ADMINISTRATIVE EDUCATION DATA:
WHAT ARE THE CHALLENGES GOING FORWARD?

DRAFT

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1. Purpose of the paper

Administrative data provide the bulk of internationally comparable education statistics, which are used both to fulfil countries' international reporting responsibilities (related to global or regional education agendas) as well as 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 (UIS, 2022) to monitor progress in SDG4 at global, regional, and national level.

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.

2. Understanding education administrative data and its use in production of comparable education data and indicators

In the routine discharge of their administrative or regulatory duties, line ministries (e.g., Ministry of Education, Ministry of Health, etc.) or other authorities in a country, collect administrative data. Administrative data are thus a by-product of the administrative process and although not always designed for statistical purposes, these data are potentially a rich source of information for producing statistics. Typically, and in most developing countries, education statistics collected through administrative systems are run under an "annual school census" that collects aggregated data from schools essentially on the education provision (learners, programs) and inputs (teachers, facilities, finance -UIS, 2017). [1]

An Education Management Information System (EMIS) plays the biggest role in data generation from administrative data sources for the SDG4 monitoring as well as it is the system the government and authorities have been using for the day-to-day operation and management of education system and its delivery. The paper is using the term EMIS in the context of collecting data from schools for educational statistical purposes to produce education indicators.
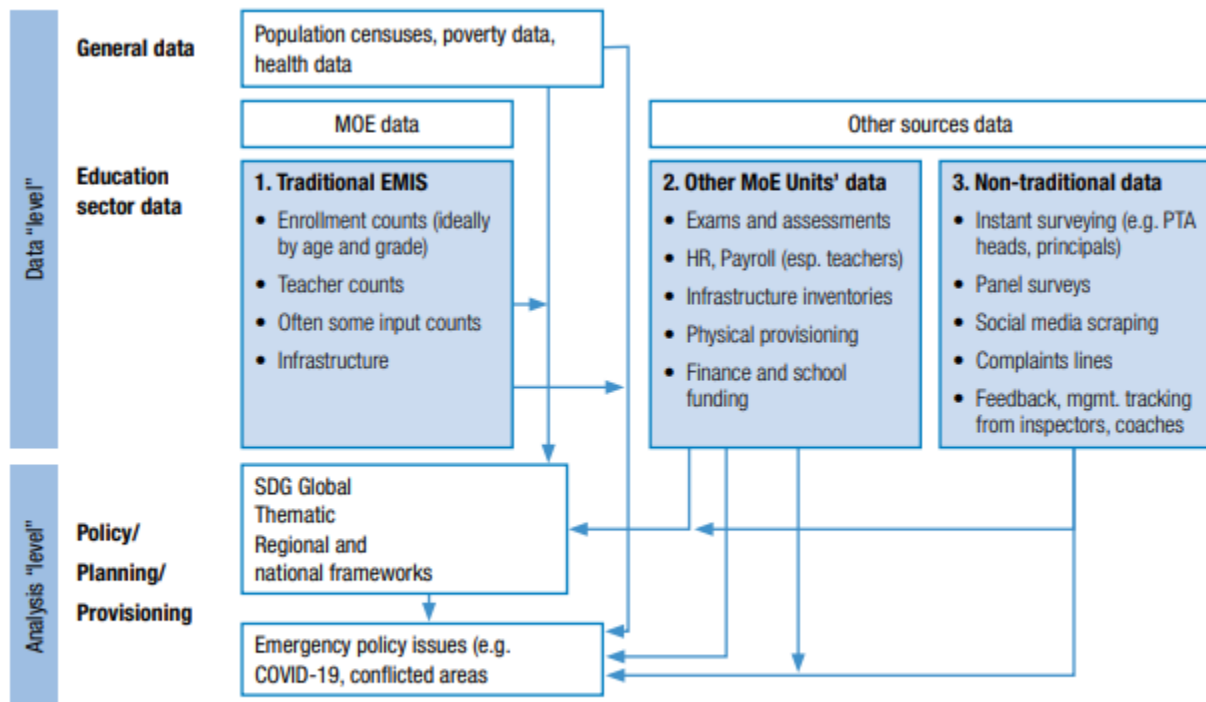
Figure 1 shows a comprehensive vision of administrative data and its cycle based on the UNESCO Institute for Statistics (UIS) companion publications [2].

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[1] UIS (2017). Ed-Data Quality Assessment Framework (Ed-DQAF) To Evaluate Administrative Routine Data Systems: Training Workshop Manual April 2017

[2] 'Operational guide to using EMIS to monitor SDG4' and 'Efficiency and Effectiveness in Choosing and Using an EMIS' both published by the UIS in 2020.

