private				

II.3. Is it the responsibility of the department in charge of EMIS to generate and revise the school ID?

II.4. All departments of the Ministry of Education is using unique school ID for their operation (work)?

II.5. Is it possible to retrieve data by using school ID over the last five years

School ownership	ECD Center	Primary	Secondary general education	Secondary Technical and vocational education
Public				
Private				

III. Student's metadata

III.1. Do you record data at the student level in your system? Y/N

III.1.1. If No, does the government have a plan to collect student level data in the future?

III.1.2. If Yes, please respond by Y/N to the following questions:	Please select from the list, it can be more than one option	Comments
The student ID is generated for its management purposes (other than data collection) only		
The student ID is generated to collect data from schools only		
The student ID is generated by the Ministry and it is mandatory to all the departments/units to use the same in their operations		
The student ID is generated by a Government body outside the education sector *(Civil registry, National identification Center, Social insurance number, etc.)*, which can be linked with other databases e. g. health, direct cash transfer, nutrition etc.		
Is it possible to retrieve data by using student ID over the last five years		
The current student ID allows the monitoring individual students in the national education system ?		

IV. Teacher's metadata

IV.1. Do you record data on individual teacher ? Y/N

IV.2. If No, does the government have a plan to do it in the near future?

IV.3. If Yes, please respond by Y/N to the following questions	Public schools	Private schools
The teacher ID is generated to collect data from schools only		
The teacher ID recorded in the system are used within MOE databases		
The teacher ID recorded in the system are used outside MOE databases		

V. Partnership and EMIS quality assessment

If your Ministry is currently receiving / received an external partner' support to produce education data and conducting EMIS assessment, please complete the table below.

Name of the partner (if there are more than one partner list them all)		Which EMIS quality assessment?, if done	Nature of support		Project completed year		Levels of education covered
EMIS (database)	EMIS quality assessment		EMIS (database)	EMIS quality assessment	EMIS (database)	EMIS quality assessment	
				Select from the list			

Summary of data collected

Table 1: Response Rate of EMIS Typology Questionnaire by region

Regions	Number of countries in the region	Response of questionnaire by countries	% of countries (Response to questionnaire)
Sub-Saharan Africa	47	32	68.1
Arab States	20	13	65.0
South and West Asia	9	9	100.0
Central Asia	9	3	33.3
East Asia	17	6	35.3
Pacific	15	8	53.3
Latin America and Caribbean	37	24	64.9
Central and Eastern Europe	21	8	38.1
Total	175	103	58.9

Source: EMIS typology survey, UIS, 2020

Table 2: Data Management Platform by Region (% of countries)

Regions	Own developed	StatEduc	Ed Assist	OpenEMIS	Others (e.g. Excel)
Sub-Saharan Africa	62.5	46.9	6.3	6.3	0.0
Arab States	84.6	7.7	0.0	15.4	7.7
South and West Asia	77.8	0.0	0.0	22.2	0.0
Central Asia	100.0	0.0	0.0	33.3	0.0
East Asia	100.0	0.0	0.0	0.0	0.0
Pacific	87.5	0.0	0.0	12.5	25.0
Latin America and Caribbean	83.3	8.3	0.0	20.8	8.3
Central and Eastern Europe	100.0	12.5	0.0	0.0	0.0
Average	79.6	18.4	1.9	12.6	4.9

Source: EMIS typology survey, UIS, 2020

Table 3: Mode of Data Collection

Regions	Paper	Standalone electronic mode	Online interface
Sub-Saharan Africa	81.3	31.3	18.8
Arab States	38.5	30.8	46.2
South and West Asia	33.3	22.2	77.8
Central Asia	33.3	33.3	66.7
East Asia	66.7	66.7	66.7
Pacific	75.0	75.0	25.0
Latin America and Caribbean	41.7	37.5	70.8
Central and Eastern Europe	0.0	12.5	100.0
Average	53.4	35.9	50.5

Source: EMIS typology survey, UIS, 2020

Table 4: School-Level Data Recording by Region

Regions	Unit of data collection at the school level (% of the country)
Sub-Saharan Africa	100.0
Arab States	100.0
South and West Asia	100.0
Central Asia	100.0
East Asia	100.0
Pacific	100.0
Latin America and Caribbean	100.0
Central and Eastern Europe	100.0
Average	100.0

Source: EMIS typology survey, UIS, 2020

Table 5: Recording of School-Level Data Using Unique School ID by Level of Education and Management of School (% of countries)

