ADMINISTRATIVE DATA

CHALLENGES AND SOLUTIONS FORWARD

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INTRODUCTION

Administrative data provide the bulk of internationally comparable education statistics, which are used to fulfil countries' international reporting responsibilities related to global or regional education agendas and to inform the international community on other policy-relevant issues. More than 50% of the SDG 4 indicators can be reported through administrative data sources.

After a brief overview of the main data collection and reporting tools, this paper explains the reasons behind the challenges of data collection and reporting, discusses potential solutions and proposes a forward-looking agenda to implement in the coming years.

THE USE OF ADMINISTRATIVE SOURCES IN COMPARABLE EDUCATION STATISTICS

In the routine discharge of their administrative or regulatory duties, line ministries (e.g. ministries of education and health) and other national authorities collect administrative data. Administrative data are thus a by-product of administrative processes. Although not always designed for statistical purposes, these data are potentially a rich source of information for producing statistics. Typically, education statistics collected through administrative systems are run under an annual school census that collects aggregated data from schools on education provision (learners, programmes) and inputs (teachers, facilities, finance).[1]

Education Management Information Systems (EMIS) play the biggest role in data generation from administrative data sources for SDG 4 monitoring. They are also the systems government and authorities have been using for the day-to-day operation and management of education systems and education delivery. This paper uses the term 'EMIS' in the context of collecting data from schools for educational statistical purposes to produce education indicators (**Figure 1**).

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[1] UIS (2017). Ed-Data Quality Assessment Framework (Ed-DQAF) to evaluate administrative routine data systems: Manual for the conduct of an evaluation by a national technical team https://uis.unesco.org/sites/default/files/documents/training-workshop-manual-data-quality-assessment-framework-2017-en_0.pdf

The UIS has been collecting and compiling education administrative data and statistics from Member States through its annual data collection, complemented by other sources, for producing:

- indicators required to monitor SDG 4 at national, regional and global level; and
- key comparable education statistics that Member States, international organizations, academia development partners, and others need to analyse and monitor education system development.

The UIS formal survey collects data from administrative sources from Member States through four tools (**Table 1**). The survey collects internationally comparable data on key aspects of education systems, including education structure and characteristics, access, participation, progression and graduation, school resources and the associated human and financial resources dedicated to them.

The UIS ensures the quality of submitted data by the Member States by utilizing various tools and approaches including requesting clarifications from Member States when the calculated indicators are out of trend and validation to agree to publish indicators within a stipulated timeframe.

Figure 1: Administrative data that could inform education
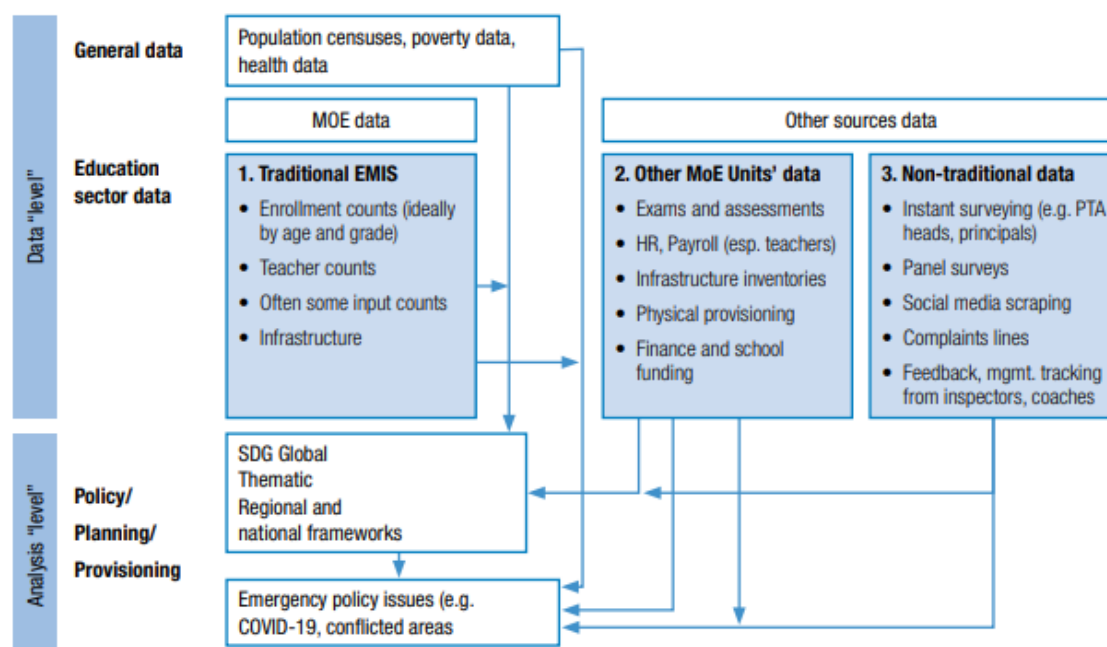
Source: UNESCO Institute for Statistics adapted from UIS and GPE (2020).