Figure 1: Administrative data that could inform education

The UIS has been collecting and compiling education administrative data and statistics from member States through its annual data collection and using other sources for producing:

- Indicators required to monitor SDG4-Education 2030 Agenda at the national, regional and global levels;
- Key cross-country comparable education statistics needed by Member States, international organizations, development partners, academia and others to analyze and monitor development of education systems.

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, such as: education structure and characteristics, access, participation, progression and graduation, school resources, as well as 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 calculated indicators are out of trend and validation to agree to publish indicators within stipulated timeframe.

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 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 covering 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 (though coverage of private expenditure is extremely low) for all levels of education focussing on formal education by level of education.
UIS/ED/C: Students and Teachers (ISCED 5-8)	Formal tertiary education system covering all types of institutions within the national borders of the responding country. It includes enrolment, graduation by faculty of education, e. g. STEM

*Note: Teacher and expenditure issues are discussed in separate papers

3. Key Challenges in compiling and producing Internationally comparable data

International education Statistics production is a complex process which includes technical as well as political processes and involve different actors thus encounters various challenges. The following challenges affect internationally comparable education data:

A. Quantity of data: Country does not report data

Any countries' capacity to respond to the UIS questionnaire totally rely on availability of the data at national level. Countries collects data based on the relevance to their policies. It is important that countries include all the variables that is required to produce indicators and information are included in the UIS questionnaire to ensure that the data are available for national and international reporting. Non-collection is not the only reason for non-response. Sometime the country do collect data or it is in their data collection tools. However due to lack of low response rate from schools or lack of clarity of the data need to be provided, collected data could not be used. Following are the key reasons for countries not responding to the certain international data and indicators:

- Country is not collecting required data for responding UIS questionnaire.
- Country is collecting required data but reporting to UIS questionnaire because it implies extra burden and requires specific expertise, for example:
  - Aggregating sub-national data into national figures;
  - Converting data collected using national standards into international standards;
  - Available tools are insufficiently adapted for reporting of quality data internationally.

B. Quality of data: Country reports data but these do not meet standards

Sometime countries do submit the data, but the UIS doesn't produce/publish the data as the submitted data does not meet the data standards. For instance, country has clearly identified education program on general programs and technical vocational programs in the country for secondary level, but data is

provided only for general education without data for vocational education. This led to calculation of unreliable enrollment data and indicators, such as enrollment 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 country and UIS. UIS sends data reports to the Member States highlighting key issues including seeking for clarification from the countries if the data shows any kind of abnormalities. If the country responses are not satisfactory or not justifiable data and indicators are suppressed. Sometime, simply country does not want some of the data to be published as they think they could provide better data or just do not agree with the value of the indicator produced by the UIS. In summary, the following are the key reasons for not publishing data reported by countries.
- o Countries do not follow global indicator definitions.
- o Countries do not follow standard global frameworks, e.g. ISCED
- o Country does 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 preventing from estimating the school-age-population for the specific level of education)
- o There is lack of clarity or disagreement on the standard/data to be used, e.g. population data (national or UNPD).
- o Country does not agree with the value of the indicators produced by the UIS.

C. Quality of analysis: non-compliance with standards, low data availability, data aggregates.

Comparable data and indicators contribute to policy debate at the international level and facilitate the decision making when they are relevant. Comparability of data and indicators across country relies on compliance to predefined quality standards, including mapping to the International Standard Classification of Education (ISCED) and the 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 internationally established methodology[3] and standards available. While, for most indicators, data are regularly produced in many of the countries and SDG regions, data are still not regularly produced for a few indicators, for example the global indicator 4.c.1, proportion of teachers with the minimum required qualifications, by education level. Concerning regional and global averages estimations, the UIS methodology is being further refined, especially to consider the shock to time series data due to major events like COVID-19, which, with presumably change to data pattern, challenges many imputation methods that are usually based on historical trends.

D. Biases introduced by combining different types of data sources.

Many education indicators are calculated using population data in the denominator (e.g. enrolment rates, out-of-school rates). For calculating these population-based indicators, enrolment data used in the

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

numerator are sourced from the country unlike the denominator, which, for many countries, come from UNPD World Population Prospects, which is the default source of population data used by the UIS for calculating population-based indicators (because UNPD uses common criteria/methodologies in estimating population data for all countries). The use of different data sources for the numerator and the denominator can yield indicator values that are different from country-calculated values which are based on both enrolment and population data produced by the country.

A similar situation arises with expenditure indicators where IMF data, instead of country's total expenditure, and GDP data (from WBG) are used as denominators.