Regions	ECD		Primary		Secondary (General)		Secondary (TVET)	
	Public	Private	Public	Private	Public	Private	Public	Private
Sub-Saharan Africa	68.8	71.9	87.5	87.5	93.8	93.8	71.9	71.9
Arab States	84.6	84.6	100.0	100.0	100.0	100.0	84.6	76.9
South and West Asia	66.7	66.7	100.0	100.0	100.0	100.0	77.8	66.7
Central Asia	66.7	66.7	100.0	66.7	100.0	66.7	66.7	66.7
East Asia	100.0	100.0	100.0	100.0	100.0	100.0	66.7	66.7
Pacific	75.0	50.0	75.0	62.5	75.0	62.5	62.5	25.0
Latin America and Caribbean	62.5	54.2	87.5	75.0	91.7	75.0	62.5	58.3
Central and Eastern Europe	75.0	75.0	87.5	87.5	87.5	87.5	87.5	87.5
Average	71.8	68.9	90.3	85.4	93.2	87.4	71.8	66.0

Source: EMIS typology survey, UIS, 2020

Table 6: Recording of Student-Level Data and Future Plan to Collect it by Region (% of countries)

Regions	Recording of student data	Future plan of recording student ID
Sub-Saharan Africa	21.9	53.1
Arab States	53.8	46.2
South and West Asia	66.7	33.3
Central Asia	100.0	0.0
East Asia	66.7	33.3
Pacific	62.5	12.5
Latin America and Caribbean	79.2	16.7
Central and Eastern Europe	62.5	25.0
Average	54.4	34.0

Source: EMIS typology survey, UIS, 2020

Table 7: Retrieval of 5-Years of Student-Level Data by Region (% of countries)

Regions	Retrieving 5 years of data based on IDs
Sub-Saharan Africa	
Arab States	53.8
South and West Asia	44.4
Central Asia	33.3
East Asia	66.7
Pacific	50.0
Latin America and Caribbean	58.3
Central and Eastern Europe	50.0
Average	53.5

Source: EMIS typology survey, UIS, 2020

Table 8: Recording and Planning of Teacher-Level Data by Region (% of countries)

Regions	Recording of teacher ID	Future plan to collect teacher ID
Sub-Saharan Africa	53.1	34.4
Arab States	84.6	30.8
South and West Asia	88.9	11.1
Central Asia	100.0	0.0
East Asia	66.7	33.3
Pacific	100.0	0.0
Latin America and Caribbean	70.8	12.5
Central and Eastern Europe	75.0	12.5
Average	71.8	21.4

Source: EMIS typology survey, UIS, 2020

Table 9: Purpose and Use of Teacher ID by Management of School and Region

(% of countries)

Regions	Data collection from schools			Teacher ID are used within MOE databases			Teacher ID are used outside MOE databases		
	Public	Private	Both	Public	Private	Both	Public	Private	Both
Sub-Saharan Africa	28.1	28.1	21.9	43.8	28.1	28.1	25.0	15.6	15.6
Arab States	46.2	30.8	30.8	61.5	30.8	30.8	46.2	30.8	30.8
South and West Asia	88.9	66.7	66.7	77.8	44.4	44.4	44.4	33.3	33.3
Central Asia	33.3	33.3	33.3	100.0	66.7	66.7	33.3	0.0	0.0
East Asia	83.3	83.3	83.3	83.3	66.7	66.7	33.3	33.3	33.3
Pacific	75.0	62.5	50.0	75.0	50.0	50.0	0.0	0.0	0.0
Latin America and Caribbean	58.3	25.0	25.0	45.8	20.8	20.8	20.8	8.3	8.3
Central and Eastern Europe	50.0	50.0	50.0	37.5	37.5	37.5	12.5	12.5	12.5
Average	51.5	38.8	35.9	55.3	34.0	34.0	26.2	16.5	16.5

Source: EMIS typology survey, UIS, 2020

Table 10: Type of Support Provided by Development Partners by Region (% of countries)

Regions	Types of support		
	Technical	Financial	Both
Sub-Saharan Africa	21.9	46.9	78.1
Arab States	30.8	23.1	7.7
South Asia	0.0	0.0	55.6
Central Asia	0.0	0.0	0.0
East Asia	0.0	50.0	66.7
Pacific	25.0	0.0	25.0
Latin America and Caribbean	4.2	0.0	0.0
Central and Eastern Europe	0.0	12.5	25.0

Source: EMIS typology survey, UIS, 2020

Table 11: Type of EMIS Quality Assessment by Region (% of countries)