Note: PTA = parent-teacher association

Table 1: UIS tools for collecting administrative data for international comparison on education

Tools	Contents
UIS/ED/ISC11	National education systems: Mapping of education programmes based on the ISCED 2011 classification system to make data internationally comparable
UIS/ED/A: Students and Teachers (ISCED 0–4)	Formal education: school, student, teacher and other infrastructure covering all types of institutions from pre-primary to post-secondary non-tertiary education.
UIS/ED/B: Educational Expenditure (ISCED 0–8)	International comparability of education expenditure data covering public and private expenditure (though coverage of private expenditure is extremely low) for all levels of education focusing on formal education by level of education.
UIS/ED/C: Students and Teachers (ISCED 5–8)	Formal tertiary education systems covering all types of institutions within the national borders of the responding country. It includes enrolment and graduation by faculty of education, e.g. science, technology, engineering and mathematics (STEM).

Notes: Teacher and expenditure issues are discussed in separate papers. ISCED: International Standard Classification of Education.

CHALLENGES IN COMPILING AND PRODUCING INTERNATIONALLY COMPARABLE DATA

International education statistics production is a complex technical and political process that involves different actors. The following challenges affect the international comparability of education data.

Quantity of data: Country does not report data

Any country's capacity to respond to the UIS questionnaire totally relies on data availability at the national level. Sometimes countries are not collecting the required data for the UIS questionnaire, but this is not the only reason of non-response. Sometimes a country is collecting the required data but not responding to the UIS questionnaire because:

- school response rates are low;
- available tools are insufficiently adapted to report quality data internationally;
- specific expertise is required to:
    - aggregate subnational data at the national level;
    - convert data collected using national standards into international standards.

Quality of data: Country reports data but they do not meet the standards

Sometimes, countries do submit the data, but the UIS does not produce or publish the data because they do not meet standards. For instance, a country may have identified an education programme on general programmes and technical vocational programmes at the secondary level, but the data are provided only for general education without data for vocational education. This could lead to the calculation of unreliable enrolment data and indicators, such as enrolment ratios for secondary and numbers and rates of out-of-school children.

Apart from these technical issues, UIS data production also depends on negotiations and communication between countries and the UIS. The UIS sends data reports to the Member States highlighting key issues. The UIS seeks clarification from countries if the data show any abnormalities. If the country responses are not satisfactory or not justifiable, the UIS will not use the data and indicators. Occasionally a country does not want some data to be published in the

hope of providing better data or the country does not agree with the value of the indicator produced by the UIS. In summary, the key reasons for the UIS not publishing data reported by countries are:

- Countries do not follow global indicator definitions.
- Countries do not follow standard global frameworks, e.g. ISCED.
- Countries do not report all data needed to estimate the indicator (e.g. data split by age, sex, level of education, entry age in and duration of a given level of education).
- Lack of clarity or disagreement on the population data to used (national or UN Population Division).
- Countries do not agree with the value of the indicators produced by the UIS.

Quality of analysis: Standards and data availability

Comparable data and indicators contribute to policy debate at the international level and facilitate decision making when they are relevant. The comparability of data and indicators across countries relies on compliance to predefined quality standards, including mapping to the ISCED and adherence to internationally agreed concepts and definitions.

The quality of analysis is also affected by the availability of data. Currently, all SDG 4 indicators are conceptually clear, have an internationally established methodology[2] and the standards are available. While data are regularly produced in many of the countries and SDG regions for most indicators, data are still not regularly produced for a few indicators, for example, global indicator 4.c.1, the proportion of teachers with the minimum required qualifications, by education level. Regional and global average estimation methodology is also being further refined to consider the impact of COVID-19, which has challenged imputation methods that were typically based on historical trends.

Biases introduced by different data sources

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[2] All metadata files with methodological details for all SDG 4 indicators are available at: https://tcg.uis.unesco.org/methodological-toolkit/metadata/.

For 'ratio' indicators, such as enrolment and out-of-school rates:

● The numerator is enrolment, whose source is the country.

● The denominator is population, whose default source for the UIS is the World Population Prospects of the UN Population Division, which uses common criteria and methodologies.

The values of these indicators calculated by the UIS may therefore differ from those calculated by countries, which use national population data. A similar situation arises with financial indicators when International Monetary Fund expenditure and World Bank Gross Domestic Product estimates are used as denominators instead of national data. Sourcing both numerator and denominator data from the country for calculating these 'ratio' indicators is expected to result in indicator values that are better owned and endorsed by the countries.