Sourcing from the country both numerator and denominator data for calculating these 'ratio' indicators is expected to result in indicator values that are better owned and endorsed by the countries.

4. Developments and challenges

To improve the international data submission and reporting, the UIS together with its partners have been working with countries in different fronts e.g., building capacities of the countries, developing more agile and efficient tools for data compilations, developing resource materials supporting countries in mapping their education programmes into international standard classification systems etc. Following section discusses some of the activities that UIS has been undertaking to improve the international data collection.

A. Implementation of UIS dynamic template

Many countries produce education data and publish them through their annual digest or statistical yearbook. Often, there are various sources of data at the national level covering different types of data such as general education, TVET and vocational education and other types of education programs. To produce data to be meaningful and to calculate indicators, such data should be compiled. However, the lack of appropriate tools and capacity is one of the reasons, countries have been facing challenges in bringing various data together and use for policy- making and planning.

The template helps to compile national education data from different sources into relevant education levels and categories following international classifications to generate the most relevant indicators. One of the main objectives to introduce the tool is to reduce the burden of the member states to fill up long questionnaire, adding value by producing international comparable indicators immediate after entering data into the template and providing historical data and indicators for each country. The SDG4 templates collects data on total school, student and teacher data not disaggregated by private and public and government expenditure not including private and other expenditure on education These new UIS template have been proven to be effective **tool in** **compiling national education data** from various data sources into one single place. The template also helps countries to understand in a very transparent manner how the indicators are calculated following the international methodologies. Therefore, it has become a **capacity development tool** for countries which encompass all the processes as well as methodologies, metadata and data definition, etc., to produce data and indicators. Countries can use the template to transfer the national data into **international data and indicators** without many resources and can use it for their national monitoring and policy discussion.

Immediately produced comparable indicators by the templates facilitate the country's verification process while entering the data in one hand and other hand it also empowers UIS to dialogue with countries on data gaps, methodological harmonization and increasing coverage data produced different ministries/departments. All these processes can take place simultaneously using the template.

Unlike UIS annual questionnaires which collects data for only one year and doesn't include the indicators, the template has included data for multiple year e.g., from 2010 and produce indicators alongside with the data entry. The template can also be a great tool to fill the data gaps in the past years in different variable which increased the capacity in reporting more efficiently and with more coverage with time series data (Table 2).

Table 2: UIS dynamic Template for collecting administrative data and education finance data and its coverage

Tools	Levels of education covered	Data types	Indicator produced	Years of data	Metadata
SDG4 Template	ISCED 0-8	Total student enrolment, repetition by age, grade, level Total teachers by training, qualification, newly recruitments, by levels and sex Total school by facilities by levels and types	14 SDG4 indicators desegregated by levels and sex+ 7 other policy relevant indicators	2010- latest year	ISCED mapping, metadata, formula and data definition, population are embedded
Education Expenditure	ISCED 0-8	Government education expenditure by level of education	2 SDG4 indicators by level of education	2010- latest year	Metadata, formula and data definition, are embedded

The ISCED classification, calculation formula, metadata and definitions all are embedded in the template and when data are inputted into the template, it calculates indicators automatically. More than 20 countries in globe have used template to report data to UIS in 2023. Among which 28 countries in Asia and Pacific, 12 in Africa. The use of the template has greatly improved in filling the historical data gaps and makes data collection and validation process efficient. Some of the key experiences that countries shared after using the templates are:
- Produced standardized indicator for national statistical yearbook and reporting to UIS at the same time;
- Lessen the gap between internationally produced and national produced indicators;
- Focused on the use of indicators to monitor national and international commitments;
- Easier to communicate with policy makers;
- Explored possibility to use at sub national level and compiling at national level to standardize the sub-national level data collection and indicators. It would be greatly helpful especially for federal countries where mainly sub-national level government is responsible for education.

B. Implementation of a new Population data policy

In 2023, the UIS has 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 in March 2023 at its post-9th meeting consultation[4]. Under this new policy[5], countries would have the possibility to 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 United Nations Population Division (UNPD), which was previously the main source of population data used by the UIS. "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."[6]

The new policy outlines the 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. Data should also have adequate population coverage and be representative of the underlying population to the extent possible. Substantive population subgroups or internationally recognised 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 was launched in April 2023 with a UIS invitation letter sent to all Member States, informing them about its new population data 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 one of their national education data. The implementation of the policy will be gradually expanded to other interested countries in future UIS data releases.