Regions	Type of EMIS assessment		
	UIS-DQAF	ADEA-Peer Review	World Bank- SABER
Arab States	7.7	0.0	7.7
South and West Asia	33.3	0.0	11.1
Central Asia	0.0	0.0	0.0
East Asia	33.3	0.0	0.0
Pacific	0.0	0.0	12.5
Latin America and Caribbean	4.2	0.0	0.0
Central and Eastern Europe	0.0	0.0	12.5
Average	28.2	9.7	3.9

Source: EMIS typology survey, UIS, 2020

Table 12: Retrieval of Five Years of School Data by Using School ID by Region, Level and Management of School

(% of countries)

Regions	ECD		Primary		Secondary (General)		Secondary (TVET)		All	
	Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
Sub-Saharan Africa	62.5	68.8	90.6	90.6	90.6	90.6	65.6	65.6	50.0	53.1
Arab States	76.9	69.2	100.0	92.3	100.0	92.3	84.6	84.6	76.9	69.2
South and West Asia	55.6	44.4	100.0	77.8	100.0	88.9	77.8	66.7	33.3	22.2
Central Asia	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
East Asia	83.3	83.3	100.0	83.3	100.0	83.3	66.7	50.0	50.0	50.0
Pacific	62.5	37.5	75.0	62.5	75.0	62.5	62.5	37.5	50.0	25.0
Latin America and Caribbean	50.0	45.8	66.7	62.5	70.8	62.5	62.5	58.3	45.8	41.7
Central and Eastern Europe	75.0	75.0	87.5	87.5	87.5	87.5	75.0	75.0	75.0	75.0
Average	62.1	59.2	84.5	78.6	85.4	79.6	68.0	63.1	52.4	48.5

Source: EMIS typology survey, UIS, 2020

Table 13: Generating School ID and Use of ID within MOE by Region (% of countries)

Regions	MOE is responsible to generate ID	Use of school ID by all dept. of MOE
Sub-Saharan Africa	90.6	65.6
Arab States	84.6	84.6
South and West Asia	88.9	88.9
Central Asia	33.3	33.3
East Asia	100.0	100.0
Pacific	62.5	50.0
Latin America and Caribbean	70.8	54.2
Central and Eastern Europe	50.0	62.5
Average	78.6	67.0

Source: EMIS typology survey, UIS, 2020

Table 14: Collection of Geographical Coordinates by Region (% of countries)

Regions	Geographical coordinates
Sub-Saharan Africa	65.6
Arab States	76.9
South and West Asia	88.9
Central Asia	66.7
East Asia	83.3
Pacific	50.0
Latin America and Caribbean	66.7
Central and Eastern Europe	87.5
Average	70.9

Source: EMIS typology survey, UIS, 2020

Table 15: Generation of Student ID by Region (% of countries)

Regions	ID generated outside MOE, e.g. National ID (among student ID countries)	ID generated outside MOE, e.g. National ID (among student ID countries)
Sub-Saharan Africa	57.1	42.9
Arab States	28.6	71.4
South and West Asia	66.7	33.3
Central Asia	66.7	33.3
East Asia	75.0	25.0
Pacific	80.0	0.0
Latin America and Caribbean	52.6	42.1
Central and Eastern Europe	0.0	40.0
Average	51.8	39.3

Source: EMIS typology survey, UIS, 2020

Table 16: Purpose of Using Student ID by Region (% of Countries)

Regions	Management	Data collection
Sub-Saharan Africa	15.6	15.6
Arab States	38.5	30.8
South and West Asia	66.7	66.7
Central Asia	33.3	66.7
East Asia	50.0	66.7
Pacific	50.0	62.5
Latin America and Caribbean	45.8	70.8
Central and Eastern Europe	25.0	50.0
Average	35.9	40.8

Source: EMIS typology survey, UIS, 2020

Table 17: Involvement of Development Partners by Development and Region

(% of countries)

Regions	Sub-Saharan Africa	Arab States	South Asia	Central Asia	East Asia	Pacific	Latin America and Caribbean	Central and Eastern Europe
UNICEF	50.0	0.0	33.3	0.0	33.3	0.0	0.0	0.0
World Bank	15.6	0.0	11.1	0.0	0.0	0.0	0.0	37.5
DFAT	0.0	0.0	0.0	0.0	16.7	25.0	0.0	0.0
ADB	0.0	0.0	0.0	0.0	33.3	12.5	0.0	0.0
USAID	6.3	0.0	11.1	0.0	0.0	0.0	0.0	0.0
UNESCO	18.8	23.1	0.0	0.0	16.7	0.0	4.2	0.0
WFP	3.1	7.7	11.1	0.0	16.7	0.0	0.0	0.0
GPE	18.8	7.7	0.0	0.0	0.0	0.0	0.0	0.0

Source: EMIS typology survey, UIS, 2020

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