DEVELOPMENTS AND CHALLENGES

To improve international data submission and reporting, the UIS, together with its partners, has been working with countries on different fronts, including building country capacity, developing more agile and efficient tools for data compilations, and developing resource materials to support countries in mapping their education programmes into the ISCED. This section describes some of these activities that the UIS has been undertaking to improve international data collection.

Implementation of UIS dynamic template

Many countries produce education data and publish them through an annual digest or statistical yearbook. Often, various data sources at the national level cover different education types (e.g. general, technical, vocational etc.). To produce meaningful data and to calculate indicators, such data should be compiled. However, the lack of appropriate tools and capacity is one of the reasons why countries are hampered in compiling various data and using them for policymaking and planning.

The UIS dynamic template helps countries to compile national education data from different sources into relevant education levels and categories following international classifications and

to generate the most relevant indicators. One of the main objectives of introducing the tool is to reduce the burden on Member States of long questionnaires. The tool produces international comparable indicators immediately after entering data into the template and provides historical data and indicators for each country. The template collects data on total school, student and teacher data and on government expenditure data.

The new UIS template has proven to be an effective **national education data compilation tool** from various data sources into one single place. The template also helps countries to understand in a transparent manner how the indicators are calculated following the international methodologies. Therefore, it has also become a **capacity-development tool** for countries which encompasses all the processes as well as methodologies, metadata and data definitions to produce data and indicators. Countries can use the template to easily transfer national data into international data and indicators and can use them for national policy and monitoring discussions.

The template immediately producing comparable indicators facilitates the country's verification process while entering the data and at the same time empowers the UIS to dialogue with countries on data gaps, methodological harmonization and increasing coverage data produced by different ministries and departments. All these processes can take place simultaneously when using the template.

Unlike UIS annual questionnaires, which collect data for one year only and do not include the indicators, the dynamic template collects data for multiple years, e.g. from 2010 onwards, and produces indicators alongside the data entry. The template also serves as a useful tool to fill data gaps from past years, which has increased reporting efficiency and time series data coverage (**Table 2**).

Table 2: UIS dynamic template for collecting administrative and education finance data

Tools	Education levels	Data types	Indicators produced	Years	Metadata embedded

SDG 4 template	ISCED 0–8	Total student enrolment, repetition by age, grade, level Total teachers by training, qualification, new recruitment, by level and sex Total schools by facilities, by levels and types	14 SDG 4 indicators by level and sex; 7 other policy relevant indicators	2010 to latest year	ISCED mapping, metadata, formula and data definition, population
Education expenditure	ISCED 0–8	Government education expenditure by level of education	2 SDG 4 indicators by level	2010 to latest year	Metadata, formula and data definition

The ISCED classification, calculation formula, metadata and definitions are all embedded in the template and, when data are inputted into the template, the indicators are automatically calculated. More than 40 countries have used the template to report data to the UIS in 2023, among which, 28 countries are in Asia and the Pacific and 12 are in sub-Saharan Africa. The use of the template has greatly improved filling in historical data gaps and has made the data collection and validation process more efficient. Countries reported that the template helped:

- produce standardized indicators for the national statistical yearbook and for reporting to the UIS at the same time;
- lessen the gap between internationally produced and national produced indicators;
- focus on the use of indicators to monitor national and international commitments;
- communicate with policymakers; and
- standardize the subnational data collection and indicators and use compile at the national level, which was considered helpful, especially for federal countries, where it is mainly subnational governments that are responsible for education.

Implementation of a new population data policy

In 2023, the UIS introduced an important change to its population data policy. As of its September 2023 release, the UIS has started the implementation of a hybrid population data policy endorsed by the Technical Cooperation Group (TCG) on SDG 4 indicators.[3] Under this new policy, countries can request that the UIS use their national population data for the calculation of their population-based indicators in place of the *World Population Prospects* estimates from the UN Population Division (UNPD), which was previously the main source of population data used by the UIS. As the policy states:

> This marks a change from previous UIS policy whereby exceptions from the use of UNPD estimates were only made on special request and only for a limited number of countries.
>
> Use of national population data increases national ownership over education statistics disseminated by the UIS. Compared to estimates from international population models, national population data have greater accuracy in some cases. National population estimates may be based on improved model specifications and incorporate relevant and up-to-date information that is not available to the UNPD team, or which cannot be incorporated in a global population estimates model. On the other hand, countries lacking statistical capacities may not produce or update data regularly or use less appropriate model assumptions.[4]

The new policy outlines data requirements and presents guidelines to facilitate the reporting of national population data. The data requirements are:

- A complete time series from 2000 to 2023
- A complete sex- and age-disaggregated data for the 0–99 age population
- Data are compiled and disseminated by recognized international organizations or are publicly available.

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[3] UIS (2023). Technical Cooperation Group 9th meeting: Post-meeting consultation results. https://tcg.uis.unesco.org/wp-content/uploads/sites/4/2023/03/TCG9_Consultation-Results_Report_2023.03_FINAL.pdf.