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[4] See https://tcg.uis.unesco.org/wp-content/uploads/sites/4/2023/03/TCG9_Consultation-Results_Report_2023.03_FINAL.pdf

[5] UIS 2023: "National Population Data: Criteria for use in indicator calculation for the UIS September 2023 Data Release", Technical Note. https://tcg.uis.unesco.org/wp-content/uploads/sites/4/2022/11/2_WG_EMIS_3_UIS_Population_Data_Note.pdf

[6] Ibid.

C. Developing Country Capacity in better administrative data

Quality education data production at international level depends on national capacities in producing quality data. Countries should have enough capacities in producing timely, accurate and relevant data for monitoring national policies and SDG4 at national level. Apart from generating data, countries also need capacity in analyzing and use them for policy making and planning. UIS continuously collaborate with various regional partners in building capacities of the countries in improving capacities in education data and statistics.

These are the minimum condition for the EMIS to be relevant and meaningful for the national education policy development, planning and monitoring.

Different countries might have developed and implemented various types of EMIS – aggregate data collection system, individual student data collection system and others. Whichever EMIS system is being implemented in the country, one of the key aspects of the EMIS should be to produce quality data and statistics and high-level education indicators for monitoring, decision making and planning at national and sub regional levels while the data be relevant for school and teachers for improving learning at school level.

The following conditions worth consideration for the development of an EMIS:
- Coverage: does the data in EMIS have full coverage of data needed to understand education system in the country - including public and private school, all levels and types of education provided by all the Ministries/departments, national and local governments, religious organizations in the country? EMIS should link relevant databases within and across education ministries, bridging gaps between local, regional, and national levels as well as identifying and addressing data inconsistencies.
- Scope: Can EMIS data collection encompass formal and non formal education?
- Alignment of annual school census forms: Are all variables[7] 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 SDG4 indicators, reflected in the data collection tools?
- Compliance to standards: Are data produced using concepts/definitions and methodologies that are compatibles with international standards? Are relevant/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.

Meeting these conditions, eventually, countries would also be able to produce the required data and be able to submit international data for regional and global monitoring.

The UIS has been working on the following aspects related to supporting country's capacities to produce administrative data:

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

- Mapping country's education data system (EMIS data collection tools)

The UIS has developed a new tool to map countries' education data ecosystems. This new tool looks holistically at the frequency, quality and coverage of variables needed to produce the indicators but also at various dimensions of education inequality. This new tool (LASER) is including a mapping of the national data collection tools. This represent an important tool to help better understand where data gaps exist, and ultimately inform about where technical support to Member States is needed the most in terms of data production. This tool also aims to strengthen the national capacity to produce data, understand data needs, and support data use.

- Development of resource guides and manual

The UIS has developed various guides on EMIS for countries to use in order to improve their EMIS systems. These manuals provide detailed guides for countries in designing the instruments, management and reporting of data. Some of these guides include: <u>Efficiency and Effectiveness in Choosing and Using EMIS</u> and <u>Operational Guide to Using EMIS to Monitor SDG 4</u>.

5. Agenda forward

National EMIS plays a critical role in monitoring SDG4 at national, regional and global levels. Several policy levers have been suggested for the further strengthening of reporting EMIS based data and indicators at national, regional and global level.

A. Addressing Quantity: improving international education data collection processes and approaches

- Expand the UIS dynamic template to more countries. Provide technical support to the countries when they need to customize the template to include more data and indicators for their national use without hampering international reporting.
- Apply business analytics in compiling and identifying data gaps and completing the trends when there are significant data gaps observed in time series data. However, a transparent process should be implemented in such data filling exercises.

B. Addressing quality constraints:

- Development of maturity model of EMIS to assess and guide countries to move from basic or intermediate to advanced systems.
- Mapping of data production systems in the country and data production plan.
- Forging partnership in developing and implementing EMIS capacity development program in collaborative and coordinated manner.
- Prototypes of EMIS questionnaires or forms with all the variables needed to populate SDG4 indicators and made be produced and made available for countries to adapt.
- Innovations and Information technologies should be harnessed in effective management of the EMIS strictly adhering to statistical principles and methodologies for accuracy and quality data production (e.g., schools and students ID).

C. Quality of analysis: non-compliance with standards, low data availability, data aggregates.

- Effective and efficient EMIS is a must for making education administrative data more relevant and useful for monitoring, policy making and planning at national levels and reporting the national data at the international level. In this sense, EMIS should be designed /redesigned to populate key indicators linking with national education policies and plans including SDG4.

- Carefully review the data and its relevance based on their frequency of availability and usefulness and prioritize the data and indicators for international collection.

- Develop appropriate tools and methods to support countries report international data efficiently to improve the quality of data and lessen the burden to the country.