[4] UIS (2022). National population data: Criteria for use in UIS indicator calculation https://tcg.uis.unesco.org/wp-content/uploads/sites/4/2022/11/2_WG_EMIS_3_UIS_Population_Data_Note.pdf.

Data should also have adequate population coverage and be representative of the underlying population to the extent possible. Substantive population subgroups or internationally recognized geographic regions should not be excluded. Estimates or counts where more than 5% of the total population is excluded are not eligible for use in calculations.

The implementation of the new UIS policy on population data began in April 2023 with a UIS invitation letter sent to all Member States, informing them about the policy and inviting those interested to use the DEM questionnaire to provide their national population data and metadata for the years 2000 onwards. The UIS September 2023 data release reflects data submitted by the countries which previously made a request to the UIS to use their national population data, and with countries for which the coverage of UNPD population data is different from the coverage of their national education data. The implementation of the policy will be gradually expanded to other interested countries in future UIS data releases.

Developing country capacity for better administrative data

Quality education data production at the international level depends on national capacities in producing quality data. Countries should have enough capacity to produce timely, accurate and relevant data for monitoring national policies and SDG 4 at the national level. As well as generating data, countries also need capacity in analysing data and using them for policymaking and planning. The UIS continuously collaborates with various regional partners in building country capacities in education data and statistics. These are the minimum conditions for an EMIS to be relevant and meaningful for national education policy development, planning and monitoring.

Different countries might have developed and implemented various types of EMIS such as aggregate or individual student data collection systems. Whichever EMIS type is being implemented in the country, one of its key aspects should be the capacity to produce quality data and statistics and high-level education indicators for monitoring, decision making and

planning at the national and subnational levels and for the data to be relevant for improving learning at the school level.

The following considerations can be used for development of an EMIS:

- Coverage: Do the data in the EMIS have full coverage to understand the education system in the country, including public and private schools, all levels and types of education provided by all ministries and departments, national and local governments, and religious organizations? The EMIS should link relevant databases within and across education ministries, bridging gaps between the local, regional and national level as well as identifying and addressing inconsistencies.
- Scope: Can EMIS data collection encompass formal and non-formal education?
- Alignment of annual school census forms: Are all variables[5] needed to produce data and indicators for monitoring the national education system and priorities, as well as regional and international education frameworks, including policy-relevant indicators and SDG 4 indicators, reflected in the data collection tools?
- Compliance with standards: Are data produced using concepts, definitions and methodologies that are compatible with international standards? Are relevant and agreed metadata developed and collected to facilitate understanding and interpretation of the data and indicators produced?
- Flexibility: Is the EMIS platform designed to adjust easily to future data needs?

If there are positive answers to these questions, countries should eventually be able to produce the required data and be able to submit international data for regional and global monitoring. The UIS has been working to support country capacity to produce administrative data:

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[5] Including school facilities, students, teachers, finance, teaching and learning materials, learning achievement and outcomes, curriculum-related activities, school and community interactions.

Development of resource guides and manuals: The UIS has developed resources that provide detailed guides for designing instruments and for managing and reporting data to help countries improve their Education Management Information Systems.[6, 7]

Mapping country education data systems (EMIS data collection tools): The UIS has developed a new tool (LASER) to map countries' education data ecosystems. This new tool looks holistically at the frequency, quality and coverage of the variables needed to produce the indicators as well as various dimensions of education inequality. This new tool includes a mapping of national data collection tools and is important for helping better understand where data gaps exist, and ultimately identify the technical support most needed by Member States for data production. This tool also aims to strengthen national capacities to produce data, understand data needs and support data use.

AGENDA FORWARD

A national EMIS plays a critical role in monitoring SDG 4. Several policy levers have been suggested to further strengthen reporting of EMIS-based data and indicators at the national, regional and global level.

Addressing quantity constraints

- Expand the use of the UIS dynamic template to more countries. Provide technical support to countries when they need to customize the template to include more data and indicators for their national use without hampering international reporting.

Addressing quality constraints

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[6] UIS (2020). Operational guide to using EMIS to monitor SDG 4 https://uis.unesco.org/sites/default/files/documents/operational_guide_to_using_emis.pdf

[7] UIS (2020). Efficiency and effectiveness in choosing and using an EMIS: Guidelines for data management and functionality in Education Management Information Systems (EMIS) https://emis.uis.unesco.org/wp-content/uploads/sites/5/2020/09/EMIS-Buyers-Guide-EN-fin-WEB.pdf

- Develop a maturity model of EMIS to assess and guide countries to move to advanced systems.

Addressing quality of analysis constraints

- Develop collaboratively standard items and formats with all the variables needed to estimate SDG 4 indicators.